California Air Resources Board

Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Final Statement of Reasons for Rulemaking, Including Summary of Comments and Agency Response

Attachment 1
45-Day Comments

Public Hearing Date: February 26, 2026
Agenda Item No.: 26-1-3

William Mancilla

Make government entities also have to report but make it less restrictive for them. Every organization should be held accountable for the environmental harm they pose to communities. If an organization does not want to change the way they handle their operations to make for cleaner air for their local environment, they should be penalized. We need to hold everyone accountable for their actions. State, and local government entities produce vast amounts of GHG emissions, not taking these into account would not only undermine Californias clean energy goals but also the well-being of all Californians across the state. 001.1

Republic Services (Tony Fritz)

Pages 5 & 6 of the regulatory text outline the payment and collection processes, stating that the Executive Officer will provide written fee determination notice on or by September 10th each year, that payment is due within 60 days, and that late payments are subject to fees and penalties assessed where each day represents a separate offense. In order to ensure that the written fee determination notice is received by the reporting and covered entities, the Executive Officer should publish the list of covered entities, including addresses, for public review at least 90 days in advance of September 10, 2026. 002.1

Thomas Maletta

I am writing to provide feedback on the proposed regulations for Senate Bills 253 and 261 within the Code of Regulations, Title 17. Specifically, I wish to address a significant omission in Section 96201, which currently excludes business entities subject to regulation by the Department of Insurance or those engaged in the business of insurance in other jurisdictions.

Excluding the insurance industry—a primary facilitator of economic activity and a significant stakeholder in climate risk management—undermines the efficacy of these disclosures. While the California Department of Insurance may pursue similar requirements, relying on disparate state-level regulators risks creating a fragmented reporting landscape. For companies headquartered outside of California, a lack of standardized mandates at the state level may lead to inconsistent data, hampering the ability of stakeholders to assess climate risk accurately. Removing this exclusion is essential to align the insurance industry with global reporting standards, provide investors with decision-useful data, and foster a robust internal control and reporting environment.

003.1

SB 253 and 261 represent a landmark shift in U.S. business reporting, bringing domestic climate-related disclosures into alignment with international frameworks. The mandate for Scope 1, 2, and 3 emissions is critical for ensuring comparability across industries and borders. The specific exclusion of insurance entities creates a significant data gap in a sector that is deeply integrated into the broader financial system. Leaving oversight to individual state insurance commissioners will inevitably result in a "patchwork" of requirements, rendering cross-jurisdictional comparability nearly impossible. In the absence of final SEC climate rules, it is imperative that California demonstrates leadership by ensuring these requirements apply broadly across all high-impact industries.

003.2

003.3

Standardized disclosures improve market efficiency by allowing for more competitive and informed capital allocation. In the insurance sector, where products are often highly commoditized, climate disclosures provide a vital point of differentiation for investors. These metrics offer insight into a carrier's underwriting philosophy, investment strategies, and long-term risk management. Inclusion in these rules will provide the transparency necessary for investors to understand the full scope of a company's operational and financed emissions.

003.4

003.5

The implementation of these regulations will necessitate rigorous improvements in corporate governance and internal controls. Establishing a clear chain of command for climate data—information that has historically been siloed or unmonitored—requires direct engagement from boards and executive leadership. This integration will modernize reporting systems and foster a culture of accountability. While the transition to tracking new data sets may be complex, the resulting evolution in control frameworks will ensure that insurance companies remain resilient in an era of rapid technological and environmental change.

003.6

While calculating Scope 3 emissions for financial institutions is complex, established methodologies already exist to facilitate this transition. The Partnership for Carbon Accounting Financials provides robust guidelines tailored specifically to the insurance industry that align with the GHG Protocol. These guidelines offer clear boundaries for measuring emissions across diverse portfolios, from commercial lines to personal auto and investment holdings. By leveraging these existing standards, insurance carriers can provide clear, comparable, and reliable disclosures that meet the expectations of the global market.

The inclusion of insurance companies in the final regulations is vital to the integrity of California's disclosure framework. Insurance companies hold a unique and critical position in the global effort to mitigate climate change. As the primary backer of property and casualty risks, particularly in disaster-prone regions like California, carriers are on the front lines of observing the increasing

003.7

frequency and severity of natural disasters. However, their responsibility extends beyond mere measurement; it requires active stewardship of their own carbon footprints and, more importantly, their massive investment portfolios. By prioritizing Environmental, Social, and Governance principles alongside financial returns, insurance companies can leverage their capital to foster a sustainable future, ensuring that the world they protect remains insurable for generations to come. By removing the current exclusion, CARB will enhance investor confidence, promote industry-wide consistency, and ensure that the insurance sector remains a resilient and transparent participant in the transition to a low-carbon economy.

[See above blocking]

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Sempra (Allison Snell)

Comments of Sempra on proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

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January 30, 2026

Clerk's Office
California Air Resources Board
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Re: Comments of Sempra in Response to CARB's Draft Regulatory Materials for California Climate Disclosure Legislation: Senate Bills 253 and 261, as Amended by SB 219

Sempra appreciates the opportunity to submit the enclosed Comments in Response to CARB's draft regulatory materials on Senate Bills (SB) 253, 261 and 219.

Sempra is a California-based holding company with energy infrastructure investments in North America. Our businesses invest in, develop and operate energy infrastructure and provide electric and gas services to customers. Sempra's business activities are organized under various reportable segments, including Sempra California, which consists of San Diego Gas & Electric Company ("SDG&E") and Southern California Gas Company ("SoCalGas"). SDG&E is a regulated public utility that provides electric and natural gas services to more than 3 million people in San Diego County and a portion of Orange County. SoCalGas is also a regulated public utility that owns and operates a natural gas distribution, transmission and storage system that delivers natural gas to approximately 21 million people in Southern California and portions of Central California. Another reportable segment, Sempra Infrastructure, develops, builds, operates and invests in energy infrastructure to help enable the energy transition in North American markets and globally.

Please contact me if you have any questions regarding this submission.

Respectfully submitted,

/s/ Allison Snell

Enclosure

Comments of Sempra in Response to CARB's Draft Regulatory Materials for California Climate Disclosure Legislation: Senate Bills 253 and 261, as Amended by SB 219

Definitions

Exclusions

004.1 Wholesale sales of electricity are currently proposed to be excluded from the definition of sales as it pertains to revenue and "doing business in California." CARB should consider applying the same rationale to wholesale sales of natural gas. As stated by Senator Weiner in his Letter to the Senate, excluding entities from reporting requirements whose only transactions in California are wholesale sales of electricity is intended to reduce the risk of out of state business entities retreating from the energy market, which would reduce the reliability of electricity for the state. Natural gas remains a critical resource for energy reliability in California and should be treated the same as wholesale electricity by excluding wholesale natural gas sales from the definition of doing business in California.

SB 253 reporting deadline

004.2 Given CARB's enforcement notice for SB 253, we support the deadline of no sooner than August 10 for the first reporting year to align with the MRR. For future years, CARB should consider a later deadline as reporting requirements increase substantially to

004.3 include scope 3 emissions information. The fourth quarter of the year would be more realistic for all companies as they undergo verification of scope 1 and 2 data and perform timely and complex calculations to estimate scope 3 emissions.

California Fuels and Convenience Alliance (Alessandra Magnasco)

California Fuels and Convenience Alliance

2520 Venture Oaks Way, Suite 100

Sacramento, CA 95833

916.646.5999

January 28, 2026

California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: CFCA Comments – Initial 200-Series Regulations and Proactive Input for Future Rulemaking

The California Fuels and Convenience Alliance (CFCA) represents approximately 300 members, including nearly 90 percent of all independent petroleum marketers in the state and more than half of the state's 12,000 convenience retailers. Our members—predominantly small, family- and minority-owned businesses—play a vital role in California's fuel supply chain, serving local governments, emergency services, school districts, transit companies, independent fuel retailers, and the agriculture industry.

We appreciate the opportunity to comment on the California Air Resources Board's (CARB) Initial Regulation and to provide proactive input for future rulemaking proceedings related to SB 253 implementation.

While mentioned in previous workshops, the initial regulation remains unclear regarding how reporting entities will be treated if they make good-faith efforts to submit complete Scope 1 and 2 emissions reports but are unable to fully comply with the voluntary framework provided by CARB. The regulation also does not specify the format in which Scope 1 and 2 emissions should be reported—leaving uncertainty as to whether entities may choose their own reporting format. Furthermore, the current CARB template requests that reporting entities use revenue-based metrics for Scope 1 emission intensities (as discussed in the preceding section). It is unclear whether a company would be penalized for instead using physical intensity ratios. Additionally, CARB has indicated a "give us whatever you have" approach for the first compliance year, but the initial regulation does not explicitly clarify this. These uncertainties underscore the need for flexibility in both reporting formats and intensity metrics, as discussed below.

005.1
005.2
005.3
005.4

SCOPE 1 EMISSIONS INTENSITY

CARB's template currently requests that reporting entities disclose Scope 1 emission intensity per million dollars in revenue ($mtCO_2e$/million dollars). CFCA recommends that CARB allow reporting entities to use physical intensity ratios (e.g., $mtCO_2e$ per square foot) rather than revenue-based metrics. Reporting intensity by physical unit would better align with facility-level operational data and protect confidential financial information from external exposure. CARB should consider providing flexibility for entities to select the intensity ratio most appropriate for their business operations.

005.5

ORGANIZATIONAL BOUNDARIES

Regarding organizational boundaries, CFCA urges CARB to allow reporting entities the flexibility to select a boundary condition consistent with established frameworks such as the Greenhouse Gas Protocol or the EU Corporate Sustainability Reporting Directive (CSRD). Each business structure is unique, and a one-size-fits-all boundary definition would not reflect operational realities. For example, some entities use an "operational control" approach consistent with the GHG Protocol framework, while others may opt for "equity share" approach or "financial control" approach. CARB should maintain flexibility for entities to apply whichever recognized boundary approach best fits their organization in order to accurately account for GHG inventories. 005.6

ONGOING CONCERNS WITH SCOPE 3 EMISSIONS

The requirement to report Scope 3 emissions remains unworkable, unreliable, and unfairly punitive, and it fails to align with the goal of advancing climate improvements while maintaining affordability for California's small businesses.

Unlike direct (Scope 1) and indirect (Scope 2) emissions, Scope 3 emissions are generated outside a company's direct control, making accurate reporting impossible. These requirements impose an excessive burden on businesses by forcing them to track emissions from suppliers, distributors, and customers—many of whom may not even operate in California. Additionally, Scope 3 emissions are impossible to verify because companies cannot compel third-party suppliers to disclose emissions data, which leads to inaccurate and inconsistent reporting. If CARB's goal is to provide more verifiable information regarding climate risk to the marketplace, requiring Scope 3 emissions disclosures only adds uncertainty. Overestimating or underestimating emissions due to lack of reliable data can harm both businesses and the marketplace. A fuel distributor reports Scope 3 emissions based on estimates from suppliers because actual data is unavailable. If the distributor overestimates emissions, it could appear less environmentally responsible than it actually is, potentially affecting investor perceptions, credit ratings, or contract opportunities. Conversely, unknowingly underestimating emissions could expose the company to regulatory scrutiny or reputational risk if discrepancies are later discovered. In both cases, inaccurate reporting creates uncertainty that can harm both the business and the overall marketplace. 005.7

Furthermore, these requirements disproportionately burden small and mid-sized businesses that lack the legal and compliance resources to conduct complex emissions audits across their supply chains. They also create competitive disadvantages for California companies that must comply with these mandates while out-of-state and international competitors face no similar requirements.

Instead, we urge CARB to eliminate all Scope 3 emissions reporting requirements from SB 253 implementation, align with federal reporting standards to prevent regulatory duplication and ensure consistency, and exempt small and mid-sized businesses from any new climate disclosure mandates to prevent disproportionate impacts on local economies.

CONCLUSION

CFCA appreciates CARB's continued engagement and commitment to clarifying SB 253 implementation. As the Board finalizes the initial regulations for the 2026 reporting year and considers regulations for

future reporting years, we strongly urge CARB to provide flexibility in the reporting template and emission intensity metrics, allowing physical or financial-based measures that reflect operational realities; permit reporting entities to choose organizational boundary approaches consistent with recognized frameworks, such as the GHG Protocol or EU CSRD; and eliminate Scope 3 emissions reporting requirements to prevent undue burdens on small and mid-sized businesses, ensure data reliability, and maintain competitive fairness. Adopting these recommendations will help ensure that the regulations are practical, accurate, and feasible for California businesses, while still advancing climate goals in a cost-effective and equitable manner.

We thank you for the opportunity to provide feedback and look forward to ongoing collaboration to ensure these regulations support both affordability and feasible implementation for California businesses.

If you have any questions, please contact CFCA's Sr. Director of Government Affairs, Alessandra Magnasco, at alessandra@cfca.energy.

Sincerely,

Alessandra Magnasco
Sr. Director of Government Affairs

David Hagen

Prof. Demetris Koutsoyiannis has quantified how the Temperature Hen PRECEDES the CO2 Egg in numerous scientific publications posted at most of his 79 publications with the ITIA group at the National Technical University of Athens as posted at https://www.itia.ntua.gr/en/search/?authors=koutsoyiannis&tags=climate.
Koutsoyiannis' quantitative scientific evidence nullifies the very premise of California's climate laws and regulations. I recommend focusing on lowest life cycle costs working towards long term sustainable energy and fuel use for the common good. Using geologically stored solar energy provided by our Creator enables rapid inexpensive rise out of poverty into sustainable society (aka natural gas, oil and coal.) Attached is a list of Koutsoyiannis' publications on Climate and four representative papers quantifying that global Temperature change precedes CO2 change. 006.1

Demetris Koutsoyianns' Publications on Climate

Posted at "https://www.itia.ntua.gr/en/search/?authors=koutsoyiannis&tags=climate

Publications in scientific journals

1. D. Koutsoyiannis, and G. Tsakalias, Unsettling the settled: Simple musings on the complex climatic system, *Frontiers in Complex Systems*, 3, 1617092, doi:10.3389/fcpxs.2025.1617092, 2025.

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5. D. Koutsoyiannis, Definite change since the formation of the Earth [Reply to Kleber, A. Comment on "Koutsoyiannis, D. Net isotopic signature of atmospheric CO2 sources and sinks: No change since the Little Ice Age. Sci 2024, 6, 17"], *Sci*, 6 (4), 63, doi:10.3390/sci6040063, 2024.

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52. D. Koutsoyiannis, and T.A. Cohn, The Hurst phenomenon and climate (solicited), *European Geosciences Union General Assembly 2008, Geophysical Research Abstracts, Vol. 10*, Vienna, 11804, doi:10.13140/RG.2.2.13303.01447, European Geosciences Union, 2008.

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[doc_id=2510] English More information and full text

From hen's egg to serpent's egg: Peer reviews and other attacks on science for silencing voices opposing the "climate crisis" narrative

by Demetris Koutsoyiannis

July 2024

Sources of images: (**left**) Flyte so Fancy[1]; (**right**) Wikipedia[2]

Crime begins with propaganda, even if such propaganda is for a good cause (Hans Fritzsche[3])

In the four-year period 2020-2023, I published a dozen of papers on climate. Four of them, prepared jointly with other colleagues, investigated causality in climate. Two of these four were published in the MDPI journal *Sci* and two in the *Proceedings of The Royal Society A – Mathematical, Physical and Engineering Studies*. Their details are:

1. D. Koutsoyiannis, and Z. W. Kundzewicz, 2020. Atmospheric temperature and CO_2: Hen-or-egg causality?. *Sci*, 2 (4), 83, doi: 10.3390/sci2040083.
2. D. Koutsoyiannis, C. Onof, A. Christofides, and Z. W. Kundzewicz, 2022. Revisiting causality using stochastics: 1.Theory. *Proceedings of The Royal Society A*, 478 (2261), 20210835, doi: 10.1098/rspa.2021.0835.
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4. D. Koutsoyiannis, C. Onof, Z. W. Kundzewicz, and A. Christofides, 2023. On hens, eggs, temperatures and CO_2: Causal links in Earth's atmosphere. *Sci*, 5 (3), 35, doi: 10.3390/sci5030035.

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[1] *How many eggs can a hen lay - The Lifecycle of Laying Hens*, https://www.flytesofancy.co.uk/blogs/information-centre/how-many-eggs-can-a-hen-lay.

[2] *The Serpent's Egg*, https://en.wikipedia.org/wiki/The_Serpent%27s_Egg_(film)

[3] The quoted phrase by Hans Fritzsche (of the Reich Ministry of Public Enlightenment and Propaganda in Nazi Germany; https://en.wikipedia.org/wiki/Hans_Fritzsche) is taken from: L. Goldensohn, Hans Fritzsche interview, in *The Nuremberg Interviews*, Ed. by R. Gellately, Vintage Books, New York, 2005.

In these we examined the potentially causal relationship between the atmospheric carbon dioxide concentration ([CO_2]) and atmospheric temperature (T). While the established narrative, supported by conventional wisdom, is that increased [CO_2] causes increase in T, in paper #1 we questioned this conviction and put the relationship of the two in a Plutarchean hen-or-egg framework.

In paper #2 we developed an advanced stochastic methodology for identifying potential causality, which in paper #3 we applied to several problems, including the T – [CO_2] relationship. We concluded that there is a unidirectional, potentially causal link between T as the cause and [CO_2] as the effect. The reverse relationship (i.e., that promoted by the established narrative) was excluded as violating a necessary condition of causality.

In paper #4 we provided more detailed analyses and additional evidence enhancing the validity of the results of paper #3.

I have now published one more paper using several proxy series, extending over the entire Phanerozoic or over parts of it, as well as instrumental data of the modern period. The details are:

5. D. Koutsoyiannis, 2024. Stochastic assessment of temperature – CO_2 causal relationship in climate from the Phanerozoic through modern times. *Mathematical Biosciences and Engineering*, 21 (7), 6560–6602, doi: 10.3934/mbe.2024287.

The extensive analyses confirm the findings of the earlier papers for the modern period and expand them for 500 million years in the past. The results converge to the single inference that change in temperature leads and that in carbon dioxide concentration lags.

Publishing papers that challenge conventional wisdom is not easy at all. Indeed, I struggled to publish each one of the papers that contradict the established climate narrative[4]. I still struggle to publish others which are being reviewed or have been rejected.

The attacks continued after publication of these papers. With "attack" I do not mean criticism, which is healthy and welcomed, as it contributes to improvement of papers and correction of possible errors. What I mean by "attack" is an attempt to block publication of a paper and to silence a voice that does not comply with the established narrative. I also include in "attack" an attempt to force a publisher to retract a published paper.

Such attacks on our papers are mentioned in a long discussion in Judith Curry's blog[5]. However, these were the exceptions, as most of the criticisms of the papers in the blog were healthy. The extent of the discussion suggests that the papers raised wide interest. It can be regarded as an interesting case of post-publication crowd-reviewing, which our work withstood well. In addition, the discussion offered independent confirmation of our results,

[4] My papers and other documents related to climate can be accessed from my web site, https://www.itia.ntua.gr/en/search/?authors=koutsoyiannis&tags=climate. The full list of my journal papers can be accessed at https://www.itia.ntua.gr/en/byauthor/Koutsoyiannis/0/. The full list of my works can be accessed at http://www.itia.ntua.gr/en/search/?title=&authors=koutsoyiannis.

[5] https://judithcurry.com/2023/09/26/causality-and-climate/.

based on a different methodology, and shed light on the physical processes that justify the causality direction found.

I have gathered all comments (about 1000, 18% of which were my own replies) into the following 370-page "book":

6. A. Christofides, D. Koutsoyiannis, C. Onof, and Z. W. Kundzewicz, 2023. *Causality, Climate, Etc.* Climate Etc. (Judith Curry's blog), doi: 10.13140/RG.2.2.21608.44803.

What follows is another example of an attack. It refers to the review of paper #5. The first version of the paper was submitted on 29 March 2024, after an invitation by the journal. It received three constructive reviews favouring its publication. The editor's decision was major revision. I addressed all review comments and submitted a revised version on 25 May 2024, along with a detailed report with replies to review comments. All three original reviewers were satisfied with the way I addressed their comments and they recommended publication of the revised manuscript.

However, something unusual happened as two additional reviewers were involved, who tried to block the publication of my paper. Interestingly, the comments of these additional reviewers were focused on papers #1 – #4 and not on #5, the one under review, despite the fact that their comments were purported to be about paper #5. Using material from online attacks on the earlier papers, these hostile reviewers adopted the same tactics claiming that our methodology was inadequate or that our work contained errors.

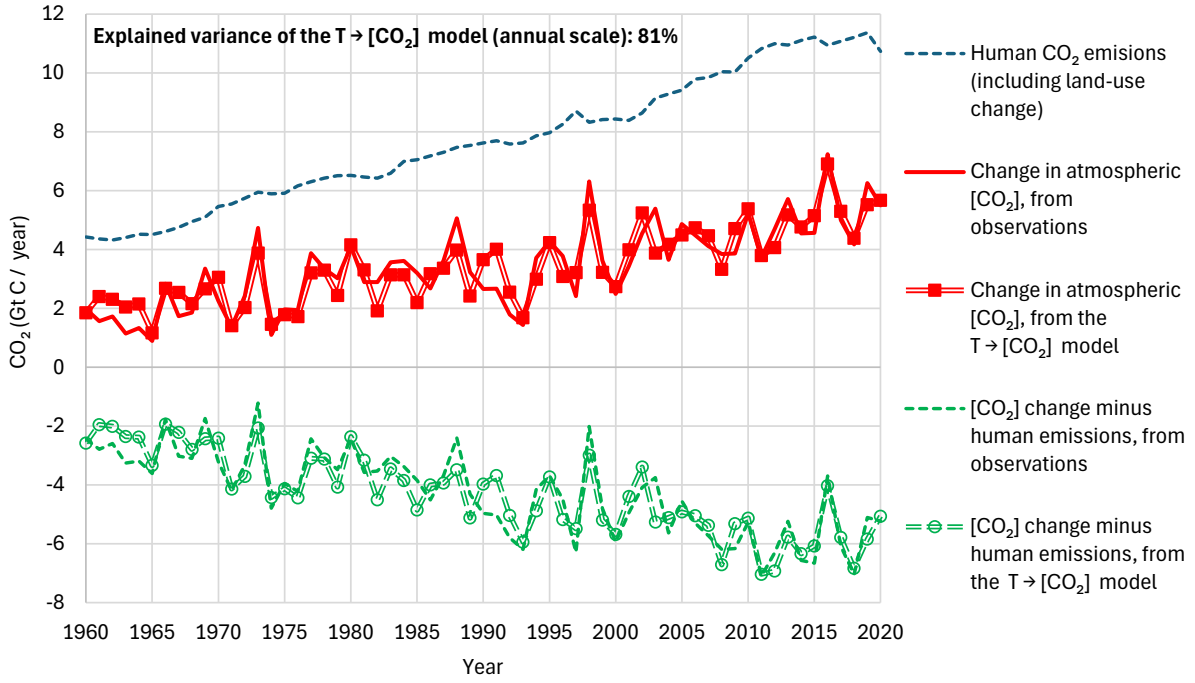
However, if errors were found, then we would either correct them or retract the papers. But not a single error was found. And none of the papers were retracted, despite the efforts of the attackers.

Eventually, paper #5 was accepted for publication, without further changes, based on the rebuttal of these review comments, which I copy in the next pages. In other words, the attacks failed. As explained in the next pages, normally I would not respond to these comments, but once I was forced to do, I thought that it would be fun to make this rebuttal public, as it also responds to earlier attacks.

The only notable change I made to the final paper is that I deleted the motto in its beginning. I explain why in the rebuttal. Yet, I used that motto in the present document as I think it is more relevant to this.

Thus, the next 41 pages is the part of my rebuttal report containing my responses to these two additional reviewers.

A side product of this rebuttal is the following graph, whose initial version is contained in the rebuttal report. The version immediately following below is somewhat improved and contains a detailed description of the graph, its use in the attacks, and its inappropriateness to assess the causality direction. The rebuttal contains detailed instructions how to reproduce the graph.



This graph was used in several versions—but, of course, without the $T \rightarrow [CO_2]$ model curves—as the main weapon (sort of "Scientific Sword Excalibur") in the attacks to our causality papers.

It seems to have first appeared (for years 1960-2005) in Cawley's (2011) paper (in *Energy and Fuels*).

Cawley also used his version in his attack in *PubPeer*, with the (admitted) purpose to force retraction of our papers in *Proceedings of The Royal Society A*. It was also used in a blog with the same purpose.

Subsequently, Engelbeen used his own version to dispute our papers in Judith Curry's blog (Climate Etc.). He uploaded/linked his version eight times in the same blog discussion.

More recently, an anonymous reviewer of my 2024 paper in *Mathematical Biosciences and Engineering* used Cawley's original version to attack the paper under review, aiming at its rejection.

The above version of the graph (initially produced for my rebuttal to that review) contains also the results of our $T \rightarrow [CO_2]$ toy model—Equation (10) in our *Sci* (2023) paper. Notice the impressive percentage of model's explained variance (81% on annual scale, becoming 99.9% on monthly scale).

Despite being used as "Sword Excalibur", this graph, in its original versions, says nothing about causality. It does not contain any information about time precedence. Only my above version says something: that the $T \rightarrow [CO_2]$ potential causality is consistent with the data.

Produced by Demetris Koutsoyiannis

Key for the pages that follow:

Review comment.

Response.

> Quotation from manuscript.
>
> Quotation from other documents.

Appendix B: Response to additional reviewers' comments of Round 2 on "Stochastic assessment of temperature – CO_2 causal relationship in climate from the Phanerozoic through modern times"

by Demetris Koutsoyiannis

Reviewer 4

R2-4.1. The author proposes a method for studying causality (X causes Y) based on the regression of one variable (Y) on lagged values of the other (X). On page 22, the author acknowledges that there are other methods for studying causality, such as "Granger causality."

Thanks for the summary. However, it is not accurate. I clearly state that I study the causality between processes, not variables. I start Section 3.2, *Stochastic methodology*, as follows:

> The stochastic methodology used here for identifying potential causal links was developed in [1,2,3] and is based on the impulse response function (IRF) between two stochastic processes $\underline{x}(t), \underline{y}(t)$, denoted as $g(h)$ where h denotes time lag, based on the convolution…

This simple statement clarifies that: (a) I use a new methodology, based on stochastic processes, and (b) that the methodology was already peer-reviewed and published, as seen in the above three references. It was also extensively reviewed at a post-publication phase [4]. Quoting from an even newer paper (Koutsoyiannis, 2024 [5]):

> The latter study [3] raised wide interest and was subsequently discussed in several forums, among which most representative is Judith Curry's blog [6]. With its about 1000 comments, 18% of which were replies by the principal author, this extended discussion, equivalent in length to a book of 370 pages [4], can be regarded as an interesting case of post-publication crowd reviewing, in which the study withstood.

In addition, this post-publication crowd reviewing offered independent confirmation of our results based on a different methodology (using cross-spectral analysis). Based on these facts, I think that it is justified not to repeat in the present paper the full scientific details of the method, the mathematical and factual proofs, and the comparisons with other methods. Any reviewer or reader can find all those in the given references.

As the reviewer correctly notes, I briefly refer to other methods in the following statement:

> As detailed in [2,3], there exist a variety of other methods for estimating IRF and for inferring causality but our method differs conceptually and computationally from them, including from the so-called "Granger causality" [7,8] and the framework proposed by Pearl and collaborators [9-11]

I clarify that this statement refers to (a) other methods for estimating IRF, (b) the so-called "Granger causality" (which, despite its name, does not identify causality but potential for prediction) and (c) the framework proposed by Pearl and collaborators. All these are out of the scope of the present paper, but the interested reviewer or reader may find any detail of these methods in the 2+2 references given above or may refer to our own papers

(Koutsoyiannis et al. [1-3]), as well as to our earlier paper, Koutsoyiannis and Kundzewicz [12], also referred to in my new paper.

R2-4.2. I am more familiar with the latter option than with the method proposed by the author. In Granger causality, two models are studied: one involving the regression of y on its past values, and another involving the regression of y on its past values as well as the past values of X. Subsequently, the significance of the coefficients associated with the lagged values of X is examined. Specifically, it is tested whether including X improves the prediction of y or if Y's past values alone are sufficient for prediction.

I understand that the reviewer is more familiar with Granger's method, as it is an old one (from 1969) while my colleagues' and my methodology is new. I agree with the reviewer when she/he says "*it is tested whether including X improves the prediction of y or if Y's past values alone are sufficient for prediction*". Our framework has many differences with Granger's method, including this one (copied from Koutsoyiannis et al. [1]):

> A second difference is that our focus is upon maximizing not the predictability per se, but the lucidity in identifying the (potentially causal) relationship between two processes $\underline{x}_\tau$ and $\underline{y}_\tau$. This can be seen by comparing Granger's expression in equation (2.11) with our expression in equation (3.20). To estimate y_τ, the former includes terms y_i for times earlier than τ while the second does not. Such terms may increase predictability but say nothing about a potentially causal relationship between the two processes $\underline{x}_\tau$ and $\underline{y}_\tau$; rather, they may obscure that relationship, as autocorrelation is by definition symmetric in time.

In other words, as identification of causality (instead of improvement of predictability) is concerned, the inclusion of term y_i for earlier times obscures (rather than improves) the performance.

I clarify that I appreciate Granger's method (originally developed for econometrics) and by no means do I want to devalue it. It has been successfully applied in several fields but also misused. Granger himself was aware of its misuses as in his Nobel Lecture [13] he stated: "*Of course, many ridiculous papers appeared.*"

R2-4.3. This methodology also has its weaknesses, such as determining the appropriate lags for the regression and including lags for variable X that differ from those in the regression of Y on itself.

I agree. Our method is much stronger in determining lags.

R2-4.4. Another approach involves modeling each series using a model that, when filtering the series, produces another with white noise structure, and calculating the cross-correlation between the two residual series. Depending on the location (right or left of 0) where significant cross-correlation values appear, causality in one direction or the other is indicated.

We had applied the method that seems to be preferred by the reviewer in our earlier paper (Koutsoyiannis and Kundzewicz [12]). Copying from Section 4.1 of that paper:

Yet, we can define a dominant direction of causality based on the time lag η_1 maximizing cross-correlation. Formally, η_1 is defined for a specified ν as

$$\eta_1 := \arg\max_{\eta} |r_{\tilde{x}\tilde{y}}(\nu, \eta)| \tag{13}$$

We can thus distinguish the following three cases:

If $\eta_1 = 0$, then there is no dominant direction.

If $\eta_1 > 0$, then the dominant direction is $\underline{x}_\tau \to \underline{y}_\tau$.

If $\eta_1 < 0$, then the dominant direction is $\underline{y}_\tau \to \underline{x}_\tau$.

Justification and further explanations of these conditions are provided in Appendix A.3.

The interested reviewer or reader may see Appendix A.3 of that paper (Koutsoyiannis and Kundzewicz [12]) for details.

The above approach, which seems to be preferable by the reviewer, was our initial attempt in trying to identify causality. In our later works (Koutsoyiannis et al. [1-3]) we substantially advanced the initial methodology and in the present paper I use the newer and more advanced methodology.

The reviewer may infer the superiority of the new methodology from the fact the old methodology is merely a (non-realistic) special case of the new methodology, in which the impulse response function is reduced to a Dirac delta function. This is clearly stated in the beginning of Section 3.2:

The stochastic methodology used here for identifying potential causal links was developed in [1,2,3] and is based on the impulse response function (IRF) between two stochastic processes $\underline{x}(t), \underline{y}(t)$, denoted as $g(h)$ where h denotes time lag, based on the convolution:

$$\underline{y}(t) = \int_{-\infty}^{\infty} g(h)\underline{x}(t-h)\mathrm{d}h + \underline{v}(t) \tag{3}$$

where $\underline{v}(t)$ is another stochastic process representing the part that is not explained by the causal link. Notice that we use the Dutch notational convention, in which stochastic variables and processes are underlined, while common variables and functions are not.

To see that the function $g(h)$ is the impulse response function (IRF) of the system $(\underline{x}(t), \underline{y}(t))$, we set $\underline{v}(t) \equiv 0$ and $\underline{x}(t) = \delta(t)$ (the Dirac delta function, representing an impulse of infinite amplitude at $t = 0$ and attaining the value 0 for $t \neq 0$), and we readily get $\underline{y}(t) = g(t)$. On the other hand, if we set $g(h) = b\,\delta(h - h_0)$ (with constant b and h_0), which means that the IRF is zero for every lag except for the specific lag h_0, then equation (1) becomes $\underline{y}(t) = b\underline{x}(t - h_0) + \underline{v}(t)$. This special case is equivalent to simply correlating $\underline{y}(t)$ with $\underline{x}(t - h_0)$ at any time instance t. It is easy to find (cf. linear

regression) that in this case the multiplicative constant b is the correlation coefficient of $\underline{y}(t)$ and $\underline{x}(t-h_0)$ multiplied by the ratio of the standard deviations of the two processes. In general, however, we expect that the actual $g(h)$ is not a Dirac delta function but a continuous one over some domain. Thus, the IRF is a much more powerful tool than correlation, as it integrates the correlations in the entire spectrum of lags.

R2-4.5. I have serious doubts that the proposed method detects causality in the aforementioned sense.

I believe it is healthy (and should be the rule in science) to have doubts and express them. Since we have published our methodology in three peer-reviewed journal papers, and also presented it in conferences, I invite the reviewer to peruse the methodology and independently test it, based on her/his doubts.

R2-4.6. The results presented are quantified numerically without a study of the significance of these values. For example, equation (5) clearly quantifies whether the regression on X eliminates information about Y or not. If the two variances are similar (coefficient e close to 0), it indicates that X does not cause Y. However, a value of coefficient e close to 1 indicates the opposite. No test is proposed to contrast these hypotheses. In this sense, the values that appear, for example, in Table 1 are not informative. In the "Explained Variance Causal" columna; is the value 0.62 different from zero or is the value 0.11 different from zero, or are both different from zero?

The reviewer is right that a value of e close to 0 indicates nonexistence of causality and a value close to 1 indicates the opposite (i.e. potential causality). Apparently, a value 0.62 provides more evidence than a value of 0.11. This is something common in statistical methods of inference by induction, as opposite to deduction. Giving a significance level of how this value differs from zero, does not make the method deductive. It remains inductive and inferior than before, because it became affected by an arbitrary choice of a significance level, as well as by several assumptions underlying the hypothesis. For example, in her/his comment R2-4.8 below, the reviewer correctly points out the effect of intrinsic correlation, which most statistical tests disregard, thus making wrong inference.

I do not know how familiar the reviewer is with new developments casting doubts on the usefulness of significance testing of "difference from zero". The following extract from Iliopoulou and Koutsoyiannis [14] provides a summary; it refers to statistical testing of trends in hydrology, but it is also relevant to other geophysical disciplines and other types of tests:

> The most established technique to evaluate fitted trends is statistical hypothesis testing, i.e. a statistical inference technique that estimates the probability of an outcome as far from what is expected as the observed under the assumption that the null hypothesis is true (Gauch, 2003 [15]). The latter is known as the p-value and is compared to predefined significance levels, in order to reject or not the null hypothesis. This is a scientific method for model evaluation, which has been in part misused. For instance, its misuse in hydrology has been showcased by seminal studies (e.g., Cohn and Lins, 2005 [16]; Koutsoyiannis and Montanari, 2007 [17]; Serinaldi et al., 2018 [18]) which have established the fact that for hydrological, non i.i.d. data the null hypothesis, which tacitly contains independence, is a priori wrong, and its rejection, if correctly interpreted,

> should point out to the wrong independence assumption. Still, the common practice has been to misinterpret outcomes in favour of trends. Part of the statistician community argues against the concept of significance testing (Nuzzo, 2014 [19]; Wasserstein and Lazar, 2016 [20]; Amrhein and Greenland, 2018 [21]; Trafimow et al., 2018 [22]; Wasserstein et al., 2019 [23]), with the main critique summarized in the statement of the American Statistical Association that "the widespread use of 'statistical significance' (generally interpreted as '$p \leq 0.05$') as a license for making a claim of a scientific finding (or implied truth) leads to considerable distortion of the scientific process" (Wasserstein and Lazar, 2016 [20]).

In particular, the seminal paper Cohn and Lins [16] explains the dramatic impact on statistical inference, based on significance testing, of the model assumed for the process studied (or the inappropriateness thereof, e.g. the neglect of stochastic dynamics such as Long-Term Persistence). I highlight the following phrase from this paper: "*In changing from one test to another, 25 orders of magnitude of significance vanished.*" Additional information can be found in my recent book "*Stochastics of Hydroclimatic Extremes*" [24], where I explain theoretically and with examples that a time series is not a sample and that statistical tests and their related significance are not valid when dealing with time series. Instead, we need advanced Monte Carlo techniques, information of which I give in chapter 7 of the book. I have tried to make this clear more than 20 years ago (Koutsoyiannis, 2003 [25]).

That said, it is self-evident that if the reviewer or any interested reader believes that a statistical test is relevant, she/he may feel free to develop one and publish it. My colleagues and I have published all mathematical details of the methodology in Koutsoyiannis et al. [1-3] and any interested reader may retrieve them from there in order to develop her/his test.

But clearly this is totally out of the scope of the current paper. I have done a lot of work in the present paper—but on another scope as seen in its title. Its length is already 50 pages. I hope the reviewer and any reader would accept the fact that the scope of the paper is that described by the title, the abstract and the introduction of the paper and not any other stuff that I have studied in earlier papers (jointly with other coauthors) or I do not think it deserves studying.

R2-4.7. The restriction (6), where all g_i are positive, is very restrictive.

Again this is something that has been explained in my earlier publications. Quoting from Section 3.3 of Koutsoyiannis et al. [1]:

> In contrast to Granger's analysis of causality (…), which treats the processes in discrete time by definition, here we treat them in continuous (i.e. natural) time, and we only convert them to discrete time for estimation purposes. If we think of the processes in natural time, we understand that a causality relationship is not an instantaneous one. In other words, if $\underline{x}(t')$ affects $\underline{y}(t)$, where $t' < t$, it is reasonable to assume that, for small h, $\underline{x}(t' \pm h)$ will also affect $\underline{y}(t)$. Therefore, the IRF, $g(h)$, is not a Dirac delta function, but one with some domain, $\mathbb{h} \subseteq \mathbb{R}$, of nonzero (and potentially infinite) measure, where $g(h) \neq 0$ for $h \in \mathbb{h}$. It is also reasonable to assume that $g(h)$ is a continuous function and has the same sign for all $h \in \mathbb{h}$. The latter can be justified as follows. If $\underline{x}(t')$ is positively correlated with $\underline{y}(t)$, then it is reasonable that $\underline{x}(t' \pm h)$ are also positively correlated with $\underline{y}(t)$. Without loss of generality, in what follows we will assume that $g(h) \geq 0$ for $h \in \mathbb{h}$

(if it were $g(h) \leq 0$, we would reflect $\underline{x}(t)$, i.e. replace it with $-\underline{x}(t)$, and hence $g(h)$ would also be reflected becoming nonnegative).

Here we clarify that the problem of identifying causality is different from that of recovering the full system dynamics. The former and not the latter, is the scope of our study. We note that, while there exist oscillatory nonlinear systems, in which the sign of $g(h)$ could alternate, we avoid subsuming them under the causality notion, particularly when causality is inferred from data in an inductive manner. This choice is consistent with Cox's (1992 [26]) conditions for causality, according to which the effect *"shows a monotone relation with 'dose'"* of the cause. Here we note that in our framework the "dose" is not regarded as an instantaneous event, but one with some time span (see details in Supplementary Information, section SI1.2).

R2-4.8. The method for determining h_c on page 21 is based on the calculation of cross-correlation on the series X and Y. This cross-correlation is affected by the intrinsic correlation of each series, and the significance study of each value at each lag can be erroneous.

I agree. The significance of this cross-correlation value can be erroneous. That is the reason why I do not calculate at all and did not give the significance level in the paper (see also my reply to comment R2-4.6 above). For the same reason, I give the emphasis on the other two indices, the mean (time average), μ_h, and the median, $h_{1/2}$, of the sequence g_j. Yet I additionally give the value of the cross-correlation (without its significance), for the completeness of the presentation. As mentioned in section 3.2 for μ_h and $h_{1/2}$:

extensive analyses in [1] showed that their estimation is quite robust.

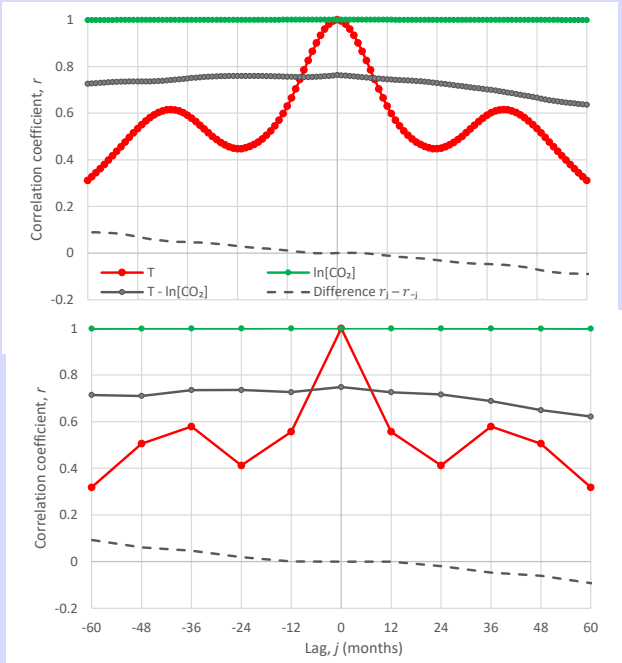
R2-4.9. Apply the "Granger Causality" method to the data and compare it with your method.

I must thank the reviewer for reminding me of my youth, some 40 years ago, when I was a seaman in the Greek Navy for 25 months. This is because this last comment sounds like a command that I must execute.

So: **Yes Sir!** I have already executed it four years ago. Quoting from Section 5.1 of Koutsoyiannis and Kundzewicz [12]:

Somewhat more informative is Figure 9, which depicts lagged cross-correlations of the two processes, based on the methodology in Section 4.1 but without differencing the processes. Specifically, Figure 9 shows the cross-correlogram between UAH temperature and Mauna Loa $\ln[CO_2]$ at monthly and annual scales; the autocorrelograms of the two processes are also plotted for comparison. In both time scales, the cross-correlogram shows high correlations at all lags, with the maximum attained at lag zero. This does not hint at a direction. However, the cross-correlations for negative lags are slightly greater than those in the positive lags. Notice that to make this clearer, we have also plotted the differences $r_j - r_{-j}$ in the graph. This behaviour could be interpreted as supporting the causality direction $[CO_2] \rightarrow T$. However, we deem that the entire picture is spurious as it is heavily affected by the fact that the autocorrelations are very high and, in particular, those of $\ln[CO_2]$ are very close to 1 for all lags shown in the figure.

In our investigation, we also applied the Granger test on these two time series in both time directions. To calculate the p-value of the Granger test, we used free software (namely the function GRANGER_TEST [27,28]). It appears that in the causality direction $[CO_2] \rightarrow T$, the null hypothesis is rejected at all usual significance levels. The attained p-value of the test is 1.8×10^{-7} for one regression lag ($\eta = 1$), 1.8×10^{-4} for $\eta = 2$, and remains below 0.01 for subsequent η. By contrast, in the direction $T \rightarrow [CO_2]$, the null hypothesis is not rejected at all usual significance levels. The attained p-value of the test is 0.25 for $\eta = 1$, 0.22 for $\eta = 2$, and remains above 0.1 for subsequent η.

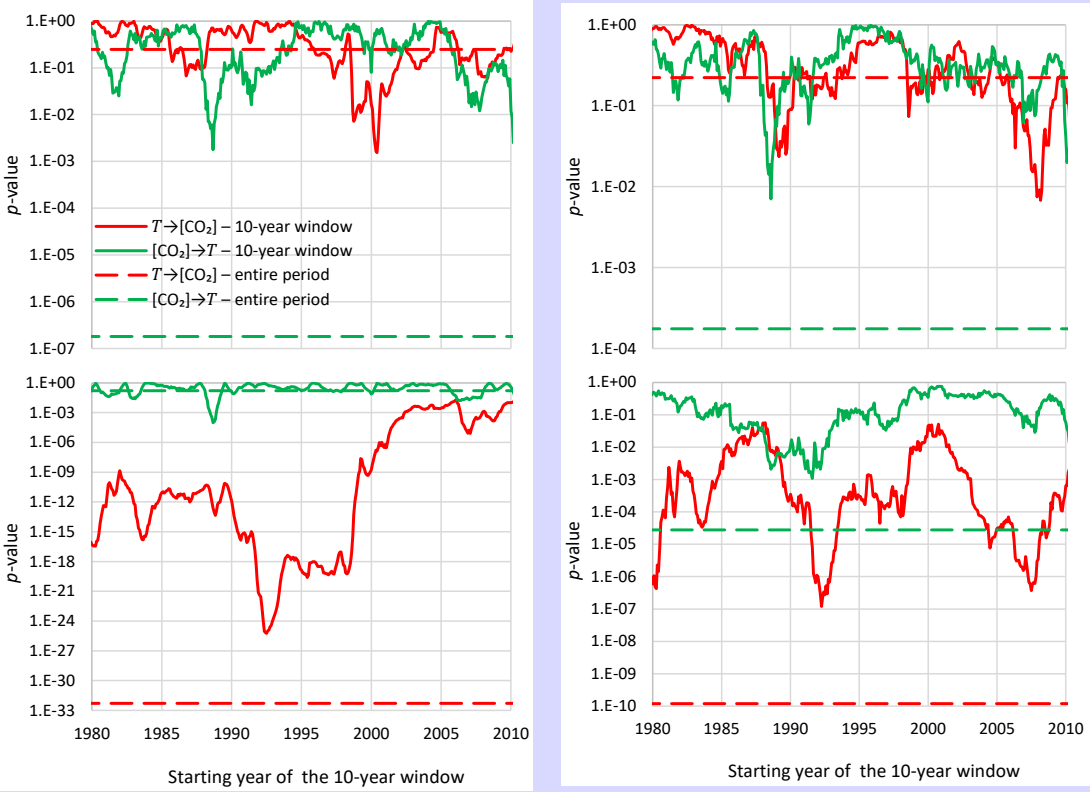


[Figure R2-4.1; reproduced from Koutsoyiannis and Kundzewicz [12]; original caption follows]

Figure 9. Auto- and cross-correlograms of the time series of UAH temperature and logarithm of CO_2 concentration at Mauna Loa.

Therefore, one could directly interpret these results as unambiguously showing one-way causality between the total greenhouse gases and temperature and, hence, validating the consensus view that human activity is responsible for the observed rise in global temperature. However, these results are certainly not unambiguous and, most probably, they are spurious. To demonstrate that they are not unambiguous, we have plotted, as shown in the upper panels of Figure 10, the p-values of the Granger test for moving windows with a size of 10 years for number of lags $\eta = 1$ and 2. The values for the entire length of time series, as given above, are also shown as dashed lines. Now the picture is quite different: each of the two directions appear dominating (meaning that the attained significance level is lower in one over the other) in about equal portions of the time. For example, for $\eta = 2$, the $T \rightarrow [CO_2]$ dominates over $[CO_2] \rightarrow T$ for 58% of the time. The attained p-value for direction $T \rightarrow [CO_2]$ is lower than 1% for 1.4% of the time, much higher than in the opposite direction (0.3% of the time). All of these observations favour the $T \rightarrow [CO_2]$ direction.

To show that the results are spurious and, in particular, affected by the very high autocorrelations of $\ln[CO_2]$ and, more importantly, by its annual cyclicity, we have "removed" the latter by averaging over the previous 12 months. We did that for both series and plotted the results in the lower panels of Figure 10. Here, the results are stunning. For both lags η = 1 and 2 and for the entire period (or almost), $T \rightarrow [CO_2]$ dominates, attaining p-values as low as in the order of 10^{-33}. However, we will avoid interpreting these results as unambiguous evidence that the consensus view (i.e., human activity is responsible for the observed warming) is wrong. Rather, what we want to stress is that it is inappropriate to draw conclusions from a methodology which is demonstrated to be so sensitive to the used time windows and data processing assumptions. In this respect, we have included this analyses in our study only (a) to show its weaknesses (which, for the reasons we explained in Section 4.2, we believe would not change if we used different statistics or different time series) and (b) to connect our study to earlier ones. For the sake of drawing conclusions, we contend that our full methodology in Sections 4.1 and 4.3 is more appropriate. We apply this methodology in Section 5.2.



[Figure R2-4.2; reproduced from Koutsoyiannis and Kundzewicz [12]; original caption follows]

Figure 10. Plots of p-values of the Granger test for 10-year-long moving windows for the monthly time series of UAH temperature and logarithm of CO_2 concentration at Mauna Loa for number of lags (**left**) η = 1 and (**right**) η = 2. The time series used are (**upper**) the original and (**lower**) that obtained after "removing" the periodicity by averaging over the previous 12 months.

Also, quoting from Section 5.2 of the same paper (Koutsoyiannis and Kundzewicz [12]), referring to the differenced time series:

> While, as explained in Sections 4.2 and 5.1, the Granger test has weaknesses that may not help in drawing conclusions, for completeness and as a confirmation, we list its results here:
>
> - For the monthly scale and the causality direction $[CO_2] \rightarrow T$, the null hypothesis is not rejected at all usual significance levels for lag $\eta = 1$ and is rejected for significance level 1% for $\eta = 2$–8, with minimum attained p-value 1.8×10^{-4} for $\eta = 6$.
>
> - For the monthly scale and the causality direction $T \rightarrow [CO_2]$, the null hypothesis is rejected at all usual significance levels for all lags η, with minimum attained p-value 2.1×10^{-8} for $\eta = 7$.
> - For the monthly scale, the attained p-values in the direction $T \rightarrow [CO_2]$ are always smaller than in direction $[CO_2] \rightarrow T$ by about 4 to 5 orders of magnitude, thus clearly supporting $T \rightarrow [CO_2]$ as dominant direction.
> - For the annual scale with fixed year specification and the causality direction $[CO_2] \rightarrow T$, the null hypothesis is not rejected at all usual significance levels for any lag η, thus indicating that this causality direction does not exist.
> - For the annual scale with fixed year specification and the causality direction $T \rightarrow [CO_2]$, the null hypothesis is not rejected at significance level 1% for all lags $\eta = 1$–6, with minimum attained p-value 5% for lag $\eta = 2$, thus supporting this causality direction at this significance level.
> - For the annual scale with fixed year specification, the attained p-values in the direction $T \rightarrow [CO_2]$ are always smaller than in direction $[CO_2] \rightarrow T$, again clearly supporting $T \rightarrow [CO_2]$ as the dominant direction.
>
> We note that the test cannot be applied for the sliding time window case and, hence, we cannot provide results for this case.
>
> […]
>
> In brief, all above confirm the results of our methodology that the dominant direction of causality is $T \rightarrow [CO_2]$.

Reviewer 5

Note: The reviewer's citations, originally denoted as [1] etc., have been changed to [[1]] etc. so as to be distinguished from the citations of my rebuttal report. Those citations that refer to my own paper, which the reviewer also denotes as [1] etc., have been changed to {1} etc., again to be distinguished from the citations of my rebuttal report.

R2-5.1. This paper investigates the use of an existing statistical method for causal inference to investigate the causality linking CO2 and temperature. Sadly the inference that for the instrumental data T causes CO2 is demonstrably incorrect. The error is due to the differencing of the time series, which decouples the long term linear trend entirely from the analysis. The finding that T causes CO2 in paleoclimate is overly simplistic, but entirely

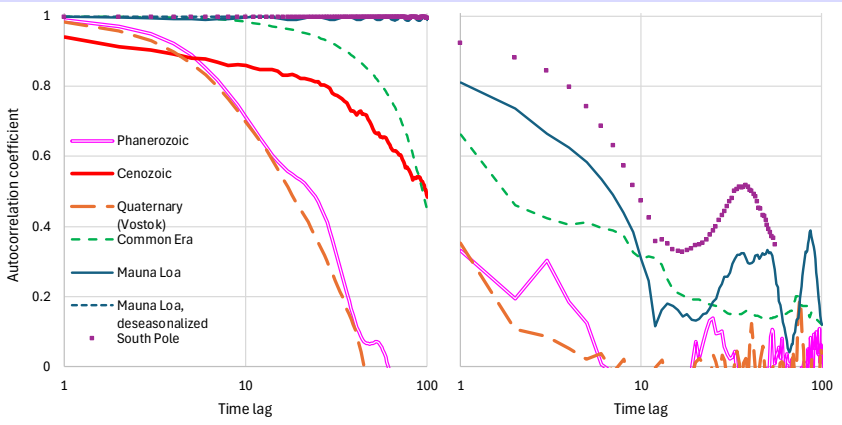
uncontraversial. There is no clear statement of the mathematical novelty of this paper (the moving average analsysis of the instrumental data? However that is a relatively minor contribution and the results are unreliable because of the differencing). I see no scope for the paper being modifiable to a state where it warrants publication.

I understand that the reviewer does not want my paper to be published. This is clear in the last sentence, "*I see no scope for the paper being modifiable to a state where it warrants publication*".

But it is also clear that the reviewer's critiques do not apply to the present paper. They apply to papers that have already published (Koutsoyiannis and Kundzewicz [12]; Koutsoyiannis et al. [1-3]). For "*the differencing of the time series*" which the reviewer regards to be an error has been thoroughly explained and justified in all four papers. In the present paper I also apply the method with non-differenced series where applicable. Apparently, the reviewer has not seen it in the paper as she/he seems to have consulted several texts that (unsuccessfully) have attacked our earlier papers (not the present one).

The reviewer's claim that "*the results are unreliable because of the differencing*" is totally wrong. Only its negation is right, i.e. "*the results are **reliable** because of the differencing*" or "the results *would be unreliable **without** the differencing*". As shown in Koutsoyiannis and Kundzewicz [12] and reproduced above in my reply to comment R2-4.9 (by Reviewer #4), when the autocorrelations are close to 1 for the lags of interest, without differencing the "*results are certainly not unambiguous and, most probably, they are spurious*". In the present paper, the autocorrelations are close to 1 at all lags of interest for the instrumental data, as seen in the following part of section 4.1 and the Figure 9 of the paper:

> Figure 11 shows the empirical autocorrelation functions of the [CO_2] series, original and differenced. In the instrumental series, the autocorrelations are almost 1, even for lags as high as 100. This prohibits any inference from the original series. However, their differenced series have reasonable positive autocorrelations, which make inference possible. The proxy series have high autocorrelations at small lags, but reasonable ones at large lags. For those we examined both the original and the differenced series, provided that the latter are positive.



[Figure R2-5.1; original caption follows]

Figure 11 Autocorrelation functions of [CO_2] series: (**left**) original; (**right**) differenced. The differenced series autocorrelation for Cenozoic is not plotted as it is mostly negative. The time lag is in discrete time j, i.e. dimensionless, and, to make it dimensional, we should multiply by the time step Δ of each series ($h = j\Delta$).

The reason that autocorrelations close to 1 do not enable inference on causality, has been explained in several places of the earlier works. As an example, below I am reproducing the section SI2.2 from the Supplementary Information of Koutsoyiannis et al. [2]:

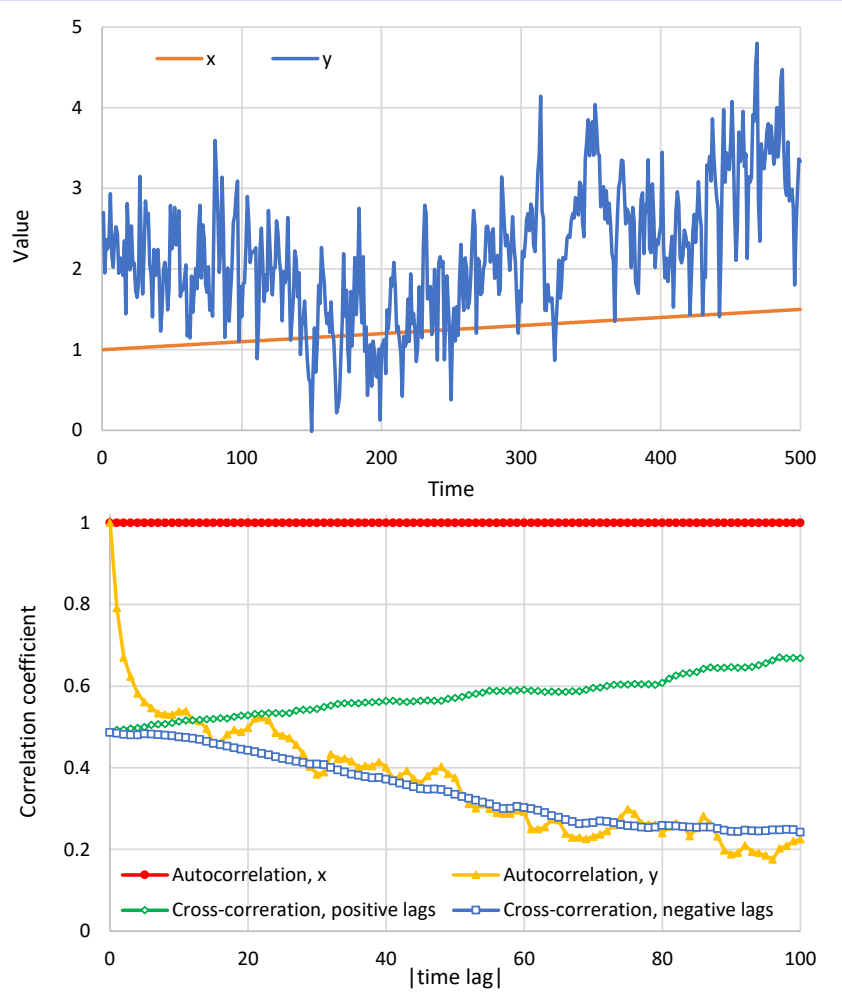
SI2.2 On high autocorrelations and spurious IRF estimates

As stated in the main papers (Koutsoyiannis et al., 2022a,b [1,2]), high autocorrelation results in increased estimation uncertainty and may even result in spurious causality claims. To illustrate this, we devise a synthetic example, in which the processes $\underline{x}_\tau$ and $\underline{y}_\tau$ are, by construction, independent of each other and with high autocorrelation.

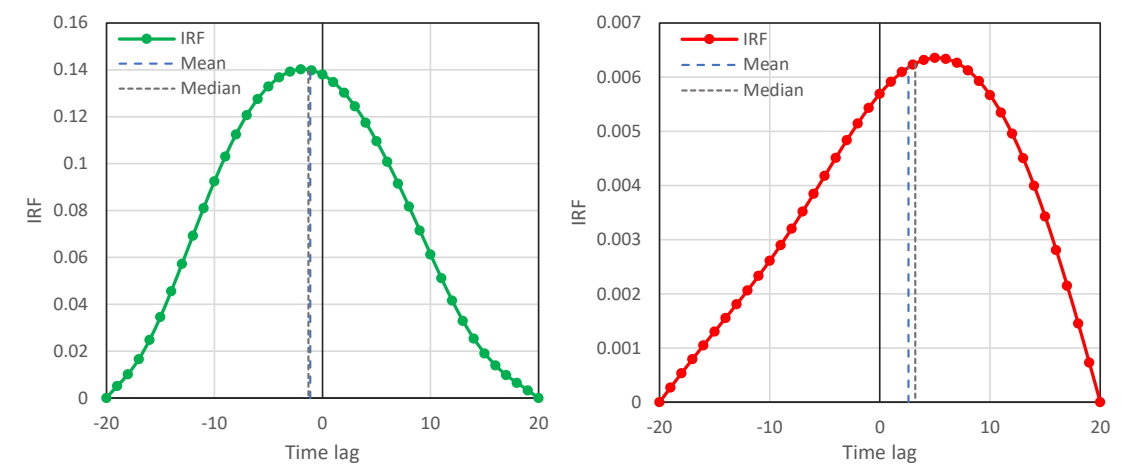
Specifically, two time series x_τ and y_τ, each of length 500, are generated independently from each other. The time series x_τ is constructed by the deterministic rule $x_\tau = 1 + 0.001\tau$. If its values are treated statistically, the resulting autocorrelation estimate is constant for all lags, $\hat{r}_{xx}(h) = 1$. The time series y_τ is generated from a Hurst-Kolmogorov process with Gaussian distribution and with a high Hurst parameter, $H = 0.95$, reflecting strong long-range dependence (LRD). By now, it is well known (e.g. Cohn and Lins, 2005 [16]; Koutsoyiannis, 2013 [29]) that realizations of processes with LRD look "trendy" even though the processes are stationary. This is evident in Figure SI2.5 (upper), which depicts both time series. Their auto- and cross-correlations, estimated using standard statistical estimators, are shown in Figure SI2.5 (lower). Interestingly, while by construction the cross correlations are $r_{yx}(h) = 0$ for any lag h, their estimates $\hat{r}_{yx}(h)$ appear very high, i.e., 0.46 ± 0.21 in the plotted interval of lag h, $(-100,100)$.

Because of the high cross-correlations, if we estimate the IRF with the proposed method, as seen in Figure SI2.4, spurious Hen-or-Egg (HOE) causality is identified in both directions $\underline{x} \to \underline{y}$ and $\underline{y} \to \underline{x}$. The dominant causality direction appears to be $\underline{y} \to \underline{x}$ with mean lag $\mu_h = 2.6$, median lag $h_{1/2} = 3.2$ and explained variance ratio $e = 0.47$. All these are obviously invalid estimates (as there are no true lags in this case and the true value of the explained variance ratio is $e = 0$), even though the calculations are correct.

Naturally, a remedy in such spurious cases is to reduce the autocorrelations. This becomes possible if instead of the time series x_τ and y_τ we study the differenced time series $\Delta x_\tau \coloneqq x_\tau - x_{\tau-1}$ and $\Delta y_\tau \coloneqq y_\tau - y_{\tau-1}$. Taking the differences is definitely reasonable: if x_τ causes y_τ, then a change in x_τ should cause a change in y_τ. In our example, we will have constant $\Delta x_\tau = 0.001$ and hence the cross-covariances would be zero, which will exclude any causality claim.



[Figure R2-5.2; reproduced from Koutsoyiannis et al. [3]; original caption follows]
Figure SI2.3 (**upper**) Time series of the synthetic example described in the text. (**lower**) Auto- and cross-correlation function estimates for the two time series.



[Figure R2-5.3; reproduced from Koutsoyiannis et al. [3]; original caption follows]
Figure SI2.4 IRFs for the synthetic example of spurious IRF estimation due to high autocorrelation of Figure SI2.3 for causality directions (left) $\underline{x} \rightarrow \underline{y}$ and (right) $\underline{y} \rightarrow \underline{x}$. For the estimated IRFs the number of weights is $2J + 1$ with $J = 20$.

If the reviewer thinks that the above four papers, which were prepared jointly with other colleagues, are "*demonstrably incorrect*" then I invite her/him to demonstrate that with mathematical and logical arguments, and publish her/his demonstration in a scientific journal. This would be more constructive than trying to block the publication of my new paper as an anonymous reviewer by repeating what she/he saw in attacks of earlier papers on the internet (some of which he also cites; see comment R2-5.14 below).

In addition, publishing her/his demonstrations would give the opportunity of a public dialogue.

R2-5.2. The paper is perhaps overlong, but the formatting, use of language and structure are all satisfactory.

I welcome this remark.

R2-5.3. Abstract

The fundamental problem with this paper is evident in the final sentence of the abstract:

> "These results contradict the conventional wisdom, according to which the temperature rise is caused by [CO_2] increase."

Firstly, this is not merely "conventional wisdom", it is the conclusion of over a century of scientific research (known as the ``enhanced greenhouse effect'' - EGHE), including a well-understood causal mechanism, and comprelling experimental and observational evidence of the process as a whole, and it's component parts. If a physics-free, purely statistical method, contradicts such strong scientific finding, then it would be prudent to be deeply skeptical of the statistical method (which does not have the benefit of a causal mechansim or evidence for the component parts, or consilience with other scientific findings). In this case, the flaw in the statistical method is easily identified (differencing of the time series), it is an error that has been made on numerous occasion, e.g. Salby and Humlum et al. etc., it has also previously been drawn to the author's attention prior to the submission of the current paper.
From research on the EGHE and on the carbon cycle, we know that there are causal mechanisms in **both** directions: The EGHE means that as CO2 levels rise, all things being otherwise equal, there will be a rise in global temperature, modified by climate feedbacks, such as water vapour feedback. However, multiple carbon cycle feedback mechanisms mean that changes in global temperatures will affect the level of atmospheric CO2. Like the EGHE, there is also considerable research on carbon cycle feedback. It is the interplay between these forces that results in a dynamic equilibrium, that has kept the Earth's temperature and it's atmospheric CO2 reasonably stable until large scale anthropogenic emissions disturbed this equilibrium, coinciding with the industrial revolution. Any model of the relationship between global temperatures and atmospheric CO2 that does not include these feedbacks is at variance with observed reality and should be discarded - it doesn't match what we observe to be the case.

Yes, "conventional wisdom" could be the result of over-century research. Longevity does not make it unconventional. Neither makes it correct. It is well known that Aristotle's geocentric system was conventional wisdom for about 18 centuries, on which conventional research of

its time was based. At the same time, Arisctarchus's heliocentric system has been rejected for 18 centuries. On the other hand, Aristotle's correct explanation of the Nile's floods was rejected for 21 centuries (Koutsoyiannis, and Mamassis [30]).

Given that conventional wisdom is not necessarily correct, I think I have the right to challenge it in a scientific context.

The statement cited by the reviewer from the abstract reflects the content of the paper and is 100% accurate. No modification is required.

Note that the statement does not say that conventional wisdom is wrong. It says that our results contradict conventional wisdom. If conventional wisdom is right, then we are wrong. This is likely but must be proven with mathematical and logical arguments using the scientific method. None of the attacks made so far, including the one by Reviewer #5, has any of these characteristics.

There may be "*physics-free, purely statistical methods*", but when applied to physical problems, statistical methods become parts of physics. Clockwise physics, without using probability and statistics, has been conventional wisdom for a couple of centuries but has proved to be weak and inadequate. Hence, stochastics has long ago been incorporated into physics. This occurred one century and a half ago, but admittedly, many of us, including this reviewer, are not updated on this fact yet and continue to contrast physics and statistics. Therefore, I am providing the following information in bulleted form (along with my apology for being didactic):

- Statistical physics (cf. Boltzmann, Gibbs, Planck) used the probabilistic concept of entropy (which is nothing other than a quantified measure of uncertainty defined within the probability theory) to explain fundamental physical laws (most notably the Second Law of thermodynamics), thus leading to a new understanding of natural behaviors and to powerful predictions of macroscopic phenomena. Atmospheric processes are explained by statistical physics in all respects (thermodynamic equilibrium, blackbody radiation, transport processes)

- Quantum theory (cf. Heisenberg) has emphasized the intrinsic character of uncertainty and the necessity of probability in the description of nature.

- Developments in numerical mathematics for applications in physics (cf. Metropolis) highlighted the effectiveness of stochastic methods in solving physical problems that are even purely deterministic, such as numerical integration in high-dimensional spaces and global optimization of non-convex functions (where stochastic techniques, e.g., stochastics-based evolutionary algorithms and simulated annealing, are in effect the only feasible solution in complex problems that involve many local optima).

This extends even beyond physics. Thus,

- Genetics (cf. Mendel) and evolutionary biology have emphasized the importance of stochasticity (e.g., in gametes fusion, selection and mutation procedures, and environmental changes) as a driver of evolution.

- Developments in mathematical logic, and particularly Gödel's incompleteness theorem, challenged the almightiness of deduction (inference by mathematical proof). This necessitates the use of induction in physical problems, whose theoretical basis is offered by the field of stochastics

It is completely untrue that in our papers we do not "*benefit of a causal mechanism or evidence for the component parts, or consilience with other scientific findings*". Here I repeat the related parts from our earlier papers.

From Koutsoyiannis and Kundzewicz [12], Section 6:

> The omnipresence of positive lags on both monthly and annual time scales and the confirmation by Granger tests reduce the likelihood that our results are statistical artefacts. Still, our results require physical interpretation which we seek in the natural process of soil respiration.
>
> Soil respiration, R_s, defined to be the flux of microbially and plant-respired CO_2, clearly increases with temperature. It is known to have increased in the recent years [31,32]. Observational data of R_s (e.g., [33,34]; see also [35]) show that the process intensity increases with temperature. Rate of chemical reactions, metabolic rate, as well as microorganism activity, generally increase with temperature. This has been known for more than 70 years (Pomeroy and Bowlus [36]) and is routinely used in engineering design.
>
> The Figure 6.1 of the latest report of the IPCC [32] provides a quantification of the mass balance of the carbon cycle in the atmosphere that is representative of recent years. The soil respiration, assumed to be the sum of respiration (plants) and decay (microbes), is 113.7 Gt C/year (IPCC gives a value of 118.7 including fire, which along with biomass burning, is estimated to be 5 Gt C/year by Green and Byrne [37]).
>
> We can expect that sea respiration would also have increased. Moreover, outgassing from the oceans must also have increased as the solubility of CO_2 in water decreases with increasing temperature [38,39]. In addition, photosynthesis must have increased, as in the 21st century the Earth has been greening, mostly due to CO_2 fertilization effects [40] and human land-use management [41]. Specifically, satellite data show a net increase in leaf area of 2.3% per decade [41]. The sums of carbon outflows from the atmosphere (terrestrial and maritime photosynthesis as well as maritime absorption) amount to 203 Gt C/year. The carbon inflows to the atmosphere amount to 207.4 Gt C/year and include natural terrestrial processes (respiration, decay, fire, freshwater outgassing as well as volcanism and weathering), natural maritime processes (respiration) as well as anthropogenic processes. The latter comprise human CO_2 emissions related to fossil fuels and cement production as well as land-use change, and amount to 7.7 and 1.1 Gt C/year, respectively. The change in carbon fluxes due to natural processes is likely to exceed the change due to anthropogenic CO_2 emissions, even though the latter are generally regarded as responsible for the imbalance of carbon in the atmosphere.

From Koutsoyiannis et al. [2], Section 3:

> In other words, it is the increase of temperature that caused increased CO_2 concentration. Though this conclusion may sound counterintuitive at first glance, because it contradicts common perception (and for this reason we have assessed the case with an alternative parametric methodology in the Supplementary Information, section SI2.4, with results confirming those presented here), in fact it is reasonable. The temperature increase began at the end of the Little Ice Period, in the early 19th century, when human CO_2 emissions were negligible; hence other factors, such as the solar activity (measured by sunspot numbers), as well as internal long-range mechanisms of the complex climatic systems had to play their roles.
>
> A possible physical mechanism for the [CO_2] increase, as a result of temperature increase, was proposed by Koutsoyiannis and Kundzewicz [12] and involves biochemical reactions, as, at higher temperatures, soil respiration, and hence natural CO_2 emissions, are increasing. In addition, as pointed out by Liu et al. [42] the influence of El Niño on climate is accompanied by large changes to the carbon cycle, with the pantropical biosphere releasing much more carbon into the atmosphere during large El Niño occurrences. Noticeably, in a very recent paper, Goulet Coulombe and Göbel [43] seem to confirm the finding by Koutsoyiannis and Kundzewicz [12], yet they deem it an "*apparently counterintuitive finding that GMTA* [global mean surface temperature anomalies] *explains a larger portion of the forecast error variance of CO_2 than vice versa*". To "*resolve*" it, they "*explore a last avenue, that of using annual CO_2 emissions*". However, using anthropogenic CO_2 emissions, which contribute only a small portion (3.8%) to the global carbon cycle (Koutsoyiannis [44]), as a principal variable is definitely less meaningful than using the atmospheric CO_2 concentration.
>
> We believe that counterintuitive results, such as those about the causal link between temperature and CO_2 concentration conveyed in this paper, can indeed open up avenues of research. However, these avenues of research might not resolve the issue in a way compatible with what intuition dictates. In the history of science, such avenues were often created when established ideas were overturned by new findings.

The following extract from Koutsoyiannis et al. [3], Section 9 provides additional information and also disputes the Goulet Coulombe and Göbel [43] "avenue":

> In terms of the carbon cycle […], several physical, chemical, biochemical and human processes are involved in it. The human CO_2 emissions due to the burning of fossil fuels have largely increased since the beginning of the industrial age. However, the global temperature increase began succeeding the Little Ice Period, at a time when human CO_2 emissions were very low. To cast light on the problem, we examine the issue of CO_2 emissions vs. atmospheric temperature further in the Supplementary Information, where we provide evidence that they are not correlated with each other. The outgassing from the sea is also highlighted sometimes in the literature among the climate-related mechanisms. On the other hand, the role of the biosphere and biochemical reactions is often downplayed, along with the existence of complex interactions and feedback. This role can be summarized in the following points, examined in detail and quantified in Appendix A1.

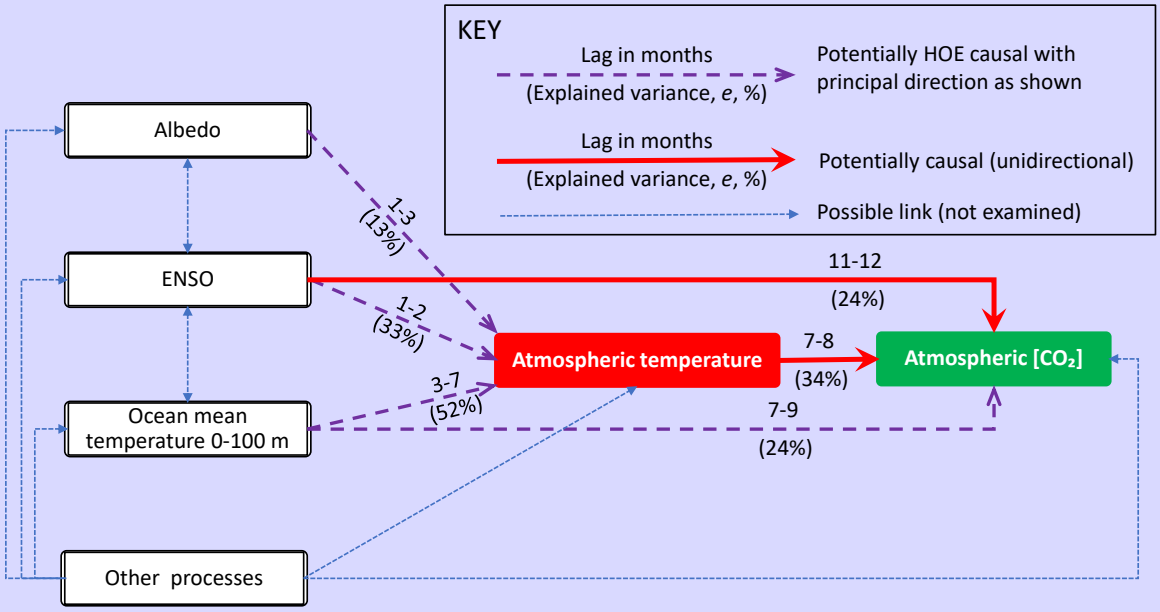
- Terrestrial and maritime respiration and decay are responsible for the vast majority of CO_2 emissions [45, Figure 5.12].
- Overall, natural processes of the biosphere contribute 96% to the global carbon cycle, the rest, 4%, being human emissions (which were even lower in the past [44]).
- The biosphere is more productive at higher temperatures, as the rates of biochemical reactions increase with temperature, which leads to increasing natural CO_2 emission [12].
- Additionally, a higher atmospheric CO_2 concentration makes the biosphere more productive via the so-called carbon fertilization effect, thus resulting in greening of the Earth [40,46], i.e., amplification of the carbon cycle, to which humans also contribute through crops and land-use management [41].

In addition to the biosphere, there are other factors that drive the Earth's climate in periodic and non-periodic way. Orbital parameters of Earth's revolution change quasi-cyclically in a multi-millennial scale (variations in eccentricity, axial tilt, and precession of Earth's orbit), as interpreted by Milanković [47-51], and changes in the orbit geometry influence the amount of insolation. The non-periodic drivers of the Earth's climate variability include volcanic eruptions and collisions with large extraterrestrial objects, e.g., asteroids. An important climate driver is water in its three phases [44]. Another apparent factor is solar activity (including solar cycles) and the solar radiation (im)balance on Earth (e.g., albedo changes; see [44] and Appendix A2). Notably, a recent study [52], by assessing 20 years of direct observations of energy imbalance from Earth-orbiting satellites, showed that the global changes observed appear largely from reductions in the amount of sunlight scattered by Earth's atmosphere.

ENSO and ocean heating, both of which affect temperature, are examined in Appendices A3 and A4, respectively. The results of Appendices A2–A4 are summarized in the schematic of Figure 13. Changes in all three examined processes, albedo, ENSO and the upper ocean heat, precede in time the changes in temperature and even more so those in $[CO_2]$. Generally, the time lags shown in Figure 13 complete a consistent picture of potential causality links among climate processes and always confirm the $T \rightarrow [CO_2]$ direction.

The examined processes in the Appendices are internal to the climatic system. Other processes affecting T, not examined here, could also be external (e.g., solar and astronomical [53,54] and geological [55-59]). Generally, in complex systems, an identified causal link, even though it gives some explanation of a phenomenon, raises additional questions, e.g., what caused the change in the identified cause, etc. In turn, causal links in complex systems may form endless sequences. For this reason, it is naïve to expect complete answers to problems related to complex systems or to assume that a complex system is in permanent equilibrium and that an external agent is needed to "kick" it out of the equilibrium and produce change. Yet the investigation of a single causal link between two processes, as is the focus of this paper, provides useful information, with possible significant scientific, technical, practical, epistemological and philosophical

implications. These are not covered in this paper. Readers interested in epistemological and philosophical aspects of causality are referred to Koutsoyiannis et al. [1], while those interested in the perennial changes in complex systems are referred to Koutsoyiannis [60,61].



[Figure R2-5.4; reproduced from Koutsoyiannis et al. [3]; original caption follows]
Figure 13. Schematic of the examined possible causal links in the climatic system, with noted types of potential causality, HOE or unidirectional, and its direction. Other processes, not examined here, could be internal of the climatic system or external.

Finally, Appendix A.1 from Koutsoyiannis et al. [3] provides quantification of changes in natural CO_2 emissions due to temperature changes:

The greatest part of the inflows is due to the respiration of the biosphere, i.e., the biochemical reaction whereby living organisms convert organic matter (e.g., glucose) to CO_2, releasing energy and consuming molecular oxygen [62]. As seen in Figure A1 (and in several publications, e.g., [31]), respiration has increased in recent years, the main reason for this being the increased temperature. Photosynthesis, the biochemical process that removes CO_2 from the atmosphere, producing carbohydrates in plants, algae and bacteria using the energy of light [62], has also increased, resulting in the greening of Earth [40,41] due to the increased atmospheric concentration of CO_2, which is plants' food.

It is not difficult to quantify the increase in respiration due to the temperature rise. The mechanism has been known in chemistry for more than a century. The rate of a chemical reaction k_T at temperature T is an increasing function of T, given by the Arrhenius equation [63]:

$$k_T = A \exp\left(-\frac{a}{R_* T}\right) \tag{A1}$$

where A and a are free parameters and R_* is the universal gas constant. Typically, the rate is measured in moles per unit volume, but it can readily be expressed in mass units. Expressing the relationship at a reference temperature T_0 and dividing with (A1), we obtain:

$$\frac{k_T}{k_0} = \exp\left(-\frac{a}{R_*}\left(\frac{1}{T} - \frac{1}{T_0}\right)\right) \tag{A2}$$

Taking the logarithms and setting $\Delta T \coloneqq T - T_0$ we find

$$\begin{aligned} \ln\left(\frac{k_T}{k_0}\right) = -\frac{a}{R_*}\left(\frac{1}{T} - \frac{1}{T_0}\right) = \frac{a}{R_* T_0}\left(1 - \frac{T_0}{T}\right) = \frac{a}{R_* T_0}\left(\frac{\Delta T}{T_0 + \Delta T}\right) \\ = \frac{a}{R_* T_0}\left(\frac{\Delta T}{T_0} - \left(\frac{\Delta T}{T_0}\right)^2 + \left(\frac{\Delta T}{T_0}\right)^3 - \cdots\right) \end{aligned} \tag{A3}$$

and assuming that $\Delta T/T_0$ is small (nb., T_0 is of the order of 300 K, while typical values of ΔT is of the order of 1–10 K). We can neglect all terms beyond first order and find:

$$\frac{k_T}{k_{T_0}} = \exp\left(\frac{a}{R_* T_0^2}\,\Delta T\right) = \left(\exp\left(\frac{a}{R_* T_0^2}\right)\right)^{\Delta T} = Q_1^{\Delta T} = Q_{10}^{\Delta T/10} \tag{A4}$$

where

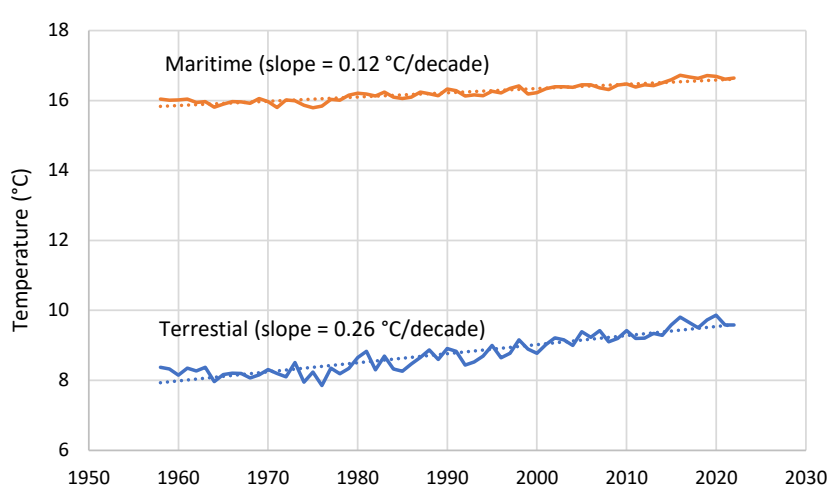
$$Q_1 \coloneqq \exp\left(\frac{a}{R_* T_0^2}\right), \qquad Q_{10} \coloneqq Q_1^{10} \tag{A5}$$

Notice that both Q_1 and Q_{10} are dimensionless numbers > 1. The exponential expression in which Q_{10} is raised to power $\Delta T/10$ is known as the Q_{10} model [64].

The exponential increase of the process rate with temperature is a general chemical behavior, also extending to biochemical reactions. This is not a hypothesis or speculation but a proven fact that is widely used in engineering. For example, the metabolic rate in wastewater and sewer systems is expressed by the so-called effective BOD (EBOD, with BOD standing for biochemical oxygen demand). It has been known for more than 75 years that the metabolic rate increases with temperature, as microorganism activity generally increases with temperature. The relationship of EBOD with temperature has been expressed by Pomeroy and Bowlus [36] as $[\mathrm{EBOD}] = [\mathrm{BOD}]\,(1.07)^{T-20}$, which is similar to (A4), where the reference temperature is $T_0 = 20$ °C and $Q_1 = 1.07$ ($Q_{10} = 2.0$). The latter relationship is the standard of engineering design in sewer systems.

To apply this framework to find the increase of respiration in the last 65-year period investigated in our study, we first retrieved the global temperature separately for land and sea from the NCEP/NCAR Reanalysis data set. These are shown on an annual timescale in Figure A2. The resulting linear trends, also shown in Figure A2, yield an

increase $\Delta T = 1.69$ °C for the terrestrial and 0.78 °C for the maritime part for the 65-year period.



[Figure R2-5.5; reproduced from Koutsoyiannis et al. [3]; original caption follows]
Figure A2. Evolution of global land (terrestrial) and sea (maritime) temperature at 2 m from the NCEP/NCAR Reanalysis data set, retrieved from the ClimExp platform, and resulting slopes of linear trends.

Now the literature gives representative average Q_{10} values of 3.05 for terrestrial respiration [64] and 4.07 for maritime respiration [65]. If R_B and R_E denote the respiration rate at the beginning and the end of the 65-year period, and $\Delta R \coloneqq R_\mathrm{E} - R_\mathrm{B}$, then according to (A4),

$$\frac{R_\mathrm{E}}{R_\mathrm{B}} = Q_{10}^{\Delta T/10} \tag{A6}$$

and hence

$$\Delta R = R_\mathrm{E}\left(1 - \frac{1}{Q_{10}^{\Delta T/10}}\right) \tag{A7}$$

For the above given values of Q_{10} and ΔT, the expression in parentheses becomes 0.172 for the terrestrial part and 0.104 for the maritime part. Multiplying these by the R_E values shown in Figure A1, i.e., 136.7 and 77.6 Gt C/year, respectively, we find $\Delta R = 23.5$ and 8.1 Gt C/year, respectively, i.e., a total global increase in the respiration rate of $\Delta R = 31.6$ Gt C/year. This rate, which is a result of natural processes, is 3.4 times greater than the CO_2 emission by fossil fuel combustion (9.4 Gt C /year including cement production).

R2-5.4. Returning to the abstract:

> "Its application to instrumental measurements of temperature (T) and atmospheric carbon dioxide concentration ([CO_2]) over the last seven decades provided evidence for a unidirectional, potentially causal link between T as the cause and [CO_2] as the effect. "

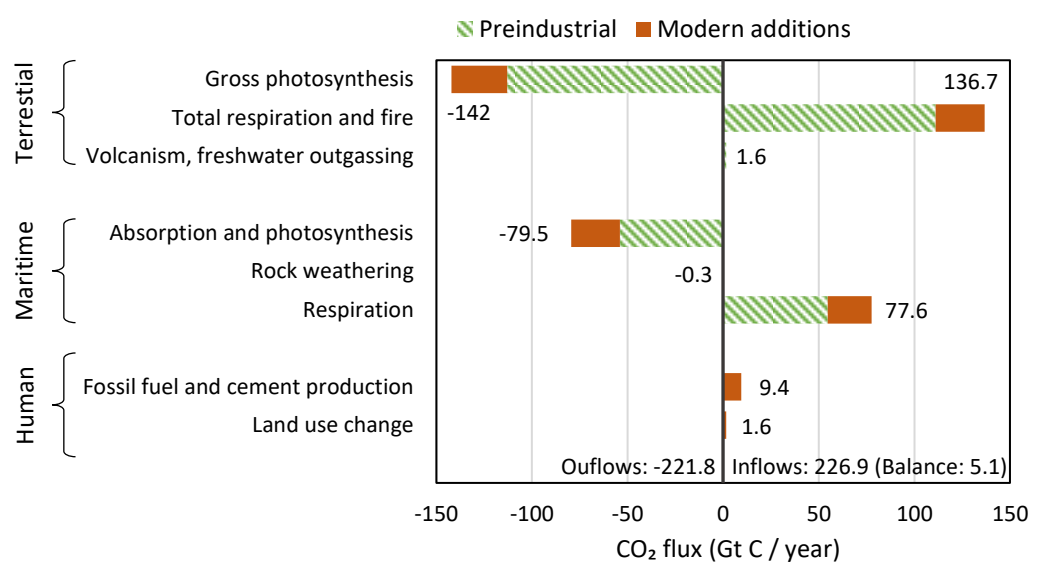
This is easily shown to be an incorrect inference - it is directly refuted by the Earth's "carbon budget" data (see e.g. [[1]]).

My statement is 100% correct. It follows the statement "*As a **result of recent research**, a new stochastic methodology of assessing causality was developed.*" And this stochastic methodology, described in Koutsoyiannis et al. [1-3] gave exactly the results summarized in the next statement, quoted by the reviewer.

Furthermore, these findings are 100% consistent with Earth's carbon budget data. The reviewer recommends citing the reference to Cawley (2011) [66]. However, we have used the newer data of the most recent (2021) IPCC's Assessment Report (AR6) [32]. And our findings are fully consistent with both the IPCC and Cawley data.

Most probably, the reviewer has not seen the part of the paper Koutsoyiannis et al. [3], where we use the IPCC carbon budget data. Hence, I am reproducing this part from Appendix A.1 here:

> Here we follow the IPCC's [32] account in its recent (2021) Assessment Report (AR6). Its schematic (Figure 5.12 in that Report) does not hide (a) the imbalances in the different parts of Earth and (b) the fact that the natural carbon inputs and outputs in the atmosphere change over time—even though the IPCC's schematic implicitly assumes that "natural" is the budget that occurred in the preindustrial age (1750) and that any change that occurred since is anthropogenic. Interestingly, in an alternative view by Hansen et al. [67], civilization always produced greenhouse gases and aerosols, and humans likely contributed to the increase of both in the past 6000 years, thus resulting in climate forcings.
>
> Based on the IPCC's representation, we have summarized in Figure A1 the information given in IPCC's schematic, in terms of annual carbon balance. When seen in the entire picture, the human emissions due to fossil fuel combustion (9.4 Gt C/year including cement production) is a small part (4%) of the total CO_2 inflows to the atmosphere.



[Figure R2-5.6; reproduced from Koutsoyiannis et al. [3]; original caption follows]
Figure A1. Annual carbon balance in the Earth's atmosphere, in Gt C/year, based on the IPCC [32] estimates. The balance of 5.1 Gt C/year is the annual accumulation of carbon (in the form of CO_2) in the atmosphere.

As per the graph contained in Cawley (2011) [66], namely its Figure 2, which the reviewer reproduces below, I show in my reply to her/his next comment (R2-5.5) that it is fully consistent with our findings.

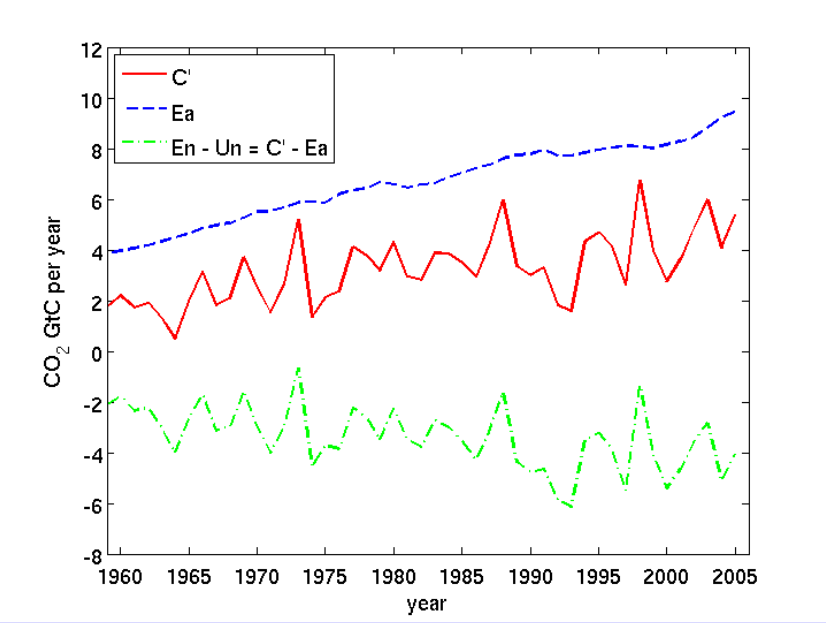
R2-5.5. Briefly stated, the carbon cycle obeys conservation of mass, so the annual change in atmospheric CO2, C', is equal to the difference in total emissions into the atmosphere, and total update from the atmosphere, i.e.

C' = Ea + En - Un

Where Ea is total emissions from anthropogenic sources, En is total emissions from all natural sources and Un it total uptake from the atmosphere by all natural sinks (note there is no non-negligible anthropogenic uptake, there is no significant amount of carbon capture and storage currently in action). Note that natural sources do not differentiate between CO2 from natural and anthropogenic, so Un is a combination of both in proportion to their atmospheric mixing ratio.
Via basic algebra, we obtain

C' - Ea = En - Un

In other words the difference between natural emissions and uptake by natural sinks (i.e. the net action of the natural carbon cycle) is equal to the difference between the annual rise in CO2 and the level of anthropogenic emissions, both of which are reliably known - C' from e.g. Mauna Loa Observatory (MLO) data and Ea from givenrment/commercial records.



[Figure R2-5.7 (by Reviewer #5 without a caption]
If we look at the carbon budget data, we see that every year since 1960 (when the MLO data became available), the annual change in atmospheric CO2 has been less (about half) the level of anthropogenic emissions, which means that the natural environment must necessarily have been a net carbon sink. The natural environment has been **opposing** the increase, and we can see that this opposition has been increasing with time.

This rules out a change in global temperature being the cause of the rise in atmospheric CO2 through some response of the natural carbon cycle.

This comment is most interesting and I will reply to it in full detail. Generally, while Reviewer's #5 comments do not seem to be plagiarized in the sense recently revealed and studied by Piniewski et al. [68], this particular comment is a paraphrasis of Cawley's [69] comment in the pubpeer site, created by Rice [70]. The notations, equations and the figure are precisely the same (without paraphrasis) as in Cawley's [69] comment.

Clearly then, this comment, which was posted in 2022, refers to the paper Koutsoyiannis et al. (2022) [2]. The reason why Rice [70] and Cawley [69] created the pubpeer site and posted their comments are revealed by Rice [71] in his blog. He says:

> I thought I might simply highlight that I started a PubPeer thread about this paper and Gavin Cawley has already posted a couple of useful comments. A PubPeer thread about the Zharkova et al. paper produced quite an extensive comment thread and probably played a role in it being retracted. You might argue that a paper shouldn't be retracted just because one of the case studies produces results that are almost certainly wrong. On the other hand, you might also argue that if one of their case studies produces such results that it rather undermines their whole method. You might also argue that it's rather embarassing that one of the Royal Society's journals could publish a paper with what is, these days, a very obviously wrong result.

In other words, these two gentlemen are the supreme judges of what is scientifically wrong and right—as well as able to dictate to scientific organizations, including the Royal Society, what they are allowed to publish and what they should retract.

In a later post, Rice [72] uncovers two things: (a) they emailed to the Royal Society to retract our papers, and (b) that the Royal Society responded negatively (how dared they!). Specifically, Rice [72] writes:

> When the Proceedings of the Royal Society A paper came out last year, I emailed the editor to point out that they'd published a paper with a rather nonsensical result. I didn't get a response. However, I was cc'd into a response to someone else who had also complained. This response was, unfortunately, rather dismissive and somewhat insulting. The response said that the criticism had been discussed with the board member and subject editor who handled the paper. According to them, the criticism misinterpreted what was in the paper and was not well-founded. Apparently, the result was scientifically intriguing and would be of interest to many of their readers.

While my coauthors and I are generally responsive to comments and criticisms by anyone interested (and we have stated in our papers that we welcome dialogue), we had decided not to respond to the comments of this group in pubpeer and in their blog for two reasons: (a) because their purpose was not the scientific dialogue, but our silencing and (b) because of the low level of their criticism.

I am very much disappointed that, because of a surprising editorial decision to invite additional reviewers, I am forced now, two years after, to reply to this old comment, referring to a paper of 2022. And this I must do in the framework of the peer review of my new paper in 2024!

So here is my reply, which, however, I do not include in the present paper, because it is totally out of its scope. It refers to my earlier papers. My reply, in full detail, to this particular comment is only part of this report.

The equations and the graph copied from Cawley [66,69] by the reviewer, as well as the interpretation given is totally irrelevant to causality. A necessary condition to assess causality is time precedence and there is nothing in the Reviewer's #5 and Cawley [69] comments related to time lead or lag.

The equations and the graph are fully consistent with our approach in Koutsoyiannis et al. [1-3], and with their finding that the temperature change leads and the [CO_2] change lags, which excludes the possibility that [CO_2] change is a cause of temperature change.

Initially I include the following quotation from Koutsoyiannis et al. [3], Section 9, which contains a simple and brief model of the covariation of the two variables:

> As already clarified, the scope of our work is not to provide detailed modeling of the processes studied but to check causality conditions. We highlight the fact that the relationship we established explains only about 1/3 of the actual variance of $\Delta\ln[CO_2]$. This is not negligible for investigating causality, but also leaves a margin for many other climatic factors to act.
>
> Nonetheless, our results can certainly be improved if we change our scope to more detailed modeling. To illustrate this, we provide the following toy model. Based on our result that the T-[CO_2] system is potentially causal with direction $\Delta T \to \Delta\ln[CO_2]$, we estimate $\Delta\ln[CO_2]$ as
>
> $$\Delta\ln[CO_2] = \sum_{j=0}^{20} g_j \Delta T_{\tau-j} + \mu_v \quad (8)$$
>
> and we proceed a step further, assuming that the mean μ_v also depends on past temperature, averaged at timescale m, i.e.,
>
> $$\mu_v = \alpha(T_m - T_0) \quad (9)$$
>
> where T_m is the average temperature of the previous m years, and α and T_0 are constants (parameters). Such a simple linear relationship is supported by the above-listed points related to the productivity of the biosphere. Equation (9) will result in negative values μ_v if $T_m < T_0$ and positive otherwise.
>
> By re-evaluating the IRF coordinates g_j simultaneously with the parameters of Equation (9), we find the modified version of the IRF plotted in Figure 14. The optimized additional parameters are $m = 4$ (years), $\alpha = 0.0034, T_0 = 285.84$ K. Similarly to [1], we used a common spreadsheet software solver to perform the optimization, adding the two parameters α and T_0 to the unknown coordinates g_j of the IRF and performing the (nonlinear) optimization for all unknowns (m was found by trial-and-error). A graphical

comparison of the actual $\Delta\ln[CO_2]$ and $[CO_2]$ with those simulated by the model of Equations (8) and (9) is given in Figure 15. The explained variance for $\Delta\ln[CO_2]$ was drastically increased from 34% to 55.5% and that for $[CO_2]$ is an impressive 99.9%.

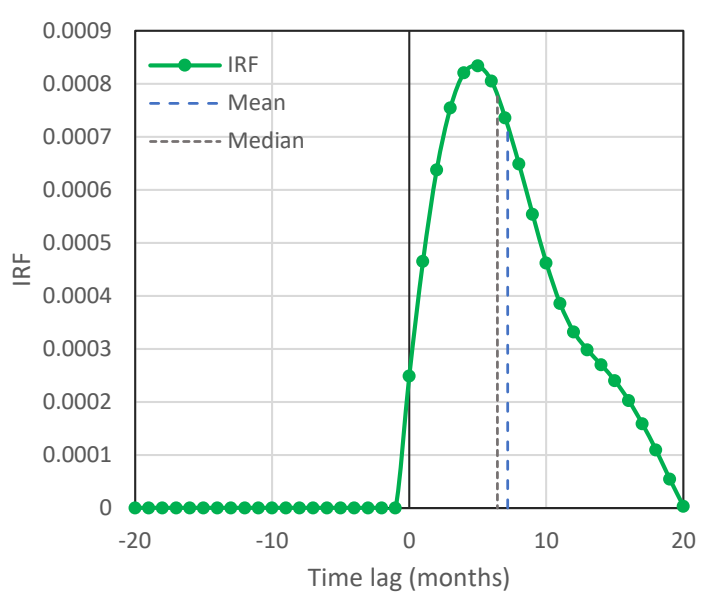
For the convenience of the readers who are interested in repeating the calculations, we also give a parametric expression of IRF and summarize the toy model as:

$$\Delta\ln[CO_2] = \sum_{j=0}^{20} g_j \Delta T_{\tau-j} + \mu_v, \qquad (10)$$

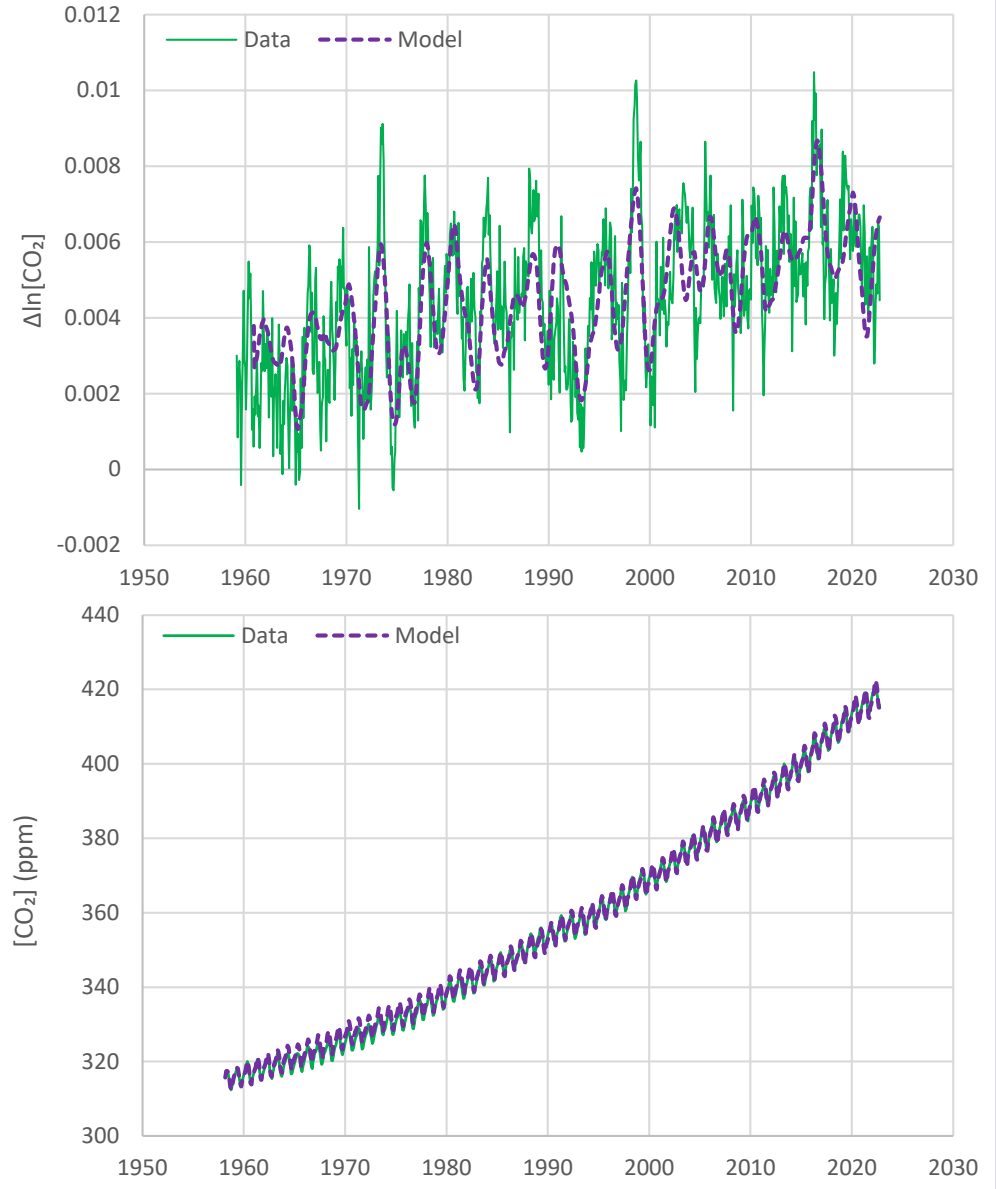
$$g_j = 0.00076\, j^{0.67} e^{-0.2j}/\mathrm{K}, \qquad \mu_v = 0.0034\,(T_4/\mathrm{K} - 285.84)$$

(where K is the unit of kelvin).

We emphasize, however, that we do not exploit the impressive result of explained variance of 99.9% to assert that we have built a decent model, even though this toy model is both accurate (in the lower panel of Figure 15, the simulated curve is indistinguishable from the actual) and parsimonious (the model expression in (10) contains only 5 fitted parameters). We prefer to highlight the fact that the hugely complex climate system entails high uncertainty, and its study needs reliable data that provide the basis for the modeling and testing of hypotheses.



[Figure R2-5.8; reproduced from Koutsoyiannis et al. [3]; original caption follows]
Figure 14. Modified IRF for temperature–CO_2 concentration based on the NCEP/NCAR Reanalysis temperature at 2 m and Mauna Loa time series, respectively, similar to Figure 2 but with IRF coordinates simultaneously optimized with the parameters of Equation (9).



[Figure R2-5.9; reproduced from Koutsoyiannis et al. [3]; original caption follows]
Figure 15. Comparison of the actual $\Delta\ln[CO_2]$ (**upper**) and $[CO_2]$ (**lower**) with those simulated by the model of Equations (8) and (9).

Now I use this toy model to reproduce Figure R2-5.7, i.e. Cawley's [66,69] and Reviewer's #5 graph. The resulting graph is seen in Figure R2-5.10 below. This is the original Figure R2-5.7 on which I overlay the results of our model in equation (10) in Koutsoyiannis et al. [3], also reproduced above. If the reviewer wants to test and reproduce it independently, here are the steps:

1. I digitized the "Ea" curve from Figure R2-5.7, i.e. Cawley's [66,69] and Reviewer's #5 graph.

2. I took the monthly global temperatures from the NCEP/NCAR reanalysis, as described in Koutsoyiannis et al. [3].

3. I applied the model of equation (10) to produce monthly values of $\Delta\ln[CO_2]$.

4. I aggregated the values of $\Delta\ln[CO_2]$ to find monthly values of $\ln[CO_2]$ and then exponentiated them to find monthly values of $[CO_2]$.

5. I aggregated from monthly scale to annual scale, and I took the annual differences of $[CO_2]$, i.e. C'.

6. I calculated the differences $C' - \text{Ea}$

7. I plotted the annual series of C' and $C' - \text{Ea}$.

It is seen that the model results, which are clearly based on the finding that temperature leads and $[CO_2]$ lags, is fully consistent with the Cawley's [66,69] and Reviewer's #5 graph.

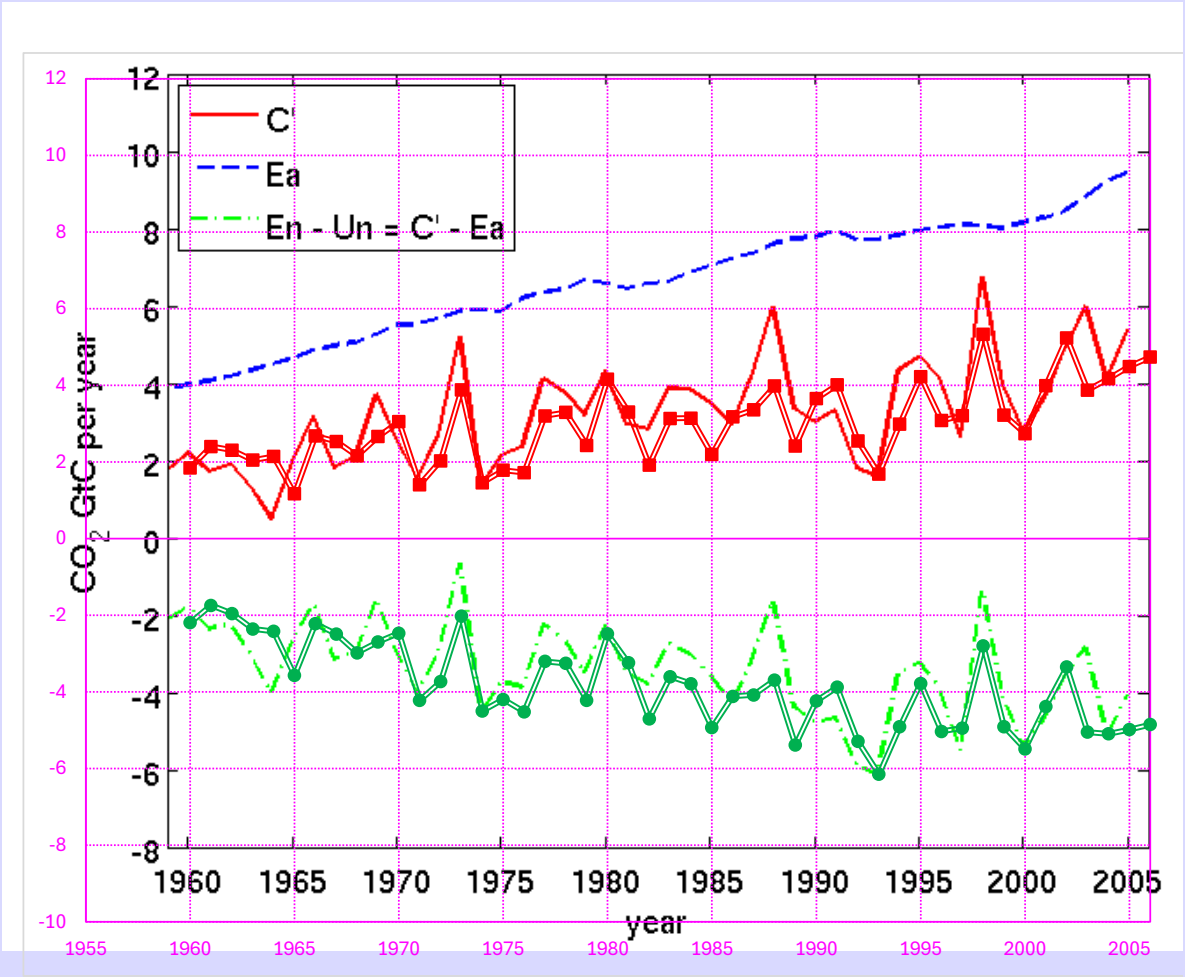


Figure R2-5.10 (new). Plots of the results of model of Equation (10), overlayed to the graph of Cawley [66,69] and Reviewer #5, seen in Figure R2-5.7.

One may notice that Cawley's [66,69] and Reviewer's #5 graph stops at year 2005. Since I took this effort, I expanded the graph up to year 2020, also using the most recent time series of emissions and of $[CO_2]$ as described in Koutsoyiannis et al. [3]. This is seen in Figure R2-5.11 (new). The model performance is excellent, explaining 81% of the annual variability.

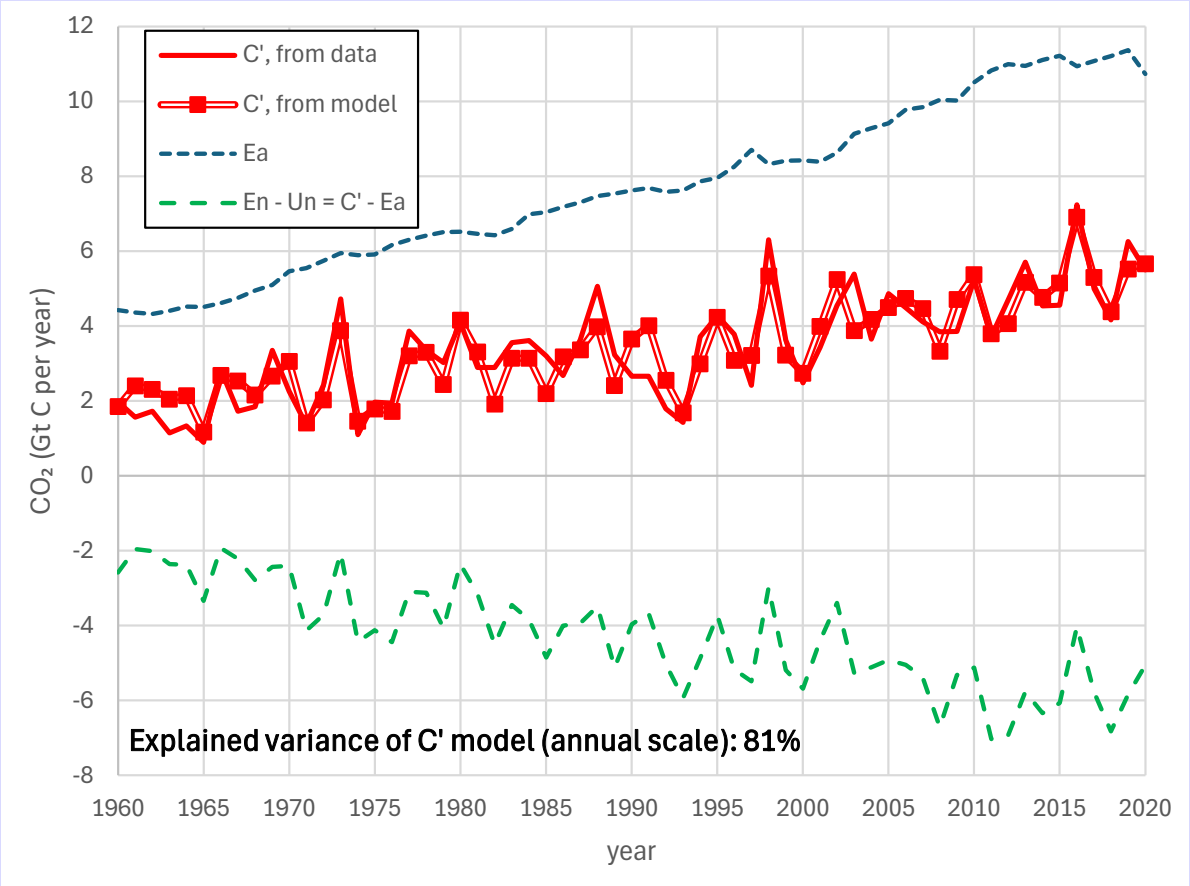


Figure R2-5.11 (new). Update of Cawley's [66,69] and Reviewer's #5 graph (seen in Figure R2-5.7) using the most recent CO_2 emission and concentration time series, and expansion up to year 2020. The results of model of Equation (10) are also shown.

As seen in Koutsoyiannis et al. [3], at the monthly scale the performance is even better, with an explained variance of 99.9%. Despite that, I wish to repeat again the following extract from Koutsoyiannis et al. [3]:

> We emphasize, however, that we do not exploit the impressive result of explained variance of 99.9% to assert that we have built a decent model […]. We prefer to highlight the fact that the hugely complex climate system entails high uncertainty, and its study needs reliable data that provide the basis for the modeling and testing of hypotheses.

After all this analysis, I wish to address an invitation to the reviewer to use my updated graph in Figure R2-5.11 for the next time she/he wants to present this stuff. That would indeed be preferrable because Figure R2-5.11 is updated and expanded, as well as for the additional reason that it also includes our model results, which agree very well with the observational data.

R2-5.6. This is not the only line of evidence that contradicts the finding of the current paper. There is also the timing of the increase in atmospheric CO2 matching the increase in anthropogenic emissions; the ratio of the atmospheric rise and anthropogenic emissions being approximately constant; declining 14C ratio; declining 13C ratio; declining; increasing oceanic CO2 etc. This is all well known - see e.g. IPCC WG1 reports.

Apparently, the reviewer is not aware of my recent publication [5] entitled "*Net isotopic signature of atmospheric CO_2 sources and sinks: No change since the Little Ice Age*". I am quoting here the abstract and the graphical abstract, and invite the reviewer to see the entire paper, which refutes her/his above claims.

> **Abstract** Recent studies have provided evidence, based on analyses of instrumental measurements of the last seven decades, for a unidirectional, potentially causal link between temperature as the cause and carbon dioxide concentration ($[CO_2]$) as the effect. In the most recent study, this finding was supported by analysing the carbon cycle and showing that the natural $[CO_2]$ changes due to temperature rise are far larger (by a factor > 3) than human emissions, while the latter are no larger than 4% of the total. Here, we provide additional support for these findings by examining the signatures of the stable carbon isotopes, 12 and 13. Examining isotopic data in four important observation sites, we show that the standard metric $\delta^{13}C$ is consistent with an input isotopic signature that is stable over the entire period of observations (>40 years), i.e., not affected by increases in human CO_2 emissions. In addition, proxy data covering the period after 1500 AD also show stable behaviour. These findings confirm the major role of the biosphere in the carbon cycle and a non-discernible signature of humans.

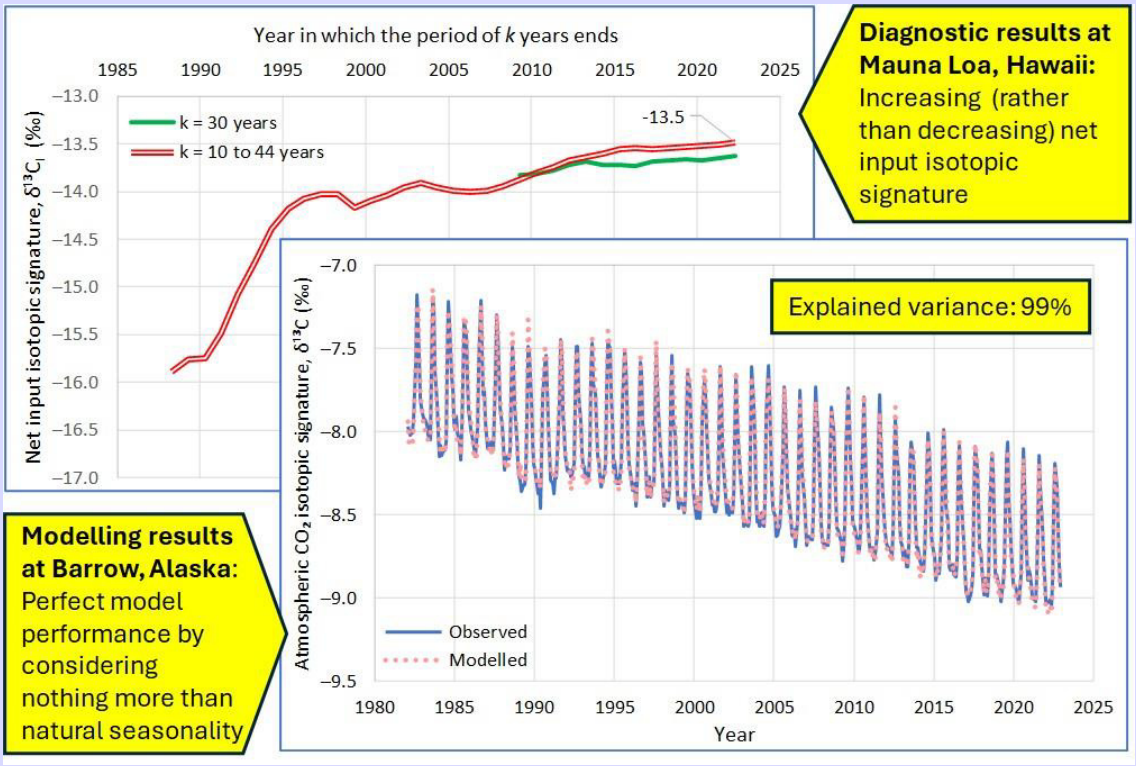


Figure R2-5.12. Graphical abstract of Koutsoyiannis [5].

R2-5.7. Returning to the abstract once more, the next claim is:

> "Several proxy series, extending over the entire Phanerozoic or parts of it, ... , are compiled, paired and analyzed. The extensive analyses made converge to the single inference that change in temperature leads, and that in carbon dioxide concertation lags."

This more moderate claim is essentially correct, but **entirely** uncontraversial. Temperatures leading and CO2 lagging does not imply that the causal relationship is exclusively from

temperature to CO2, because the same thing can result from a system in dynamic equilibrium with causal relationships in both directions. Throughout most of the Phanerozoic, the carbon cycle has mostly acted as a feedback mechansim, that on some timescales amplifies changes in temperature and on other timescales damping them down. For instance carbon cycle feedback amplified the very small changes in solar forcing from Milankovic cycles, giving rise to large temperature swings between glacial and interglacial periods in over the last 800,000 years seen in the Vostok ice core. The change in solar forcing is much too small to explain the temperature change in isolation. In this case, as the carbon cycle is acting as a positive feedback, it is not surprising that CO2 lags temperature (it takes time for thermal inetria of the oceans to be gradually overcome and so there is a delay in the ougassing) - see [[4]] for a basic explanation. On longer timescales, the "weathering thermostat" kept planetary temperature fairly stable - the chemical weathinging of silicate rocks is temperature dependent. If temperatures are high, this cases greated weathering and more CO2 is taken out of the atmosphere. This reduces the GHE, which tends to lower temperatures again, over many thousands of years, and the dynamic equilibrium is restored. Again, temperature leads and CO2 lags. None of this is obscure knowledge - it can easily be found in public understanding of science texts, such as Archer [[2]] or Volk [[3]]. As we know this from existing studies, informed by physics, a statistical model sheds no real light on the issue and does not justify publication.

However, on geological timescales, the carbon cycle can also act as a forcing. For example, the most plausible explanation for the emergence from the "Snowball Earth" conditions during the Cryogenian, Late Ordovician and Silurian is that the weathering thermostat was "switched off" by the ice coverage, which allowed GHG emissions from volcanic activity to gradually accumulate in the atmosphere, until the EGHE was sufficient for temperatures to rise to the point where the ice melted. In that case, CO2 led and temperatures lagged. Another example would be changes in the weathering thermostat due to changes in the position of the continents (see e.g. [[5]]) or the creation of mountain ranges (see e.g. [[6]]). In those cases, CO2 would also lead and temperatures lag because there the CO2 is acting as a forcing rather than a feedback. Again, this information has been discussed in the public debate on the science of climate.

The entire comment is irrelevant. The entire abstract, from which the reviewer quotes a couple of sentences is:

> As a result of recent research, a new stochastic methodology of assessing causality was developed. Its application to instrumental measurements of temperature (T) and atmospheric carbon dioxide concentration ($[CO_2]$) over the last seven decades provided evidence for a unidirectional, potentially causal link between T as the cause and $[CO_2]$ as the effect. Here we refine and extend this methodology, and apply it to both paleoclimatic proxy data and instrumental data of T and $[CO_2]$. Several proxy series, extending over the entire Phanerozoic or parts of it, gradually improving in accuracy and temporal resolution up to the modern period of accurate records, are compiled, paired and analyzed. The extensive analyses made converge to the single inference that change in temperature leads, and that in carbon dioxide concentration lags. This conclusion is valid for both proxy and instrumental data in all time scales and time spans. The time scales examined start from annual and decadal for the modern period (instrumental data) and the last two millennia (proxy data), and reach one million years

> for the most sparse time series for the entire Phanerozoic. The type of causality appears to be unidirectional, $T \rightarrow [CO_2]$, as in earlier studies. The time lags found depend on the time span and time scale and are of the same order of magnitude as the latter. These results contradict the conventional wisdom, according to which the temperature rise is caused by $[CO_2]$ increase.

This abstract summarizes the content of the paper and is fully consistent with that content. It does not reflect the other studies which the reviewer likes and refers to. It reflects the analyses contained in my paper. In this respect, the sentences quoted by the reviewer are 100% accurate and no change is required.

R2-5.8. In summary, the abstract contains nothing that is both correct and novel. The conclusion is naive, ignores a substantial amount of well established scientific work, reflecting a lack of adequate scholarship.

As I already stated, the abstract contains a summary of the paper. The analyses and results presented in the paper are correct and novel, as also recognized by the three original reviewers.

I did not invite the reviewer to assess whether my scholarship is adequate or not. Of course he has the right to do that without my invitation, but she/he may keep his assessment for her/him self.

R2-5.9. Introduction

> Crime begins with propaganda, even if such propaganda is for a good cause Hans Fritzsche {1}

This sort of rhetoric is simply unacceptable in a scientific paper and oonly undermines the authors work. It seems to imply that the mainstream scientific position on CO2 is (well intentioned) "propaganda" rather than the result of dispassionate scientific research, which is simply not the case.

I put this as a motto relevant to the paper. I could argue about its relevance, but the discussion would be too long and would distract the interest from the focus of the paper. Therefore, I preferred to delete the motto in the re-revised manuscript.

R2-5.10. One of the most controversial issues of our time is the causal relationship between atmospheric temperature (T) and carbon dioxide (CO2) concentration ([CO2]) in Earth's climate.

There is no genuine *scientific* controversy on the existence and mechanism of the EGHE, which has been well understood for over a century, nor on the basic science of the carbon cycle or the evidence that demonstrates that the rise in atmospheric CO2 is due to anthropogenic emissions (the IPCC WG1 reports have long had an explicit section on that issue). There is controversy in the public debate on climate, but it is largely due to misinformation promulgated on climate blogs and media. There are occasional failures of peer review that result in the publication of fundamentally flawed papers, but in the long run science is self-correcting and robust to these problems.

What is *misinformation*, *propaganda*, *censoring* and *silencing* is a tough issue to discuss and, again, the discussion would be a distraction from the focus of the paper. I invite the reviewer to see

another paper of mine, [44], and in particular its section 6, where I discuss the political origin of the climate change agenda.

To address this comment, I changed the quoted phrase, which now reads:

> Some of the most controversial issues of our time are related to Earth's climate, not excluding the causal relationship between atmospheric temperature (T) and carbon dioxide (CO_2) concentration ($[CO_2]$).

R2-5.11. It is also accepted that the cosmic ray flux has a large effect on the climate and this flux had variations, including a cycle with a period of about 145 million years, corresponding to the passage of the solar system through one of the two sets of spiral arms of the Milky Way {16}.

While time constraints means that I can't check on all of the references cited, this is something that most certainly is not accepted by the scientific community (although it has been widely discussed on climate skeptic blogs). From the IPCC AR6 WG1 report (page 958)

> AR5 concluded that the GCR effect on CCN is too weak to have any detectable effect on climate and no robust association was found between GCR and cloudiness (Boucher et al., 2013). Published literature since AR5 robustly supports these conclusions with key laboratory, theoretical and observational evidence. There is high confidence that GCRs contribute a negligible ERF over the period 1750–2019.

The section makes reference to the CLOUD project at CERN that was set up to test the the proposed causal mechanism (an increase in cloud consensation nucleii) and found that the effect was very small. An effect on geological timescales has not been completely ruled out as far as I am aware, but there is very little beyond a statistical correlation as evidence.

I prefer not to include this information in the paper, as it is another political issue. We should not forget that IPCC is a political organization. Perhaps the reviewer is not aware of the developments related to the political aspects of the CLOUD project at CERN. Here I quote a part from an interview from 2011 of the then CERN's Director General Rolf-Dieter Heuer in the German newspaper Die Welt [73] using machine translation from German to English (my emphasis):

> **Heuer**: This is actually about understanding cloud formation better. There are many parameters in nature that influence this - including temperature, humidity, impurities and cosmic radiation. The "Cloud" experiment is about investigating the influence of cosmic radiation on cloud formation. The radiation used for this comes from the accelerator. And in an experimental chamber, it is possible to research under controlled conditions how droplet formation depends on radiation and suspended particles. The results will be published shortly. **I asked my colleagues to make the results clear but not to interpret them. This would immediately enter the highly political arena of the climate change discussion.** It must be clear that cosmic radiation is only one of many parameters.

What I write is consistent with the last sentence in the above quotation, that that cosmic radiation is only one of many parameters.

To address the reviewer's comment, in the revised manuscript and in the phrase quoted by the her/him, I have changed the verb "accepted" to "asserted" (which was actually what I meant but perhaps I made a typing error and the automatic speller changed it).

R2-5.12. "According to the established narrative, which is simplistic and negligent of the huge complexity of the climatic system, ..."

Again this is rhetoric unbecoming of a scientific paper and devalues the authors argument. It isn't an "established narrative", it is a century or more of diligent scientific research and is not simplistic (demonstrated by the page count of the IPCC report) not does it neglect complexity. I will not comment on further uses of rhetoric in this review, as it would be an egregious waste of my time as a reviewer. It is not to the authors advantage in communicating his findings. That ought to be sufficient.

I did not invite the reviewer to advise me regarding my style of writing. I am 69, I have published more than 250 journal articles and more than 1100 documents in total, including editorial notes and books and I feel I have the right to express myself according to the experience I developed through the years.

That said, in the phrase quoted by the reviewer, I changed "established" to "this".

R2-5.13. It is concerning that the author cites one of their previous papers on this topic (reference 22 in the paper) but does not appear to mention the critical comment paper that was published explaining why the findings of that paper were incorrect. Unfortunately the same error is made in the current paper. Also cited is the paper by Humlum et al. (reference 34), which makes essentially the same mistake as this paper (differencing of the time series data deletes the contribution of anthropogenic emissions), but none of the papers that explained the error. This is not an acceptable practice.

I do not understand which error and which "critical comment paper that was published" the reviewer refers. There is no error. I do not understand why it is concerning to the reviewer that I cite my previous works. Should I repeat in the present work what I have already published?

See additional information in my reply to the next comment.

R2-5.14. Methodology

One important issue that should be kept in mind is related to the very high autocorrelations, which appear particularly in [CO 2] series. As high autocorrelation increases uncertainty in the long term, this is a major case leading to false identification of potential causality. This problem was discussed in {22} and illustrated in the electronic supplementary material of this publication, along with the technique to handle such situations and avoid false conclusions. Specifically, the appropriate technique is to difference the time series, so as to investigate the changes of the related processes, rather than the processes per se. Differencing reduces the autocorrelations substantially and thus avoids spurious results but has the disadvantage of reducing the explained variance.

This, as pointed out by Asbrink [[7]] and in the pubpeer discussion of the Author's previous work [[8]], is a fundamental error. Differencing the time series causes the long term linear trend component of the time series to become an additive constant in the differenced time series. If the method of analysis is insensitve to additive constants, then there is no mathematical link between the findings of the analysis and the long term increase. This is problematic in the case of the carbon cycle because the cause of the long term increase in both series (fossil fuel emissions and the EGHE) is not the same as the causes of the short term variability around the trend namely seasonality and the effects of ENSO (as noted by Bacastow, see [[7]]). Seasonality can be dealt with via the running mean used in the paper, or use of anomalies, which would be a more usual approach. In the case of ENSO, it affects temperature directly, through changes in ocean surface temperature, but the effect on CO2 is not via temperature, but via changes in precipitation leading to variation in growth and decay in the terrestrial biosphere. It is a confounding variable that is missing from the analysis. Unfortunately, this means the analysis will incorrectly attribute the cause of the long term change to the cause of the short term variability, which is essentially unrelated. This is the same error made by Humlum et al., as well as several others, including Murry Salby and the error has been repeatedly pointed out. This primarily affects the instrumental data, but similar problems may also be present in the paleoclimate studies.

First off, we should distinguish Åsbrink's [74] Commentary from the "*pubpeer discussion*". The former is a scientific work, formally published in a journal. The latter is a failed action to force retraction of our paper. As the "*pubpeer discussion*" is already discussed above (comment R2-5.5), I am replying here to the part of the reviewer's comment that is related to Åsbrink's Comment. I admit that it was my omission not to cite Åsbrink, which I now corrected.

Åsbrink did not challenge our methodology nor our results. His comment does not contain anything related to our mathematical part. He simply expressed disagreements with some of our formulations and interpretations. These disagreements allowed us to confirm our results in the original papers [1,2] and to shed further light on why our original formulations stand. As our new analyses exceeded the length of a typical reply to a Commentary, we published them in a stand-alone new paper [3]. In this, we responded to all Åsbrink's disagreements and we further developed our method. We let both the Royal Society and Åsbrink know that they can find our complete set of replies to our newer paper [3]. This triggered a constructive email exchange with Åsbrink.

In particular, with respect to Åsbrink claim that

> *'Common perception' is different for different timescales. It is a well-known fact that the fluctuations of [CO_2] in a timescale of a couple of years are caused by temperature variations.*

and

> *Hence, the common perception that increasing [CO_2] causes increased T seems likely.*

in our paper [3] we proved that this common perception cannot stand. Already in our paper [2], our Figure 15, whose time lags span 200 months (≈ 17 years) confirms the validity of our results for timescales larger than decadal. In addition to what is reported in our paper [2], in [3] we tested larger timescales, using longer temperature series along with the Mauna Loa [CO_2] measurements, which began in 1958. These analyses gave essentially the same results as

in the case study presented in [2], suggesting a potentially causal system with the directionality being $\Delta T \rightarrow \Delta \ln[CO_2]$, with even better characteristics (higher cross correlation and explained variance, and time lags greater than or equal to those in [2]). In addition, we increased the time interval of differencing from one year to more than a decade. The results were again essentially the same. As per the Åsbrink's suggestion that "*For the annual cycle, one should actually look at the two hemispheres separately*", in our paper [3] we conducted an additional analysis with the South Pole [CO_2] measurements, with the results being very similar: potentially causal system with causality direction $\Delta T \rightarrow \Delta \ln[CO_2]$, and lags close to 10 months. In all our case studies the possible causality $\Delta \ln[CO_2] \rightarrow \Delta T$ has been excluded as not satisfying the necessary condition of time precedence.

Concerning the reviewer's remark about the effect that differencing the time series may have on the long-term trend, our analysis in Section 9 of our paper [3] shows that clearly this is not the case. My reproduction of the reviewer's graph in her/his comment R2-5.5 clearly confirms that after aggregating the differenced results, our model, fully based on causality direction $T \rightarrow [CO_2]$, has even better performance than in the differenced case: explained variance 81% at annual scale and 99.9% on monthly scale.

Other issues mentioned by the reviewer such as ENSO and the role of the biosphere are fully analyzed in our paper [3]—see Section 9 and Appendices A.1 and A.3.

R2-5.15. Conclusions

> Is there a mechanism that, at the recent period has, due to human or presumed 'unnatural' actions, reversed directionality, as the popular claim is? Perhaps, but no analysis based on observational data has shown that.

Yes. Extracting fossil carbon from the lithosphere and injecting it into the atmosphere is a mechansim that will increase atmospheric CO2; the extended greenhouse effect means that this will result in an increase in global mean surface temperature (all things being otherwise equal. The carbon budget/mass balance analysis given earlier (see also [[1]]) establishes the former; a variety of evidence confirms the latter, e.g. [[9]] but see also the IPCC WG1 report

I have changed the quoted phrase, which now reads:

> Did human actions, such as fossil fuel combustion and other presumed 'unnatural' actions, reverse directionality, as the popular claim is?

R2-5.16. Rather, such claims are based on imagination and climatic models full of assumptions.

All models are full of assumptions, including the statistical models used in the paper. Again, this is rhetoric that does not belong in a balanced, objective scientific paper.

Indeed, models are based on assumptions, but not all models are full of assumptions. The stochastic methodology on which the paper is based is extraordinarily parsimonious in terms of assumptions, as seen in Section 3.2.

I have many papers showing the poor performance of climate models in representing reality, such as [75-80], while, most importantly, our recent paper, Koutsoyiannis et. al. [3] shows that the causality direction in climate models, identified by the same methodology, is opposite to

that identified from real-world data. However, I prefer not to expand the paper about this, as it would be a distraction.

In terms of my style of writing (the "*rhetoric*" according to the reviewer), please see my reply to comment R2-5.12.

R2-5.17 References [in Reviewer's #5 review]

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Atmospheric Temperature and CO_2: Hen-Or-Egg Causality?

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Abstract: It is common knowledge that increasing CO_2 concentration plays a major role in enhancement of the greenhouse effect and contributes to global warming. The purpose of this study is to complement the conventional and established theory, that increased CO_2 concentration due to human emissions causes an increase in temperature, by considering the reverse causality. Since increased temperature causes an increase in CO_2 concentration, the relationship of atmospheric CO_2 and temperature may qualify as belonging to the category of "hen-or-egg" problems, where it is not always clear which of two interrelated events is the cause and which the effect. We examine the relationship of global temperature and atmospheric carbon dioxide concentration in monthly time steps, covering the time interval 1980–2019 during which reliable instrumental measurements are available. While both causality directions exist, the results of our study support the hypothesis that the dominant direction is $T \rightarrow CO_2$. Changes in CO_2 follow changes in T by about six months on a monthly scale, or about one year on an annual scale. We attempt to interpret this mechanism by involving biochemical reactions as at higher temperatures, soil respiration and, hence, CO_2 emissions, are increasing.

Keywords: temperature; global warming; greenhouse gases; atmospheric CO_2 concentration

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> Πότερον ἡ ὄρνις πρότερον ἢ τὸ ᾠὸν ἐγένετο (Which of the two came first, the hen or the egg?).
>
> Πλούταρχος, Ηθικά, Συμποσιακὰ Β, Πρόβλημα Γ (Plutarch, Moralia, Quaestiones convivales, B, Question III).

1. Introduction

The phrase "hen-or-egg" is a metaphor describing situations where it is not clear which of two interrelated events or processes is the cause and which the effect. Plutarch was the first to pose this type of causality as a philosophical problem using the example of the hen and the egg, as indicated in the motto above. We note that in the original Greek text, "ἡ ὄρνις" is feminine (article and noun), meaning the hen rather than the chicken. Therefore, here, we preferred the form "hen-or-egg" over "chicken-or-egg", which is more common in English (Very often, in online Greek texts, e.g., [1,2], "ἡ ὄρνις" appears as "ἡ ἄρνις". After extended searching, we contend that this must be an error, either an old one in copying of manuscripts, e.g., by monks in monasteries, or a modern one, e.g., in OCR. We are confident that the correct word is "ὄρνις").

The objective of the paper is to demonstrate that the relationship of atmospheric CO_2 and temperature may qualify as belonging to the category of "hen-or-egg" problems. First, we discuss the relationship between temperature and CO_2 concentration by revisiting intriguing results from

proxy data-based palaeoclimatic studies, where the change in temperature leads and the change in CO_2 concentration follows. Next, we discuss the databases of modern (instrumental) measurements related to global temperature and atmospheric CO_2 concentration and introduce a methodology to analyse them. We develop a stochastic framework, introducing useful notions of time irreversibility and system causality while we discuss the logical and technical complications in identifying causality, which prompt us to seek just necessary, rather than sufficient, causality conditions. In the Results section, we examine the relationship of these two quantities using the modern data, available at the monthly time step. We juxtapose time series of global temperature and atmospheric CO_2 concentration from several sources, covering the common time interval 1980–2019. In our methodology, it is the timing rather than the magnitude of changes that is important, being the determinant of causality. While logical, physically based arguments support the "hen-or-egg" hypothesis, indicating that both causality directions exist, interpretation of cross-correlations of time series of global temperature and atmospheric CO_2 suggests that the dominant direction is $T \rightarrow CO_2$, i.e., the change in temperature leads and the change in CO_2 concentration follows. We attempt to interpret this latter mechanism by noting the positive feedback loop—higher temperatures increase soil respiration and, hence, CO_2 emissions.

The analysis reported in this paper was prompted by observation of an unexpected (and unfortunate) real-world experiment: during the COVID-19 lockdown in 2020, despite the unprecedented decrease in carbon emissions (Figure 1), there was an increase in atmospheric CO_2 concentration, which followed a pattern similar to previous years (Figure 2). Indeed, according to the International Energy Agency (IEA) [3], global CO_2 emissions were over 5% lower in the first quarter of 2020 than in that of 2019, mainly due to an 8% decline in emissions from coal, 4.5% from oil, and 2.3% from natural gas. According to other estimates [4], the decrease is even higher: the daily global CO_2 emissions decreased by 17% by early April 2020 compared with the mean 2019 levels, while for the whole 2020, a decrease between 4% and 7% is predicted. Despite that, as seen in Figure 2, the normal pattern of atmospheric CO_2 concentration (increase until May and decrease in June and July) did not change. Similar was the behaviour after the 2008–2009 financial crisis, but the most recent situation is more characteristic because the COVID-19 decline in 2020 is the most severe ever, even when considering the periods corresponding to World Wars. It is also noteworthy that, as shown in Figure 1, there are three consecutive years in the 2010s where there are no major increases, in emissions while there was an increase in CO_2 concentration. (At first glance, this does not sound reasonable and we have therefore cross-checked the data with other sources, namely the Global Carbon Atlas [5], and the database of Our World In Data [6]; we found only slight differences.) Interestingly, Figure 1 also shows a rapid growth in emissions after the 2008–2009 global financial crisis, which is in agreement with Peters et al. [7].

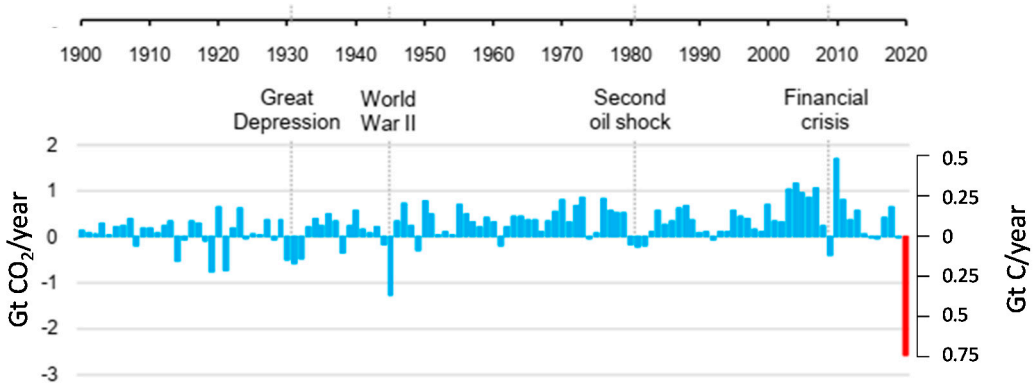

Figure 1. Annual change in global energy-related CO_2 emissions (adapted from International Energy Agency (IEA) [3]).

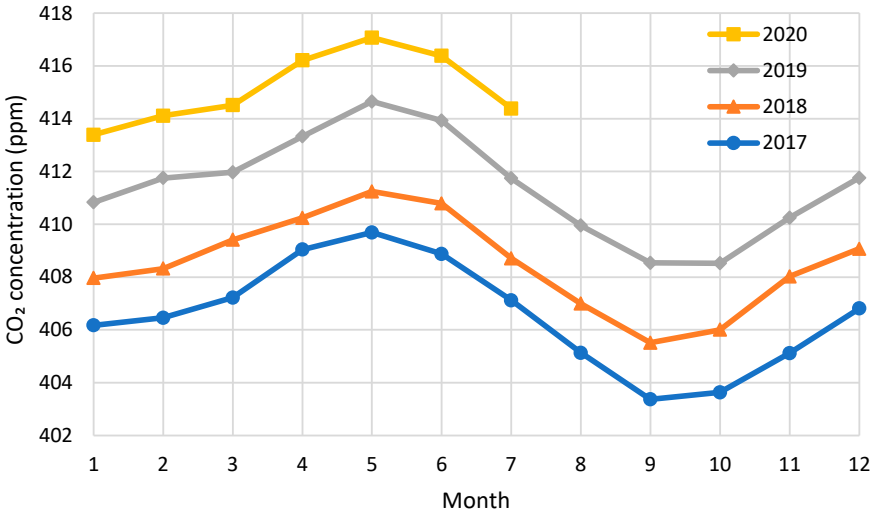

Figure 2. Atmospheric CO_2 concentration measured in Mauna Loa, Hawaii, USA, in the last four years.

2. Temperature and Carbon Dioxide—From Arrhenius and Palaeo-Proxies to Instrumental Data

Does the relationship of atmospheric carbon dioxide (CO_2) and temperature classify as a "hen-or-egg"-type causality? If we look at the first steps of studying the link between the two, the reply is clearly negative. Arrhenius (1896, [8]), the scientist most renowned for studying the causal relationship between two quantities, regarded the changes in atmospheric carbon dioxide concentration as the cause and the changes in temperature as the effect. Specifically, he stated:

> *Conversations with my friend and colleague Professor Högbom together with the discussions above referred to, led me to make a preliminary estimate of the probable effect of a variation of the atmospheric carbonic acid* [meaning CO_2] *on the temperature of the earth. As this estimation led to the belief that one might in this way probably find an explanation for temperature variations of 5–10 °C, I worked out the calculation more in detail and lay it now before the public and the critics.*

Furthermore, following the Italian meteorologist De Marchi (1895, [9]), whom he cited, he rejected what we call today *Milanković cycles* as possible causes of the glacial periods. In addition, he substantially overestimated the role of CO_2 in the greenhouse effect of the Earth's atmosphere. He calculated the relative weights of absorption of CO_2 and water vapour as 1.5 and 0.88, respectively, or a ratio of 1:0.6.

Arrhenius [8] also stated that "if the quantity of carbonic acid increases in geometric progression, the augmentation of the temperature will increase nearly in arithmetic progression". This Arrhenius's "rule" (which is still in use today) is mathematically expressed as

$$T - T_0 = \alpha \ln\left(\frac{[CO_2]}{[CO_2]_0}\right) \quad (1)$$

where T and $[CO_2]$ denote temperature and CO_2 concentration, respectively, T_0 and $[CO_2]_0$ represent reference states, and α is a constant.

Here, it is useful to note that Arrhenius's studies were not the first on the subject. Arrhenius [8] cites several other authors, among whom Tyndall (1865, [10]) for pointing out the enormous importance of atmospheric absorption of radiation and for having the opinion that water vapour has the greatest influence on this. Interestingly, it appears that the first experiments on the ability of water vapour and carbon dioxide to absorb heat were undertaken even earlier by Eunice Newton Foote (1856, [11]), even though she did not recognize the underlying mechanisms or even the distinction of short- and long-wave radiation [12–14]).

While the fact that the two variables are tightly connected is beyond doubt, the direction of the simple causal relationship needs to be studied further. Today, additional knowledge has

been accumulated, particularly from palaeoclimatic studies, which allow us to examine Arrhenius's hypotheses on a sounder basis. In brief, we can state the following:

- Indeed, CO_2 plays a substantial role as a greenhouse gas. However, modern estimates of the contribution of CO_2 to the greenhouse effect differ largely from Arrhenius's results, attributing 19% of the long-wave radiation absorption to CO_2 against 75% of water vapour and clouds (Schmidt et al. [15]), or a ratio of 1:4.
- During the Phanerozoic Eon, Earth's temperature varied by even more than 5–10 °C, which was postulated by Arrhenius—see Figure 3. Even though the link of temperature and CO_2 is beyond doubt, this is not clear in Figure 3, where it is seen that the CO_2 concentration has varied by about two orders of magnitude and does not always synchronize with the temperature variation. Other factors may become more important at such huge time scales. Thus, an alternative hypothesis of the galactic cosmic ray flux as a climate driver via solar wind modulation has been suggested [16,17], which has triggered discussion or dispute [14,18–23]. The T–CO_2 relationship becomes more legible and rather indisputable in proxy data of the Quaternary (see Figure 4). It has been demonstrated in a persuasive manner by Roe [24] that in the Quaternary, it is the effect of Milanković cycles (variations in eccentricity, axial tilt, and precession of Earth's orbit), rather than of atmospheric CO_2 concentration, that explains the glaciation process. Specifically (quoting Roe [24]),

> *variations in atmospheric CO_2 appear to lag the rate of change of global ice volume. This implies only a secondary role for CO_2—variations in which produce a weaker radiative forcing than the orbitally-induced changes in summertime insolation—in driving changes in global ice volume.*

Despite falsification of some of Arrhenius's hypotheses, his line of thought remained dominant. Yet, there have been some important studies, based on palaeoclimatological reconstructions (mostly the Vostok ice cores [25,26]), which have pointed to the opposite direction of causality, i.e., the change in temperature as the cause and that of CO_2 concentration as the effect. Such claims have been based on the fact that temperature change leads and CO_2 concentration change follows. In agreement with Roe [24], several papers have found the time lag to be positive, with estimates varying from 50 to 1000 years or more, depending on the time period and the particular study [27–32]. Claims that CO_2 concentration leads (i.e., a negative lag) have not generally been made in these studies. At most, a synchrony claim has been sought on the basis that the estimated positive lags are often within the 95% uncertainty range [31], while in one publication [29], it has been asserted that a "short lead of CO_2 over temperature cannot be excluded". With respect to the last deglacial warming, Liu et al. [32], using breakpoint lead–lag analysis, again find positive lags and conclude that the CO_2 is an internal feedback in Earth's climate system rather than an initial trigger.

Since palaeoclimatic data suggest a direction opposite to that assumed by Arrhenius, Koutsoyiannis [30], using palaeoclimatic data from the Vostok ice cores at a time resolution of 1000 years and a stochastic framework similar to that of the present study (see Section 4.1), concluded that a change in temperature precedes that of CO_2 by one time step (1000 years), as illustrated in Figure 4. He also noted that this causality condition holds for a wide range of time lags, up to 26,000 years, and, hence, the time lag is positive and most likely real. He asserted that the problem is obviously more complex than that of exclusive roles of cause and effect, classifying it as a "hen-or-egg" causality problem. Obviously, however, the proxy character of these data and the overly large time step of the time series reduce the reliability and accuracy of the results.

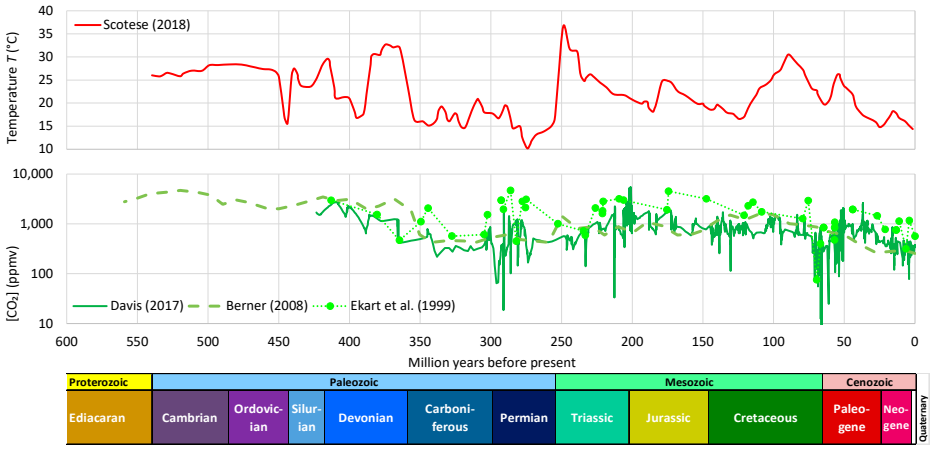

Figure 3. Proxy-based reconstructions of global mean temperature and CO_2 concentration during the Phanerozoic. The temperature reconstruction by Scotese [33] was mainly based on proxies from [21,34–36], while the CO_2 concentration proxies have been taken from Davis [37], Berner [38], and Ekart et al. [39]; all original figures were digitized in this study. The chronologies of geologic eras shown in the bottom of the figure have been taken from the International Commission on Stratigraphy [40].

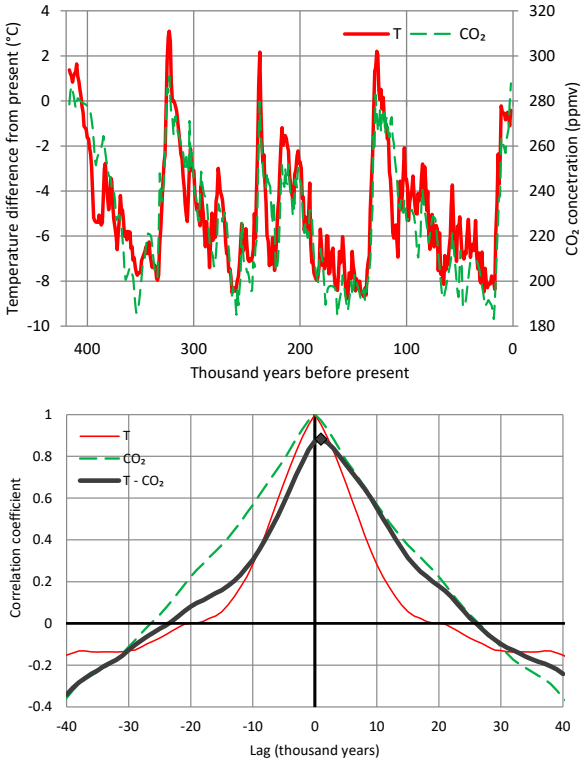

Figure 4. (**upper**) Time series of temperature and CO_2 concentration from the Vostok ice core, covering part of the Quaternary (420,000 years) with time step of 1000 years. (**lower**) Auto- and cross-correlograms of the two time series. The maximum value of the cross-correlation coefficient, marked as ◆, is 0.88 and appears at lag 1 (thousand years) (adapted from Koutsoyiannis [30]).

Studies exploring the rich body of modern datasets have also been published. Most of the studies have been based on the so-called "Granger causality test" (see Section 4.2). To mention a few, Kodra et al. [41], after testing several combinations and lags within the Granger framework, did not find any statistically significant results at the usual 5% significance level (they only found 2 cases at the

10% significance level; see their Tables 2 and 3). Stern and Kaufmann [42] studied, again within the Granger framework, the causality between radiative forcing and temperature, and found that both natural and anthropogenic forcings cause temperature change, and also that the inverse is true, i.e., temperature causes greenhouse gas concentration changes. They concluded that their results

> *show that properly specified tests of Ganger* [sic] *causality validate the consensus that human activity is partially responsible for the observed rise in global temperature and that this rise in temperature also has an effect on the global carbon cycle.*

By contrast, Stips et al. [43] used a different method [44] to investigate the causal structure and concluded that their

> *study unambiguously shows one-way causality between the total Greenhouse Gases and GMTA* [global mean surface temperature anomalies]. *Specifically, it is confirmed that the former, especially CO_2, are the main causal drivers of the recent warming.*

Here, we use a different path to study the causal relation between temperature and CO_2 concentration with the emphasis given on the exploratory and explanatory aspect of our analyses. While we occasionally use the Granger statistical test, this is not central in our approach. Rather, we place the emphasis on time directionality in the relationship, which we try to identify in the simplest possible manner, i.e., by finding the lag, positive or negative, which maximizes the cross-correlation between the two processes (see Section 4.1). We visualize our results by plots, so as to be simple, transparent, intuitive, readily understandable by the reader, and hopefully persuading. For the algorithmic-friendly reader, we also provide statistical testing results which just confirm what is directly seen in the graphs.

Another difference of our study, from most of the earlier ones, is our focus on changes, rather than current states, in the processes we investigate. This puts the technique of process differencing in central place in our analyses. This technique is quite natural and also powerful for studying time directionality [30]. We note that differencing has also been used in a study by Humlum et al. [45], which has several similarities with our study, even though it is not posed in a formal causality context, as well as in the study by Kodra et al. [41]. However, differencing has been criticized for potentially eliminating long-run effects and, hence, providing information only on short-run effects [42,46]. Even if this speculation were valid, it would not invalidate the differencing technique for the following reasons:

- The short-term effects deserve to be studied, as well as the long-term ones.
- The modern instrumental records are short themselves and only allow the short-term effects to be studied.
- For the long-term effects, the palaeo-proxies provide better indications, as already discussed above.

3. Data

Our investigation of the relationship of temperature with concentration of carbon dioxide in the atmosphere is based on two time series of the former process and four of the latter. Specifically, the temperature data are of two origins, satellite and ground-based. The satellite dataset, developed at the University of Alabama in Huntsville (UAH), infers the temperature, T, of three broad levels of the atmosphere from satellite measurements of the oxygen radiance in the microwave band using advanced (passive) microwave sounding units on NOAA and NASA satellites [47,48]. The data are publicly available on the monthly scale in the forms of time series of "anomalies" (defined as differences from long-term means) for several parts of earth as well as in maps. Here, we use only the global average on monthly scale for the lowest level, referred to as the lower troposphere. The ground-based data series we use is the CRUTEM.4.6.0.0 global T2m land temperature [49]. This originates from a gridded dataset of historical near-surface air temperature anomalies over land. Data are available for each month from January 1850 to the present. The dataset is a collaborative product of the Met Office

Hadley Centre and the Climatic Research Unit at the University of East Anglia. We note that both sources of information, UAH and CRUTEM, provide time series over the globe, land, and oceans; here, we deliberately use one source for the globe and one for the land.

The two temperature series used in the study are depicted in Figure 5. They are consistent with each other (and correlated, $r = 0.8$), though the CRUTEM4 series shows a larger increasing trend than the UAH series. The differences can be explained by three reasons: (a) the UAH series includes both land and sea, while the chosen CRUTEM4 series is for land only, in which the increasing trend is substantially higher than in sea; (b) the UAH series refers to some high altitude in the troposphere (see details in Koutsoyiannis [50]), while the CRUTEM4 series refers to the ground level; and (c) the ground-based CRUTEM4 series might be affected by urbanization (many ground stations are located in urban areas). In any case, the difference in the increasing trends is irrelevant for the current study, as the timing, rather than the magnitude, of changes is the determinant of causality. This will manifest in our results.

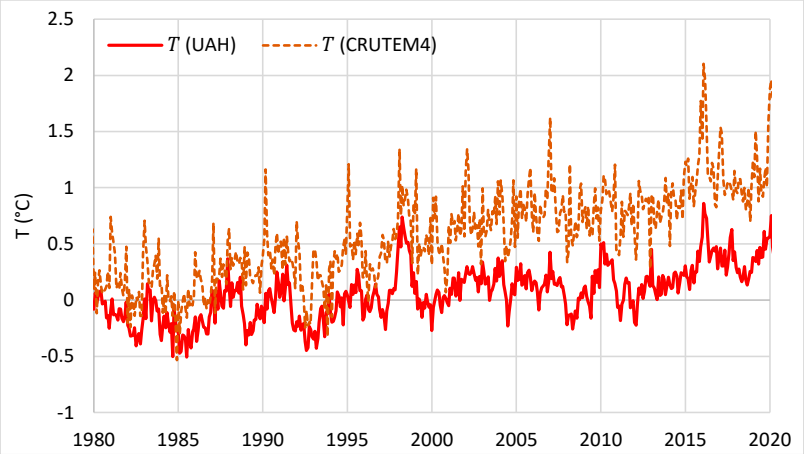

Figure 5. Plots of the data series of global temperature "anomalies" since 1980, as used in the study, from satellite measurements over the globe (UAH) and from ground measurements over land (CRUTEM4).

The most famous CO_2 dataset is that of Mauna Loa Observatory [51]. The Observatory, located on the north flank of Mauna Loa Volcano on the Big Island of Hawaii, USA, at an elevation of 3397 m above sea level, is a premier atmospheric research facility that has been continuously monitoring and collecting data related to the atmosphere since the 1950s. The NOAA also has other stations that systematically measure atmospheric CO_2 concentration, namely at Barrow, Alaska, USA and at South Pole. The NOAA's Global Monitoring Laboratory Carbon Cycle Group also computes global mean surface values of CO_2 concentration using measurements of weekly air samples from the Cooperative Global Air Sampling Network. The global estimate is based on measurements from a subset of network sites. Only sites where samples are predominantly of well-mixed marine boundary layer air, representative of a large volume of the atmosphere, are considered (typically at remote marine sea level locations with prevailing onshore winds). Measurements from sites at high altitude (such as Mauna Loa) and from sites close to anthropogenic and natural sources and sinks are excluded from the global estimate. (Details about this dataset are provided in [52]).

The period of data coverage varies, but all series cover the common 40-year period 1980–2019 which, hence, constitute the time reference of all our analyses. As a slight exception, the Barrow (Alaska) and South Pole measurements have not yet been available in final form for 2019 and, thus, this year was not included in our analyses of these two time series. The data of the latter two stations are given in irregular-step time series, which was regularized (by interpolation) to monthly in this study. All other data series have already been available on a monthly scale. While some of the earlier studies

refer to a longer time span (e.g., [42,43] which start from 1850s), here, we avoid using non-systematic data earlier than 1980 due to their low reliability and bypass the raised controversies explained in Appendix A.1.

All four CO_2 time series used in the study are depicted in Figure 6. They show a superposition of increasing trends and annual cycles whose amplitudes increase as we head from the South to the North Pole. The South Pole series has opposite phase of oscillation compared to the other three.

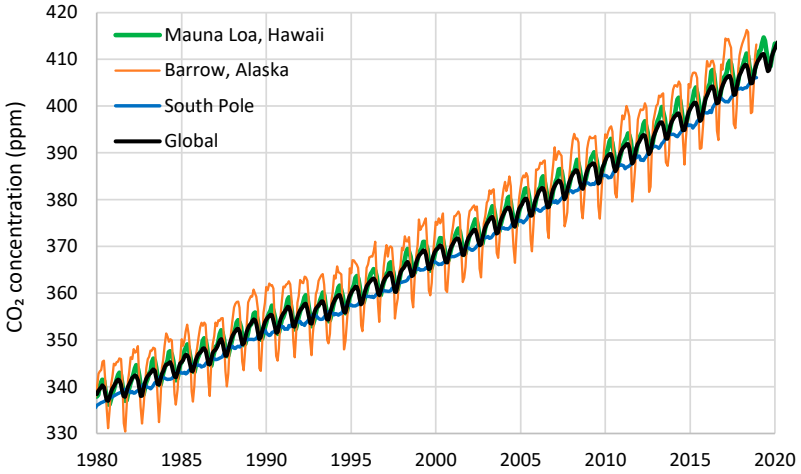

Figure 6. Plots of the data series of atmospheric CO_2 concentration measured in Mauna Loa (Hawaii, USA), Barrow (Alaska, USA), and South Pole, and the global average.

The annual cycle is better seen in Figure 7, where we have removed the trend with standardization, namely by dividing each monthly value by the geometric average of the preceding 5-year period. The reason why we used division rather than subtraction and geometric rather than arithmetic average (being thus equivalent to subtracting or averaging the logarithms of CO_2 concentration) will become evident in Section 5. In the right panel of Figure 7, which depicts monthly statistics of the time series of the left panel, it is seen that in all sites but the South Pole, the annual maximum occurs in May; that of the South Pole occurs in September.

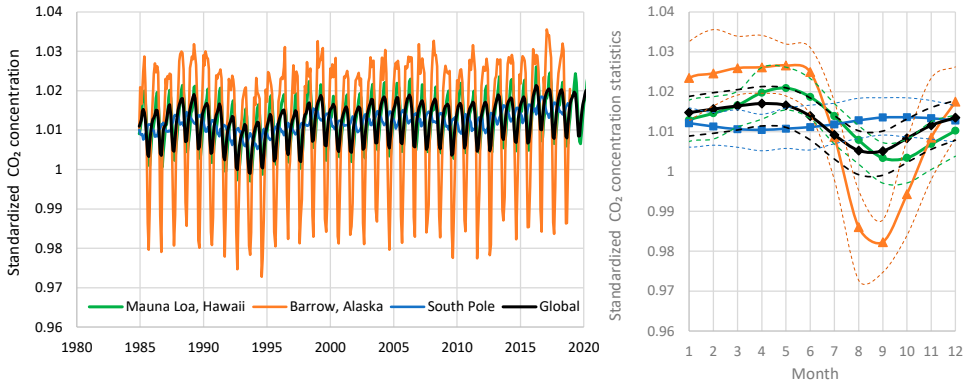

Figure 7. Plots of atmospheric CO_2 concentration after standardization: (**left**) each monthly value is standardized by dividing with the geometric average of the 5-year period before it. (**right**) Monthly statistics of the values of the left panel; for each month, the average is shown in continuous line and the minimum and maximum in thin dashed lines of the same colour as the average.

4. Methods

4.1. Stochastic Framework

A recent study [30] investigated time irreversibility in hydrometeorological processes and developed a theoretical framework in stochastic terms. It also studied necessary conditions for causality, which is tightly linked to time irreversibility. A simple definition of time reversibility within stochastics is the following, where underlined symbols denote stochastic (random) variables and non-underlined ones denote values thereof or regular variables.

A stochastic process $\underline{x}(t)$ at continuous time t, with nth order distribution function:

$$F(x_1, x_2, \ldots, x_n; t_1, t_2, \ldots, t_n) := P\left\{\underline{x}(t_1) \leq x_1, \underline{x}(t_2) \leq x_2, \ldots, \underline{x}(t_n) \leq x_n\right\} \tag{2}$$

is time-symmetric or time-reversible if its joint distribution does not change after reflection of time about the origin, i.e., if for any $n, t_1, t_2, \ldots, t_n$,

$$F(x_1, x_2, \ldots, x_n; t_1, t_2, \ldots, t_n) = F(x_1, x_2, \ldots, x_n; -t_1, -t_2, \ldots, -t_n). \tag{3}$$

If times t_i are equidistant, i.e., $t_i - t_{i-1} = D$, the definition can be also written by reflecting the order of points in time, i.e.,

$$F(x_1, x_2, \ldots, x_{n-1}, x_n; t_1, t_2, \ldots, t_{n-1}, t_n) = F(x_1, x_2, \ldots, x_{n-1}, x_n; t_n, t_{n-1}, \ldots, t_2, t_1). \tag{4}$$

A process that is not time-reversible is called time-asymmetric, time-irreversible, or time-directional. Important results related to time (ir)reversibility are the following:

- A time reversible process is also stationary (Lawrance [53]).
- If a scalar process $\underline{x}(t)$ is Gaussian (i.e., all its finite dimensional distributions are multivariate normal) then it is reversible (Weiss [54]). The consequences are (a) a directional process cannot be Gaussian; (b) a discrete-time ARMA process (and a continuous-time Markov process) is reversible if and only if it is Gaussian.
- However, a vector (multivariate) process can be Gaussian and irreversible at the same time. A multivariate Gaussian linear process is reversible if and only if its autocovariance matrices are all symmetric (Tong and Zhang [55]).

Time asymmetry of a process can be studied more conveniently (or even exclusively in a scalar process) through the differenced process, i.e.,

$$\underline{\tilde{x}}_{\tau,\nu} := \underline{x}_{\tau+\nu} - \underline{x}_{\tau} \tag{5}$$

for an appropriate time-step ν of differencing. The differenced process represents change of the original process within a time period of length ν. We further define the cumulative process of $\underline{x}_\tau$ for discrete time κ as

$$\underline{X}_\kappa := \underline{x}_1 + \underline{x}_2 + \ldots + \underline{x}_\kappa. \tag{6}$$

Through this, we find that the time average of the original process $\underline{x}_\tau$ for discrete time scale κ is

$$\underline{x}_\tau^{(\kappa)} := \frac{\underline{x}_{(\tau-1)\kappa+1} + \underline{x}_{(\tau-1)\kappa+2} + \ldots + \underline{x}_{\tau\kappa}}{\kappa} = \frac{\underline{X}_{\tau\kappa} - \underline{X}_{(\tau-1)\kappa}}{\kappa}. \tag{7}$$

Similar equations for the cumulative and averaged processes for the differenced process $\underline{\tilde{x}}_{\tau,\nu}$ are given in Appendix A.2.

The variance of the process $\underline{x}_\tau^{(\kappa)}$ is a function of the time scale κ, which is termed the climacogram of the process:

$$\gamma_\kappa := \mathrm{var}[\underline{x}_\tau^{(\kappa)}]. \tag{8}$$

The autocovariance function for time lag η is derived from the climacogram through the relationship [56]

$$c_\eta = \frac{(\eta+1)^2\gamma_{|\eta+1|} + (\eta-1)^2\gamma_{|\eta-1|}}{2} - \eta^2\gamma_{|\eta|}. \tag{9}$$

For sufficiently large κ (theoretically as $\kappa \to \infty$), we may approximate the climacogram as

$$\gamma_\kappa \propto \kappa^{2H-2} \tag{10}$$

where H is termed the *Hurst parameter*. The theoretical validity of such (power-type) behaviour of a process was implied by Kolmogorov (1940 [57]). The quantity $2H$—2 is visualized as the slope of the double logarithmic plot of the climacogram for large time scales. In a random process, $H = 1/2$, while in most natural processes, $1/2 \le H \le 1$, as first observed by Hurst (1951 [58]). This natural behaviour is known as (long-term) *persistence* or *Hurst–Kolmogorov* (HK) *dynamics*. A high value of H (approaching 1) indicates enhanced presence of patterns, enhanced change, and enhanced uncertainty (e.g., in future predictions). A low value of H (approaching 0) indicates enhanced fluctuation or *antipersistence* (sometimes misnamed as quasi-periodicity as the period is not constant).

For a stationary stochastic process $\underline{x}_\tau$, the differenced process $\underline{\tilde{x}}_\tau$ has mean zero and variance:

$$\tilde{\gamma}_{\nu,1} := \mathrm{var}[\underline{\tilde{x}}_{\tau,\nu}] = \mathrm{var}[\underline{x}_{\kappa+\nu}] + \mathrm{var}[\underline{x}_\tau] - 2\mathrm{cov}[\underline{x}_{\tau+\nu}, \underline{x}_\tau] = 2(\gamma_1 - c_\nu) \tag{11}$$

where γ_1 and c_ν are the variance and lag ν autocovariance, respectively, of $\underline{x}_\tau$. Furthermore, it has been demonstrated [30] that the Hurst coefficient of the differenced process $\underline{\tilde{x}}_\tau$ precisely equals zero, which means that $\underline{\tilde{x}}_\tau$ is completely antipersistent, irrespective of γ_κ.

To study irreversibility in vector processes, we can use second-order moments and, in particular, cross-covariances among the different components of the vector. In particular (adapting and simplifying the analyses and results in Koutsoyiannis, [30]), given two processes $\underline{x}_\tau$ and $\underline{y}_\tau$, we could study the cross-correlations:

$$r_{\tilde{x}\tilde{y}}[\nu,\eta] := \mathrm{corr}\left[\underline{\tilde{x}}_{\tau,\nu}, \underline{\tilde{y}}_{\tau+\eta,\nu}\right]. \tag{12}$$

Time (ir)reversibility could then be characterized by studying the properties of symmetry or asymmetry of $r_{\tilde{x}\tilde{y}}(\nu,\eta)$ as a function of the time lag η. In a symmetric bivariate process, $r_{\tilde{x}\tilde{y}}[\nu,\eta] = r_{\tilde{x}\tilde{y}}[\nu,-\eta]$, and if the two components are positively correlated, the maximum of $r_{\tilde{x}\tilde{y}}[\nu,\eta]$ will appear at lag $\eta = 0$. If the bivariate process is irreversible, this maximum will appear at a lag $\eta_1 \neq 0$ and its value will be $r_{\tilde{x}\tilde{y}}[\nu,\eta_1]$.

Time asymmetry is closely related to causality, which presupposes irreversibility. Thus, "no causal process (i.e., such that of two consecutive phases, one is always the cause of the other) can be reversible" (Heller, [59]; see also [60]). In probabilistic definitions of causality, time asymmetry is determinant. Thus, Suppes [61] defines causation thus: "An event $B_{t'}$ [occurring at time t'] is a prima facie cause of the event A_t [occurring at time t] if and only if (i) $t' < t$, (ii) $P\{B_{t'}\} > 0$, (iii) $P(A_t|B_{t'}) > P(A_t)$". In addition, Granger's [62] first axiom in defining causality reads, "The past and present may cause the future, but the future cannot".

Consequently, in simple causal systems, in which the process component $\underline{x}_\tau$ is the cause of $\underline{y}_\tau$ (like in the clear case of rainfall and runoff, respectively), it is reasonable to expect $r_{\tilde{x}\tilde{y}}[\nu,\eta] \ge 0$ for any $\eta \ge 0$, while $r_{\tilde{x}\tilde{y}}[\nu,\eta] = 0$ for any $\eta = 0$. However, in "hen-or-egg" causal systems, this will not be the case, and we reasonably expect $r_{\tilde{x}\tilde{y}}[\nu,\eta] \neq 0$ for any η. Yet, we can define a dominant direction of causality based on the time lag η_1 maximizing cross-correlation. Formally, η_1 is defined for a specified ν as

$$\eta_1 := \underset{\eta}{\mathrm{argmax}}\left|r_{\tilde{x}\tilde{y}}(\nu,\eta)\right|. \tag{13}$$

We can thus distinguish the following three cases:

- If $\eta_1 = 0$, then there is no dominant direction.

- If $\eta_1 > 0$, then the dominant direction is $\underline{x}_\tau \rightarrow \underline{y}_\tau$.
- If $\eta_1 < 0$, then the dominant direction is $\underline{y}_\tau \rightarrow \underline{x}_\tau$.

Justification and further explanations of these conditions are provided in Appendix A.3.

4.2. Complications in Seeking Causality

It must be stressed that the above conditions are considered as necessary and not sufficient conditions for a causative relationship between the processes $\underline{x}_\tau$ and $\underline{y}_\tau$. Following Koutsoyiannis [30] (where additional necessary conditions are discussed), we avoid seeking sufficient conditions, a task that would be too difficult or impossible due to its deep philosophical complications as well as the logical and technical ones.

Specifically, it is widely known that correlation is not causation. As Granger [62] puts it,

> *when discussing the interpretation of a correlation coefficient or a regression, most textbooks warn that an observed relationship does not allow one to say anything about causation between the variables.*

Perhaps that is the reason why Suppes [61] uses the term "prima facie cause" in his definition given above which, however, he does not explain, apart for attributing "prima facie" to Jaakko Hintikka. Furthermore, Suppes discusses *spurious causes* and eventually defines the *genuine cause* as a "prima facie cause that is not spurious"; he also discusses the very existence of genuine causes which under certain conditions (e.g., in a Laplacean universe) seems doubtful.

Granger himself also uses the term "prima facie cause", while Granger and Newbold [63] note that a cause satisfying a causality test still remains prima facie because it is always possible that, if a different information set were used, it would fail the new test. Despite the caution issued by its pioneers, including Granger, through the years, the term "Granger causality" has become popular (particularly in the so-called "Granger causality test", e.g., [64]). Probably because of that misleading term, the technique is sometimes thought of as one that establishes causality, thus resolving or overcoming the "correlation is not causation" problem. In general, it has rarely been understood that identifying genuine causality is not a problem of choosing the best algorithm to establish a statistical relationship (including its directionality) between two variables. As an example of misrepresentation of the actual problems, see [65], which contains the statement:

> *Determining true causality requires not only the establishment of a relationship between two variables, but also the far more difficult task of determining a direction of causality.*

In essence, the "Granger causality test" studies the improvement of prediction of a process $\underline{y}_\tau$ by considering the influence of a "causing" process $\underline{x}_\tau$ through the Granger regression model:

$$\underline{y}_\tau = \sum_{j=1}^{\eta} a_j \underline{y}_{\tau-j} + \sum_{j=1}^{\eta} b_j \underline{x}_{\tau-j} + \varepsilon_\tau \tag{14}$$

where a_j and b_j are the regression coefficients and ε_τ is an error term. The test is based on the null hypothesis that the process $\underline{x}_\tau$ is not actually causing $\underline{y}_\tau$, formally expressed as

$$H_0 : b_1 = b_2 = \ldots = b_\eta = 0 \tag{15}$$

Algorithmic details of the test are given in [64], among others. The rejection of the null hypothesis is commonly interpreted in the literature with a statement that $\underline{x}_\tau$ "Granger-causes" $\underline{y}_\tau$.

This is clearly a misstatement and, in fact, the entire test is based on correlation matrices. Thus, it again reflects correlation rather than causation. The rejection of the null hypothesis signifies improvement of prediction and this does not mean causation. To make this clearer, let us consider the following example: people sweat when the atmospheric temperature is high and also wear light clothes. Thus, it is reasonably expected that in the prediction of sweat quantity, temperature matters. In the

absence of temperature measurements (e.g., when we have only visual information, like when watching a video), the weight of the clothes algorithmically improves the prediction of sweat quantity. However, we could not say that the decrease in clothes weight causes an increase in sweat (the opposite is more reasonable and becomes evident in a three-variable regression, temperature–clothes weight–sweat, as further detailed in Appendix A.4).

Cohen [66] suggested replacing the term "Granger causality" with "Granger prediction" after correctly pointing out this:

> *Results from Granger causality analyses neither establish nor require causality. Granger causality results do not reveal causal interactions, although they can provide evidence in support of a hypothesis about causal interactions.*

To avoid such philosophical and logical complications, here, we replace the "prima facie" or "Granger" characterization of a cause and, as we already explained, we abandon seeking for genuine causes by using the notion of *necessary conditions* for causality. One could say that if two processes satisfy the necessary conditions, then they define a prima facie causality, but we avoid stressing that as we deem it unnecessary. Furthermore, we drop "causality" from "Granger causality test", thus hereinafter calling it "Granger test".

Some have thought they can approach genuine causes and get rid of the caution "correlation is not causation" by replacing the correlation with other statistics in the mathematical description of causality. For example, Liang [44] uses the concept of information (or entropy) flow (or transfer) between two processes; this method has been called "Liang causality" in the already cited work he co-authors [43]. The usefulness of such endeavours is not questioned, yet their vanity to determine genuine causality is easy to infer: It suffices to consider the case where the two processes, for which causality is studied, are jointly Gaussian. It is well known that in any multivariate Gaussian process, the covariance matrix (or the correlation matrix along with the variances) fully determines all properties of the multivariate distribution of any order. For example, the mutual information in a bivariate Gaussian process is (Papoulis, [67])

$$H[\underline{y}|x] = \ln \sigma_y \sqrt{2\pi \mathrm{e}(1-r^2)} \tag{16}$$

where σ and r denote standard deviation and correlation, respectively. Thus, using any quantity related to entropy (equivalently, information), is virtually identical to using correlation. Furthermore, in Gaussian processes, whatever statistic is used in describing causality, it is readily reduced to correlation. This is evident even in Liang [44], where, e.g., in his Equation (102), the information flow turns out to be the correlation coefficient multiplied by a constant. In other words, the big philosophical problem of causality cannot be resolved by technical tricks.

From what was exposed above (Section 4.1), the time irreversibility (or directionality) is most important in seeking causality. In this respect, we certainly embrace Suppes's condition (i) and Granger's first axiom, as stated above. Furthermore, we believe there is no meaning in refusing that axiom and continuing to speak about causality. We note though that there have been recent attempts to show that

> *coupled chaotic dynamical systems violate the first principle of Granger causality that the cause precedes the effect*. [68]

Apparently, however, the particular simulation experiment performed in the latter work which, notably, is not even accompanied by any attempt for deduction based on stochastics, cannot show any violation. In our view, such a violation, if it indeed happened, would be violation of logic and perhaps of common sense.

Additional notes for other procedures detecting causality, which are not included in the focus of our study, are given in Appendix A.4.

4.3. Additional Clarifications of Our Approach

After the above theoretical and methodological discourse, we can clarify our methodological approach by emphasizing the following points.

1. To make our assertions and, in particular, to use the "hen-or-egg" metaphor, we do not rely on merely statistical arguments. If we did that, based on our results presented in the next section, we would conclude that only the causality direction $T \rightarrow [CO_2]$ exists. However, one may perform a thought experiment of instantly adding a big quantity of CO_2 to the atmosphere. Would the temperature not increase? We believe it would, as CO_2 is known to be a greenhouse gas. The causation in the opposite direction is also valid, as will be discussed in Section 6, "Physical Interpretation". Therefore, we assert that both causality directions exist, and we are looking for the dominant one under the current climate conditions (those manifest in the datasets we use) instead of trying to make assertions of an exclusive causality direction.
2. While we occasionally use statistical tests (namely, the Granger test, Equations (14) and (15)), we opt to use, as the central point of our analyses, Equation (13) (and the conditions below it) because it is more intuitive and robust, fully reflects the basic causality axiom of time precedence, and is more straightforward, transparent (free of algorithmic manipulations), and easily reproducible (without the need for specialized software).
3. For simplicity, we do not use any statistic other than correlation here. We stress that the system we are examining is indeed classified as Gaussian and, thus, it is totally unnecessary to examine any statistic in addition to correlation. The evidence of Gaussianity is provided by Figures A1 and A2 in Appendix A.5, in terms of marginal distributions of the processes examined and in terms of their relationship. In particular, Figure A2 suggests a typical linear relationship for the bivariate process. We note that the linearity here is not a simplifying assumption or a coincidence as there are theoretical reasons implying it, which are related to the principle of maximum entropy [67,69].
4. All in all, we adhere to simplicity and transparency and, in this respect, we illustrate our results graphically, so they are easily understandable, intuitive, and persuasive. Indeed, our findings are easily verifiable even from simple synchronous plots of time series, yet we also include plots of autocorrelations and lagged cross-correlation, which are also most informative in terms of time directionality.

5. Results

5.1. Original Time Series

Here, we examine the relationship of atmospheric temperature and carbon dioxide concentration using the available modern data (observations rather than proxies) in monthly time steps, as described in Section 3. To apply our stochastic framework, we must first make the two time series linearly compatible. Specifically, based on Arrhenius's rule (Equation (1)), we take the logarithms of CO_2 concentration while we keep T untransformed. Such a transformation has also been performed in previous studies, which consider the logarithm of CO_2 concentration as a proxy of total radiative forcing (e.g., [41]). However, by calling this quantity "forcing", we indirectly give it, a priori (i.e., before investigating causation), the role of being the cause. Therefore, here, we avoid such interpretations; we simply call this variable the logarithm of carbon dioxide concentration and denote it as $\ln[CO_2]$.

A synchronous plot of the two processes (specifically, UAH temperature and $\ln[CO_2]$ at Mauna Loa) is depicted in Figure 8. Very little can be inferred from this figure alone. Both processes show increasing trends and thus appear as positively correlated. On the other hand, the two processes appear to have different behaviours. Temperature shows an erratic behaviour while $\ln[CO_2]$ has a smooth evolution marked by the annual periodicity. It looks impossible to infer causality from that graph alone.

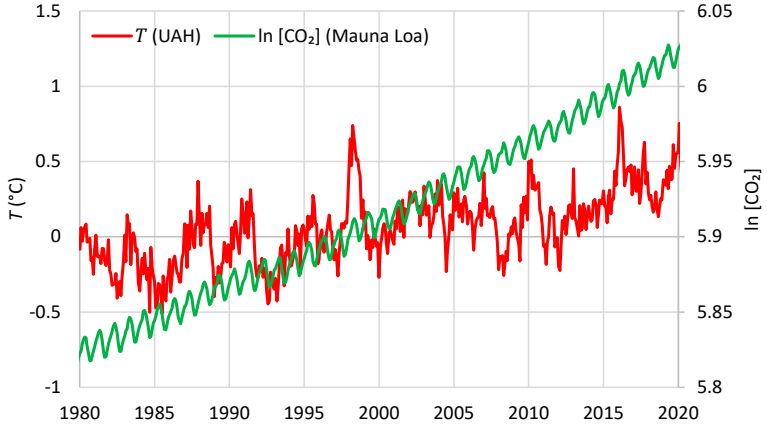

Figure 8. Synchronous plots of the time series of UAH temperature and logarithm of CO_2 concentration at Mauna Loa at monthly scale.

Somewhat more informative is Figure 9, which depicts lagged cross-correlations of the two processes, based on the methodology in Section 4.1 but without differencing the processes. Specifically, Figure 9 shows the cross-correlogram between UAH temperature and Mauna Loa $\ln[CO_2]$ at monthly and annual scales; the autocorrelograms of the two processes are also plotted for comparison. In both time scales, the cross-correlogram shows high correlations at all lags, with the maximum attained at lag zero. This does not hint at a direction. However, the cross-correlations for negative lags are slightly greater than those in the positive lags. Notice that to make this clearer, we have also plotted the differences $r_j - r_{-j}$ in the graph. This behaviour could be interpreted as supporting the causality direction $[CO_2] \rightarrow T$. However, we deem that the entire picture is spurious as it is heavily affected by the fact that the autocorrelations are very high and, in particular, those of $\ln[CO_2]$ are very close to 1 for all lags shown in the figure.

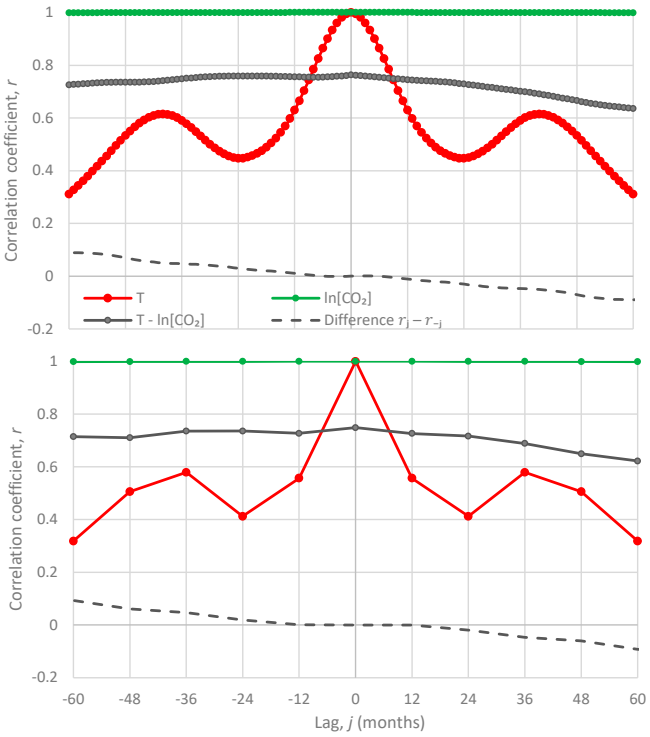

Figure 9. Auto- and cross-correlograms of the time series of UAH temperature and logarithm of CO_2 concentration at Mauna Loa.

In our investigation, we also applied the Granger test on these two time series in both time directions. To calculate the p-value of the Granger test, we used free software (namely the function GRANGER_TEST [70,71]). It appears that in the causality direction $[CO_2] \rightarrow T$, the null hypothesis is rejected at all usual significance levels. The attained p-value of the test is 1.8×10^{-7} for one regression lag ($\eta = 1$), 1.8×10^{-4} for $\eta = 2$, and remains below 0.01 for subsequent η. By contrast, in the direction $T \rightarrow [CO_2]$, the null hypothesis is not rejected at all usual significance levels. The attained p-value of the test is 0.25 for $\eta = 1$, 0.22 for $\eta = 2$, and remains above 0.1 for subsequent η.

Therefore, one could directly interpret these results as unambiguously showing one-way causality between the total greenhouse gases and temperature and, hence, validating the consensus view that human activity is responsible for the observed rise in global temperature. However, these results are certainly not unambiguous and, most probably, they are spurious. To demonstrate that they are not unambiguous, we have plotted, as shown in the upper panels of Figure 10, the p-values of the Granger test for moving windows with a size of 10 years for number of lags $\eta = 1$ and 2. The values for the entire length of time series, as given above, are also shown as dashed lines. Now the picture is quite different: each of the two directions appear dominating (meaning that the attained significance level is lower in one over the other) in about equal portions of the time. For example, for $\eta = 2$, the $T \rightarrow [CO_2]$ dominates over $[CO_2] \rightarrow T$ for 58% of the time. The attained p-value for direction $T \rightarrow [CO_2]$ is lower than 1% for 1.4% of the time, much higher than in the opposite direction (0.3% of the time). All of these observations favour the $T \rightarrow [CO_2]$ direction.

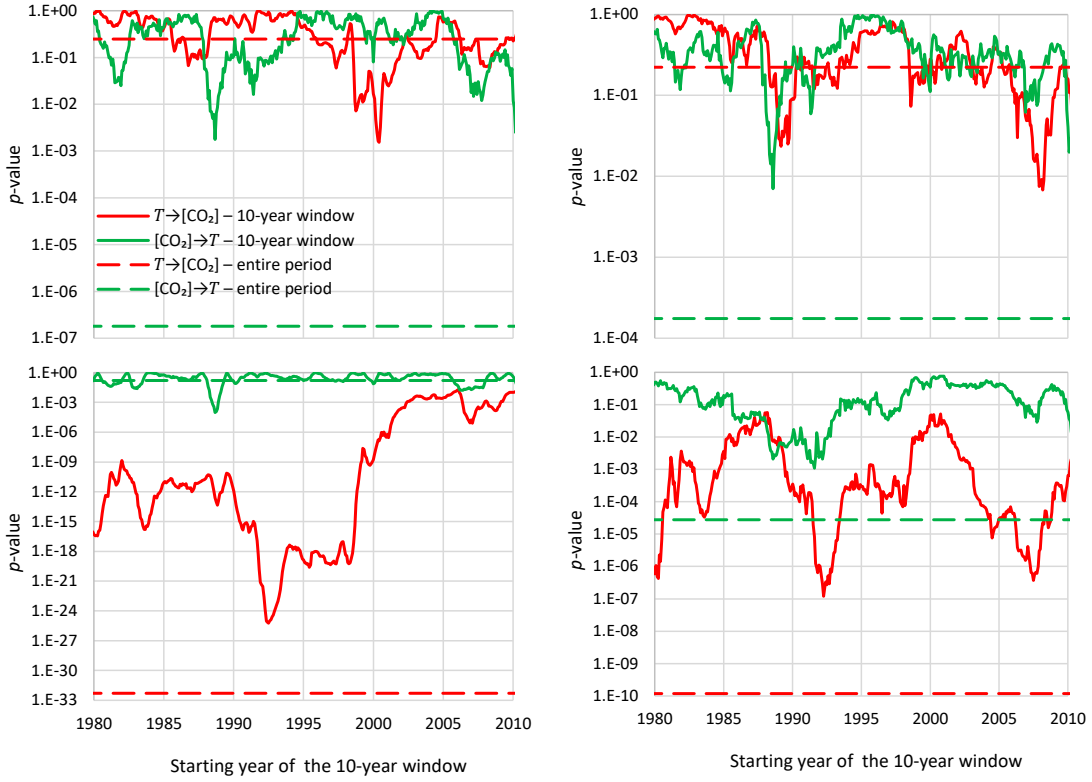

Figure 10. Plots of p-values of the Granger test for 10-year-long moving windows for the monthly time series of UAH temperature and logarithm of CO_2 concentration at Mauna Loa for number of lags (**left**) $\eta = 1$ and (**right**) $\eta = 2$. The time series used are (**upper**) the original and (**lower**) that obtained after "removing" the periodicity by averaging over the previous 12 months.

To show that the results are spurious and, in particular, affected by the very high autocorrelations of $\ln[CO_2]$ and, more importantly, by its annual cyclicity, we have "removed" the latter by averaging over the previous 12 months. We did that for both series and plotted the results in the lower panels

of Figure 10. Here, the results are stunning. For both lags $\eta = 1$ and 2 and for the entire period (or almost), $T \rightarrow [CO_2]$ dominates, attaining p-values as low as in the order of 10^{-33}. However, we will avoid interpreting these results as unambiguous evidence that the consensus view (i.e., human activity is responsible for the observed warming) is wrong. Rather, what we want to stress is that it is inappropriate to draw conclusions from a methodology which is demonstrated to be so sensitive to the used time windows and data processing assumptions. In this respect, we have included this analyses in our study only (a) to show its weaknesses (which, for the reasons we explained in Section 4.2, we believe would not change if we used different statistics or different time series) and (b) to connect our study to earlier ones. For the sake of drawing conclusions, we contend that our full methodology in Sections 4.1 and 4.3 is more appropriate. We apply this methodology in Section 5.2.

5.2. *Differenced Time Series*

We have already explained the advantages of investigating the differenced processes, which quantify changes from a mathematical and logical point of view. In our case, taking differences is also physically meaningful as both CO_2 concentration and temperature (equivalent to thermal energy) represent "stocks", i.e., stored quantities and, thus, the mass and energy fluxes are indeed represented by differences.

The chosen time step of differencing is equal to one year ($\nu = 12$ for the monthly time step of the time series). For instance, from the value of January of a certain year, we subtract the value of January of the previous year and so forth. A first reason for this choice is that it almost eliminates the effect of the annual cycle (periodicity). A second reason is that the temperature data are given in terms of "anomalies", i.e., differences from an average which varies from month to month. By taking $\nu = 12$, the varying means are eliminated, and "anomalies" are effectively replaced by the actual processes (as the differences in the actual values equal the differences of "anomalies").

We perform all analyses on both monthly and annual time scales. Figure 11 shows the differenced time series for the UAH temperature and Mauna Loa CO_2 concentration at monthly scale; the symbols ΔT and $\Delta \ln[CO_2]$ are used interchangeably with $\tilde{x}_{\tau,12}$ and $\tilde{y}_{\tau,12}$, respectively.

Comparing Figure 8 (undifferenced series) with Figure 11 (differenced series), one can verify that the latter is much more informative in terms of the directionality of the relationship of the two processes. While Figure 8 did not provide any relevant hints, Figure 11 clearly shows that, most often, the temperature curve leads and that of CO_2 follows. However, there are cases where the changes in the two processes synchronize in time or even become decoupled.

Figure 12 shows the same time series at the annual time scale, with the year being defined as July–June for ΔT and February–January for $\Delta \ln[CO_2]$. The reason for this differentiation will be explained below. Here, it is more evident that, most of the time, the temperature change leads and that of CO_2 follows.

It is of interest here that the variability of global mean annual temperature is significantly influenced by the rhythm of ocean–atmosphere oscillations, such as ENSO, AMO, and IPO [72]. This mechanism may be a complicating factor, in turn influencing the link between temperature and CO_2 concentration. This is not examined here (except a short note in the end of the section) as, given the focus in examining just the connection of the latter two processes, it lies out of our present scope.

The climacograms of the differenced time series used (actually four of the six to avoid an overcrowded graph) are shown in Figure 13. It appears that the differenced temperature time series are consistent with the condition implied by stationarity, i.e., $H = 0$ for the differenced process. The same does not look to be the case for the CO_2 time series, particularly for the Mauna Loa time series, in which the Hurst parameter appears to be close to 1/2. Based on this, one would exclude stationarity for the Mauna Loa CO_2 time series. However, a simpler interpretation of the graph is that the data record is not long enough to reveal that $H = 0$ for the differenced process. Actually, all available data belong to a period in which $[CO_2]$ exhibits a monotonic increasing trend (as also verified by the fact that all values of $\Delta \ln[CO_2]$ in Figures 11 and 12 are positive, while stationarity entails a zero mean of the differenced

process). Had the available database been broader, both positive and negative trends could appear. Indeed, a broader view of the [CO_2] process based on palaeoclimatic data (Figures 3 and 4) would justify a stationarity assumption.

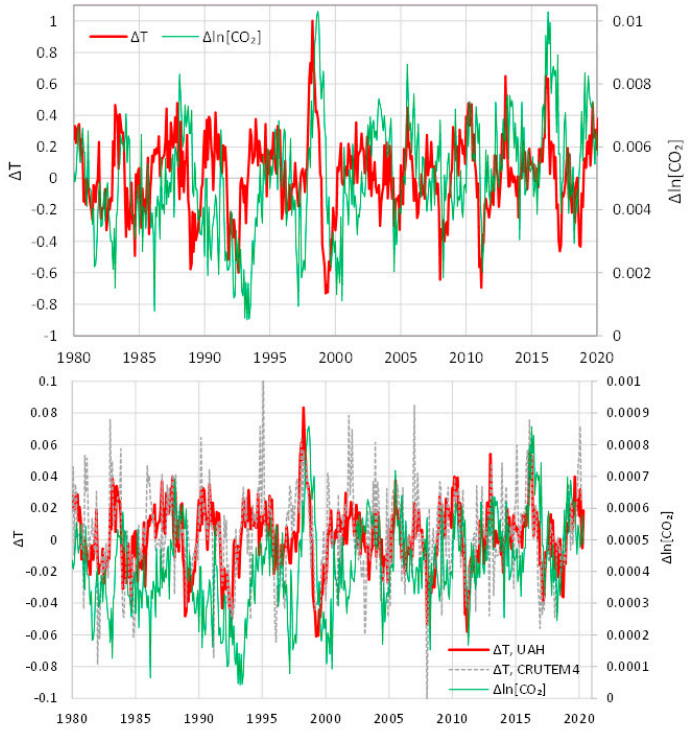

Figure 11. Differenced time series of UAH temperature and logarithm of CO_2 concentration at Mauna Loa at monthly scale. The graph in the upper panel was constructed in the manner described in the text. The graph in the lower panel is given for comparison and was constructed differently by taking differences of the values of each month with the previous month and then averaging over the previous 12 months (to remove periodicity); in addition, the lower graph includes the CRUTEM4 land temperature series.

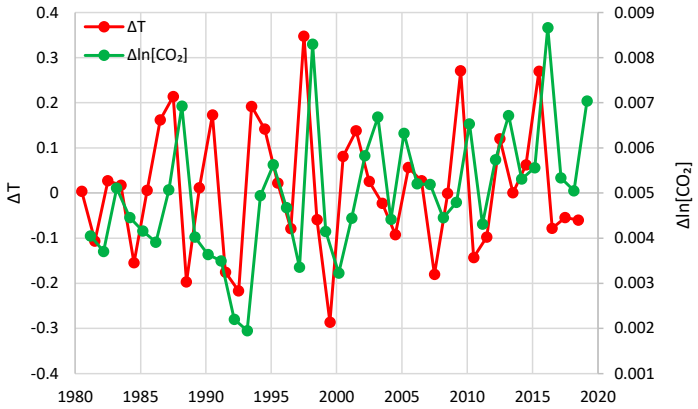

Figure 12. Annually averaged time series of differenced temperatures (UAH) and logarithms of CO_2 concentrations (Mauna Loa). Each dot represents the average of a one-year duration ending at the time of its abscissa.

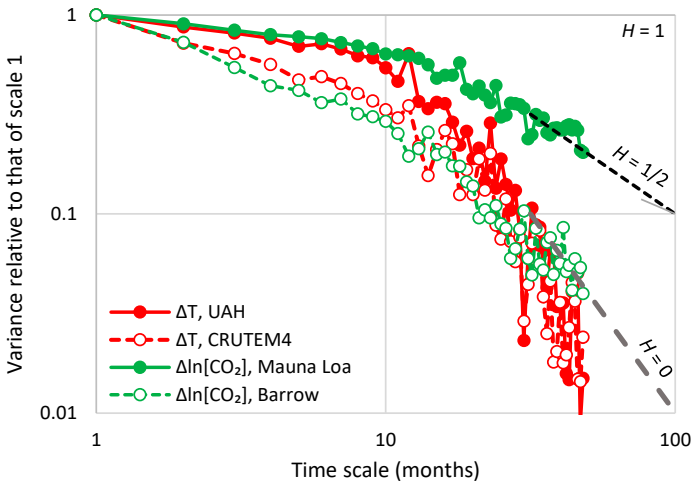

Figure 13. Empirical climacograms of the indicated differenced time series; the characteristic slopes corresponding to values of the Hurst parameter $H = 1/2$ (large-scale randomness), 0 (full antipersistence) and 1 (full persistence) are also plotted (note, $H = 1 +$ slope/2).

The preliminary qualitative observation from graphical inspection of Figures 11 and 12 suggests that the temperature change very often precedes and the CO_2 change follows in the same direction. We note, though, that temperature changes alternate in sign while CO_2 changes are always positive.

A quantitative analysis based on the methodology in Section 4.1 requires the study of lagged cross-correlations of the two processes. Figure 14 shows the cross-correlogram between UAH temperature and Mauna Loa CO_2 concentration; the autocorrelograms of the two processes are also plotted for comparison. The fact that the cross-correlogram does not have values consistently close to zero at any of the semi-axes eliminates the possibility of an exclusive (unidirectional) causality and suggests consistency with "hen-or-egg" causality.

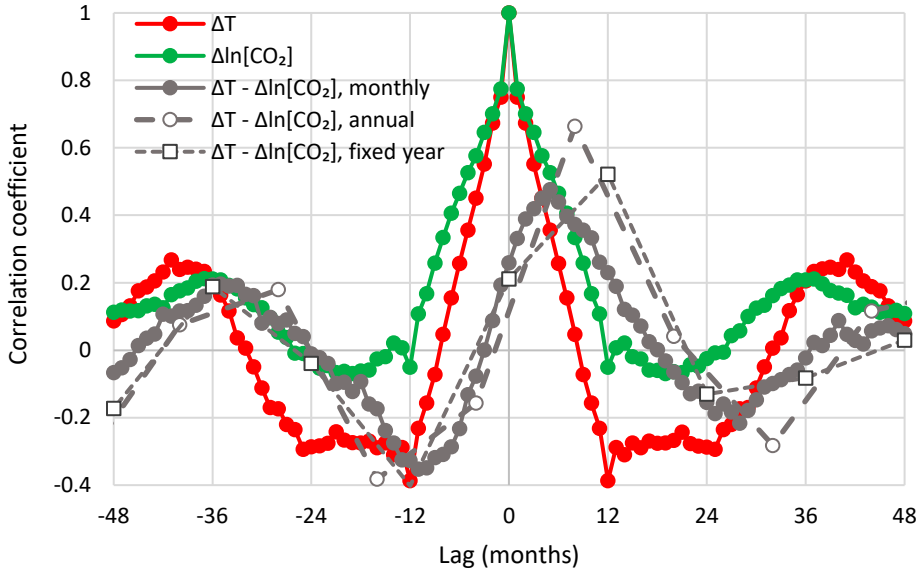

Figure 14. Auto- and cross-correlograms of the differenced time series of UAH temperature and Mauna Loa CO_2 concentration.

The maximum cross-correlation of the monthly series is 0.47 and appears at a positive lag, $\eta_1 = 5$ months, thus suggesting $T \rightarrow [CO_2]$, rather than $[CO_2] \rightarrow T$, as dominant causality direction. Similar

are the graphs of the other combinations of temperature and CO_2 datasets, which are shown in Appendix A.5 (Figures A3–A7). In all cases, η_1 is positive, ranging from 5 to 11 months.

To perform similar analyses on the annual scale, we fixed the specification of a year for temperature for the period July–June, as already mentioned, and then slid the initial month specifying the beginning of a year for CO_2 concentration so as to find a specification that maximizes the cross-correlation at the annual scale. In Figure 14, maximization occurs when the year specification is February–January (of the next year), i.e., if the lag is 8 months. The maximum cross-correlation is 0.66. If we keep the specification of the year for CO_2 concentration the same as in temperature (July–June), then maximization occurs at lag one year (12 months) and the maximum cross-correlation is 0.52. Table 1 summarizes the results for all combinations examined. The lags are always positive. They vary between 8 and 14 months for a sliding window specification and are 12 months for the fixed window specification. Most interestingly, the opposite phase in the annual cycle of CO_2 concentration in the South Pole, with respect to the other three sites, does not produce any noteworthy differences in the shape of the cross-correlogram nor in the time lags maximizing the cross-correlations.

Table 1. Maximum cross-correlation coefficient (MCCC) and corresponding time lag in months. The annual window for temperature is July–June, while for CO_2, it is either different (sliding), determined so as to maximize MCCC, or the same (fixed).

Temperature—CO_2 Series	Monthly Time Series		Annual Time Series—Sliding Annual Window		Annual Time Series—Fixed Annual Window	
	MCCC	Lag	MCCC	Lag	MCCC	Lag
UAH—Mauna Loa	0.47	5	0.66	8	0.52	12
UAH—Barrow	0.31	11	0.70	14	0.59	12
UAH—South Pole	0.37	6	0.54	10	0.38	12
UAH—Global	0.47	6	0.60	11	0.60	12
CRUTEM4—Mauna Loa	0.31	5	0.55	10	0.52	12
CRUTEM4—Global	0.33	9	0.55	12	0.55	12

While, as explained in Sections 4.2 and 5.1, the Granger test has weaknesses that may not help in drawing conclusions, for completeness and as a confirmation, we list its results here:

- For the monthly scale and the causality direction $[CO_2] \to T$, the null hypothesis is not rejected at all usual significance levels for lag $\eta = 1$ and is rejected for significance level 1% for $\eta = 2$–8, with minimum attained p-value 1.8×10^{-4} for $\eta = 6$.
- For the monthly scale and the causality direction $T \to [CO_2]$, the null hypothesis is rejected at all usual significance levels for all lags η, with minimum attained p-value 2.1×10^{-8} for $\eta = 7$.
- For the monthly scale, the attained p-values in the direction $T \to [CO_2]$ are always smaller than in direction $[CO_2] \to T$ by about 4 to 5 orders of magnitude, thus clearly supporting $T \to [CO_2]$ as dominant direction.
- For the annual scale with fixed year specification and the causality direction $[CO_2] \to T$, the null hypothesis is not rejected at all usual significance levels for any lag η, thus indicating that this causality direction does not exist.
- For the annual scale with fixed year specification and the causality direction $T \to [CO_2]$, the null hypothesis is not rejected at significance level 1% for all lags $\eta = 1$–6, with minimum attained p-value 5% for lag $\eta = 2$, thus supporting this causality direction at this significance level.
- For the annual scale with fixed year specification, the attained p-values in the direction $T \to [CO_2]$ are always smaller than in direction $[CO_2] \to T$, again clearly supporting $T \to [CO_2]$ as the dominant direction.

We note that the test cannot be applied for the sliding time window case and, hence, we cannot provide results for this case.

We add a final remark, in view of a comment by Masters and Benestad [73] on the already mentioned study by Humlum et al. [45], in which they claim that "the inter-annual fluctuations in atmospheric CO_2 produced by ENSO can lead to a misdiagnosis of the long-term cause of the recent atmospheric CO_2 increase". Inspired by this comment, we have made a preliminary three-variable investigation using differenced temperatures (UAH), logarithms of CO_2 concentrations (Mauna Loa), and Equatorial South Oscillation index (SOI) characterizing ENSO. The investigation has been made on a monthly scale. $\Delta \ln[CO_2]$ has been linearly regressed with ΔT and the running average of SOI for the previous 12 months. At synchrony (without applying any time lag), the correlation of SOI with ΔT is 0.40, higher than that of ΔT and $\Delta \ln[CO_2]$ (0.24, as seen in Figure 14 at lag 0). The highest determination coefficient for the three regressed quantities is obtained when the time lag between $\Delta \ln[CO_2]$ and ΔT is again 5 months, as in the two-variable case (the optimal lag for SOI is 0, but the regression is virtually insensitive to the change of that lag). Its value is $r^2 = 0.23$, corresponding to $r = 0.48$, i.e., only slightly higher than the maximum cross-correlation coefficient of the two variable-case (which is 0.47 as seen in Table 1). In other words, by including ENSO in the modelling framework, the results do not change.

In brief, all above confirm the results of our methodology that the dominant direction of causality is $T \rightarrow [CO_2]$.

6. Physical Interpretation

The omnipresence of positive lags on both monthly and annual time scales and the confirmation by Granger tests reduce the likelihood that our results are statistical artefacts. Still, our results require physical interpretation which we seek in the natural process of soil respiration.

Soil respiration, R_s, defined to be the flux of microbially and plant-respired CO_2, clearly increases with temperature. It is known to have increased in the recent years [74,75]. Observational data of R_s (e.g., [76,77]; see also [78]) show that the process intensity increases with temperature. Rate of chemical reactions, metabolic rate, as well as microorganism activity, generally increase with temperature. This has been known for more than 70 years (Pomeroy and Bowlus [79]) and is routinely used in engineering design.

The Figure 6.1 of the latest report of the IPCC [75] provides a quantification of the mass balance of the carbon cycle in the atmosphere that is representative of recent years. The soil respiration, assumed to be the sum of respiration (plants) and decay (microbes), is 113.7 Gt C/year (IPCC gives a value of 118.7 including fire, which along with biomass burning, is estimated to be 5 Gt C/year by Green and Byrne [80]).

We can expect that sea respiration would also have increased. Moreover, outgassing from the oceans must also have increased as the solubility of CO_2 in water decreases with increasing temperature [14,81]. In addition, photosynthesis must have increased, as in the 21st century the Earth has been greening, mostly due to CO_2 fertilization effects [82] and human land-use management [83]. Specifically, satellite data show a net increase in leaf area of 2.3% per decade [83]. The sums of carbon outflows from the atmosphere (terrestrial and maritime photosynthesis as well as maritime absorption) amount to 203 Gt C/year. The carbon inflows to the atmosphere amount to 207.4 Gt C/year and include natural terrestrial processes (respiration, decay, fire, freshwater outgassing as well as volcanism and weathering), natural maritime processes (respiration) as well as anthropogenic processes. The latter comprise human CO_2 emissions related to fossil fuels and cement production as well as land-use change, and amount to 7.7 and 1.1 Gt C/year, respectively. The change in carbon fluxes due to natural processes is likely to exceed the change due to anthropogenic CO_2 emissions, even though the latter are generally regarded as responsible for the imbalance of carbon in the atmosphere.

7. Conclusions

The relationship between atmospheric concentration of carbon dioxide and the global temperature is widely recognized, and it is common knowledge that increasing CO_2 concentration plays a major role in enhancement of the greenhouse effect and contributes to global warming.

While the fact that these two variables are tightly connected is beyond doubt, the direction of the causal relationship needs to be studied further. The purpose of this study is to complement the conventional and established theory, that increased CO_2 concentration due to anthropogenic emissions causes an increase of temperature, by considering the concept of reverse causality. The problem is obviously more complex than that of exclusive roles of cause and effect, qualifying as a "hen-or-egg" ("ὄρνις ἢ ᾠὸν") causality problem, where it is not always clear which of two interrelated events is the cause and which the effect. Increased temperature causes an increase in CO_2 concentration and, hence, we propose the formulation of the entire process in terms of a "hen-or-egg" causality.

We examine the relationship of global temperature and atmospheric carbon dioxide concentration using the most reliable global data that are available—the data gathered from several sources, covering the common time interval 1980–2019, available at the monthly time step.

The results of the study support the hypothesis that both causality directions exist, with $T \to CO_2$ being the dominant, despite the fact that $CO_2 \to T$ prevails in public, as well as in scientific, perception. Indeed, our results show that changes in CO_2 follow changes in T by about six months on a monthly scale, or about one year on an annual scale.

The opposite causality direction opens a nurturing interpretation question. We attempted to interpret this mechanism by noting that the increase in soil respiration, reflecting the fact that the intensity of biochemical process increases with temperature, leads to increasing natural CO_2 emission. Thus, the synchrony of rising temperature and CO_2 creates a positive feedback loop. This poses challenging scientific questions of interpretation and modelling for further studies. In this respect, we welcome the review by Connolly [14], which already proposes interesting interpretations within a wider epistemological framework and in connection with a recent study [84]. In our opinion, scientists of the 21st century should have been familiar with unanswered scientific questions as well as with the idea that complex systems resist simplistic explanations.

Author Contributions: Conceptualization, D.K.; methodology, D.K.; software: D.K.; validation, Z.W.K.; formal analysis, D.K.; investigation, D.K. and Z.W.K.; data curation, D.K.; writing—original draft preparation, D.K. and Z.W.K.; writing—review and editing, D.K. and Z.W.K.; visualization, D.K. and Z.W.K. All authors have read and agreed to the published version of the manuscript.

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Acknowledgments: Some negative comments of two anonymous reviewers for an earlier submission of this manuscript in another journal (which we have posted online: manuscript at http://dx.doi.org/10.13140/RG.2.2.29154.15045/1, reviews at http://dx.doi.org/10.13140/RG.2.2.14524.87681) helped us improve the presentation and strengthen our arguments against their comments. We appreciate these reviewers' suggestions of relevant published works, which we were unaware of. We are grateful to the reviewers of the submission of our study to *Sci*, Yog Aryal, Ronan Connolly, and Stavros Alexandris, whose constructive comments helped us to improve the paper, mostly by adding a lot of additional information and clarification in appendices. The discussion of DK with Antonis Christofides helped to substantially improve an initial version of Appendix A.4, which he informally reviewed. We thank the journal *Sci* for the interesting experience it offered us.

Conflicts of Interest: The authors declare no conflict of interest.

Data Availability: The two temperature time series and the Mauna Loa CO_2 time series are readily available on monthly scale from http://climexp.knmi.nl. All NOAA CO_2 data are available from https://www.esrl.noaa.gov/gmd/ccgg/trends/gl_trend.html. The CO_2 data of Mauna Loa were retrieved from http://climexp.knmi.nl/data/imaunaloa_f.dat while the original measurements are in https://www.esrl.noaa.gov/gmd/dv/iadv/graph.php?code=MLO. The Barrow series is available (in irregular step) in https://www.esrl.noaa.gov/gmd/dv/iadv/graph.php?code=BRW, and the South Pole series in https://www.esrl.noaa.gov/gmd/dv/data/index.php?site=SPO. All these data were accessed (using the "Download data" link in the above sites) in June 2020. The global CO_2 series is accessed at https://www.esrl.noaa.gov/gmd/ccgg/trends/gl_data.html, of which the "Globally averaged marine surface monthly mean data" are used here. The palaeoclimatic data of Vostok CO_2 were retrieved from http://cdiac.ess-dive.lbl.gov/ftp/trends/co2/vostok.icecore.co2 (dated January 2003, accessed September 2018) and the temperature data from http://cdiac.ess-dive.lbl.gov/ftp/trends/temp/vostok/vostok.1999.temp.dat (dated January 2000, accessed September 2018).

Appendix A

Appendix A.1. On Early Non-Systematic Measurements of CO_2

This Appendix (not contained in Version 1 of our paper) addresses comments by all three reviewers of Version 1, Yog Aryal [85], Ronan Connolly [14], and Stavros Alexandris [86], about the reasons why we delimit our analysis to the period 1980–2019. The two latter reviewers suggested using earlier data compiled by Beck (2007), who referred to old chemical analyses of atmospheric concentration of CO_2.

We are sympathetic to the passion of the late Ernst-Georg Beck who, being a biology teacher, sacrificed a lot of time and effort to the exciting exercise of digging out old CO_2 measurements. Indeed, it could be worthwhile to have a critical look at the historical data and to try to make order in them and utilize them. However, this would certainly warrant an individual paper with this particular aim.

Historically, it was not the first review paper of this sort. For instance, in his Table 1, Beck [87] refers to old works by Letts and Blake (~1900; [88]), who considered 252 papers with data (all in 19th century), and to Stepanova [89], who considered 229 papers with data (130 in 19th century and 99 in 20th century). Beck himself [87] considered 156 papers with data (82 in 19th and 74 in 20th century).

As usual, it is instructive to consider the paper by Beck [87] jointly with critical commentaries published later in the journal where the original paper appeared [90,91]. In particular, R.F. Keeling [90] opined that the old chemical measurements examined by Beck [87] "exhibit far too much geographic and short-term temporal variability to plausibly be representative of the background. The variability of these early measurements must therefore be attributed to 'local or regional' factors or poor measurement practice". Keeling [90] also noted "basic accounting problems". "Beck's 11-year averages show large swings, including an increase from 310 to 420 ppm between 1920 and 1945 (Beck's Figure 11)". "To drive an increase of this magnitude globally requires the release of 233 billion metric tons of carbon to the atmosphere. The amount is equivalent to more than a third of all the carbon contained in land plants globally. [. . .] To make a credible case, Beck needed to offer evidence for losses or gains of carbon of this magnitude from somewhere. He offered none."

Meijer [91] expressed the opinion that Beck's work "contains major flaws, such that the conclusions are wrong". He also wrote: "The measurements presented in the paper are indeed useless for the purpose the author wants to use them, certainly in the way the author interprets them". There is a lack of interpretation of diurnal and seasonal variability (effects called the "diurnal" and the "seasonal" rectifier in the literature) and consideration of atmospheric mixing or lack thereof. Meijer also criticized the lack of meta-data: "The necessary data to judge, namely measurement height, consecutive length of a record and especially temporal resolution, are lacking in [Beck's] Table 2. In the light of the above, the whole 'Discussion and Conclusion' section is invalid, including [Beck's] Figures 11–14". Indeed, the records mentioned in Beck's Table 2 were local and short-lasting, with the longest periods being 1920–1926. Beck's Figures 11 and 13 show concatenated short segments of data at different places.

There are some other puzzling elements in Beck's paper. For instance, in his Figure 5, referring to data from a meteorological station near Giessen, the variability of high amplitude seems suspicious and not physically realistic. In particular, from June to August 1940, the measured CO_2 concentration increases from 340 to 550 ppm (much more than in Beck´s Figure 5 discussed by Keeling [90] and Meijer [91] as quoted above), with weird seasonal behaviour. Beck himself admitted that the results for Giessen "need to be adjusted downwards to take account of anthropogenic sources of CO_2 from nearby city, an influence that has been estimated as lying between 10 and 70 ppm [. . .] by different authors".

The controversy and disputes among these authors extended beyond pure scientific issues. Thus, Beck [87] wrote "[t]he data accepted [. . .] had to be sufficiently low to be consistent with the greenhouse hypothesis of climate change controlled by rising CO_2 emissions from fossil fuel burning". On the other hand, Meijer [91] wrote: "The author even accuses the pioneers Callendar and [Charles David] Keeling of selective data use, errors or even something close to data manipulation". In addition, [R.F.] Keeling [90] noted: "Beck is [. . .] wrong when he asserts that the earlier data have been discredited only because they don't fit a preconceived hypothesis of CO_2 and climate. [. . .] Instead, the data have

been ignored because they cannot be accepted as representative without violating our understanding of how fast the atmosphere mixes".

In view of the above questions about the data reliability as well as the controversies and disputes, we decided to limit the period of our study in 1980–2019 in which the measurements are systematic and verifiable because they are made in several locations simultaneously.

Appendix A.2. Some Notes on the Averaged Differenced Process

The cumulative process of the differenced process $\underline{\tilde{x}}_{\tau,\nu}$ will be

$$\begin{aligned}\underline{\tilde{X}}_{\kappa,\nu} := \underline{\tilde{x}}_{1,\nu} + \underline{\tilde{x}}_{2,\nu} + \ldots + \underline{\tilde{x}}_{\kappa,\nu} = \underline{x}_{1+\nu} - \underline{x}_1 + \underline{x}_{2+\eta} - \underline{x}_2 + \ldots + \underline{x}_{\kappa+\nu} - \underline{x}_\kappa \\ = \underline{X}_{\kappa+\nu} - \underline{X}_\nu - \underline{X}_\kappa.\end{aligned} \tag{A1}$$

Note that for $\eta = 1$, this simplifies to

$$\underline{\tilde{X}}_{\kappa,1} = \underline{X}_{\kappa+1} - \underline{X}_1 - \underline{X}_\kappa = \underline{x}_{\kappa+1} - \underline{x}_1 = \underline{\tilde{x}}_{\kappa,1} =: \underline{\tilde{x}}_\kappa. \tag{A2}$$

Following Equation (7), the average differenced process at discrete time scale $\kappa = \eta$ will be

$$\underline{\tilde{x}}_\tau^{(\kappa)} = \frac{\underline{\tilde{X}}_{\tau\kappa,\kappa} - \underline{\tilde{X}}_{(\tau-1)\kappa,\kappa}}{\kappa} = \frac{(\underline{X}_{\tau\kappa+\kappa} - \underline{X}_\kappa - \underline{X}_{\tau\kappa}) - (\underline{X}_{(\tau-1)\kappa+\kappa} - \underline{X}_\kappa - \underline{X}_{(\tau-1)\kappa})}{\kappa} \tag{A3}$$

which, noting that in the rightmost part, the two terms $\underline{X}_\kappa$ cancel each other and by virtue of (7), simplifies to

$$\underline{\tilde{x}}_\tau^{(\kappa)} = \underline{x}_{\tau+1}^{(\kappa)} - \underline{x}_\tau^{(\kappa)} = \underline{\tilde{x}}_{\tau,1}^{(\kappa)}. \tag{A4}$$

In other words, the average differenced process equals the differenced average process in the case that the differencing time step η has been chosen as equal to the averaging time scale κ. For $\kappa = \eta = 1$, we have $\underline{\tilde{x}}_\tau^{(1)} \equiv \underline{\tilde{x}}_{\tau,1} \equiv \underline{\tilde{x}}_\tau$.

Appendix A.3. Some Notes on Time Directionality of Causal Systems

In a unidirectional causal system in continuous time t, in which the process $\underline{x}(t)$ is the cause of $\underline{y}(t)$, an equation of the form

$$\underline{y}(t) = \int_0^\infty \alpha(s)\underline{x}(t-s)\mathrm{d}s \tag{A5}$$

should hold [67], where $\alpha(t)$ is the impulse response function. The causality condition is thus

$$\alpha(t) = 0 \text{ for } t < 0. \tag{A6}$$

Here, we consider systems with positive dependence, in which $\alpha(t) \geq 0$ for $t \geq 0$, which are possibly also excited by another process $\underline{v}(t)$, independent of $\underline{x}(t)$. Working in discrete time, we write

$$\underline{y}_\tau = \sum\nolimits_{j=0}^\infty \alpha_j \underline{x}_{\tau-j} + \underline{v}_\tau. \tag{A7}$$

Assuming (without loss of generality) zero means for all processes, multiplying by $\underline{x}_{\tau-\eta}$, taking expected values, and denoting the cross-covariance function as $c_{xy}[\eta] := \mathrm{E}\left[\underline{x}_{\tau-\eta}\underline{y}_\tau\right]$ and the autocovariance function as $c_x[\eta] := \mathrm{E}\left[\underline{x}_{\tau-\eta}\underline{x}_\tau\right]$, we find

$$c_{xy}[\eta] = \sum\nolimits_{j=0}^\infty \alpha_j c_x[\eta - j]. \tag{A8}$$

For $\eta > 0$, using the property that $c_x[\eta]$ is an even function ($c_x[\eta] = c_x[-\eta]$), we get

$$c_{xy}[\eta] = \sum_{j=0}^{\infty} \alpha_j c_x[j-\eta] = \sum_{j=0}^{\eta-1} \alpha_j c_x[\eta-j] + \sum_{j=\eta}^{\infty} \alpha_j c_x[j-\eta], \tag{A9}$$

and for the negative part

$$c_{xy}[-\eta] = \sum_{j=0}^{\infty} \alpha_j c_x[j+\eta]. \tag{A10}$$

With intuitive reasoning, assuming that the autocovariance function is decreasing ($c_x[j'] < c_x[j]$ for $j' > j$), as usually happens in natural processes, we may see that the rightmost term of Equations (A9) and (A10) should be decreasing functions of η (as for $j' > j$ it will be $c_x[j'-\eta] < c_x[j-\eta]$ and $c_x[j'+\eta] < c_x[j+\eta]$). However, the term $\sum_{j=0}^{\eta-1} \alpha_j c_x[\eta-j]$ of Equation (A9) is not decreasing. Therefore, it should attain a maximum value at some positive lag $\eta = \eta_1$. Thus, a positive maximizing lag, $\eta = \eta_1 > 0$, is a necessary condition for causality direction from $\underline{x}_\tau$ to $\underline{y}_\tau$. Conversely, the condition that the maximizing lag is negative is a sufficient condition to exclude the causality direction exclusively from $\underline{x}_\tau$ to $\underline{y}_\tau$.

All above arguments remain valid if we standardize (divide) by the product of standard deviations of the processes $\underline{x}_\tau$ and $\underline{y}_\tau$ and, thus, we can replace cross-covariances $c_{xy}[\eta]$ with cross-correlations $r_{xy}[\eta]$ (or, in the case of differenced processes, $r_{\tilde{x}\tilde{y}}[\nu, \eta]$).

Appendix A.4. Some Notes on the Alternative Procedures on Causality

Reviewer Yog Aryal [85] opined that we missed referring to the recent relevant works by Hannart et al. [92] and Verbitsky et al. [93]. In response to this comment, we include this Appendix (not contained in Version 1 of our paper) explaining, in brief, why we do not compare our results with the ones of those studies, also noting that only the latter study contains material that is prima facie comparable to ours. The former study, focusing on the so-called causal counterfactual theory, is more theoretical and also much more interesting. While we, too, are preparing a theoretical study, in which we will discuss some theories in detail, in this Appendix, we give some key elements of our theoretical disagreements and a counterexample that illustrates the disagreements.

We first note that in order to define causality, Hannart et al. [92] refer to the work on the 18th century philosopher David Hume and, in particular, his famous book *Enquiry concerning Human Understanding* [94] first published in 1748. From this book, we wish to quote the following important passage, which emphasizes the difficulties even in defining causality:

> *Our thoughts and enquiries are, therefore, every moment, employed about this relation: Yet so imperfect are the ideas which we form concerning it, that it is impossible to give any just definition of cause, except what is drawn from something extraneous and foreign to it.*

Hannart et al. [92], while studying the probability of occurrence of an event Y, introduced the two-valued variable X_f to indicate whether or not a forcing f is present, and continue as follows:

> *The probability* $p_1 = P(Y = 1 | X_f = 1)$ *of the event occurring in the real world, with f present, is referred to as factual, while* $p_0 = P(Y = 1 | X_f = 0)$ *is referred to as counterfactual. Both terms will become clear in the light of what immediately follows. The so-called fraction of attributable risk (FAR) is then defined as*
>
> $$\mathrm{FAR} = 1 - \frac{p_0}{p_1} \tag{A11}$$
>
> *The FAR is interpreted as the fraction of the likelihood of an event that is attributable to the external forcing.*

They also show that under some conditions, FAR is a probability which they denote PN and call probability of necessary causality. They stress that it "is important to distinguish between necessary and sufficient causality" and they associate PN (or FAR) "with the first facet of causality, that of

necessity". They claim to have "introduced its second facet, that of sufficiency, which is associated with the symmetric quantity $1-(1-p_1)/(1-p_0)$"; they denote it as PS, standing for probability of sufficient causality.

Central to the logical framework of Hannart et al. [92] is the notion of *intervention* of an experimenter, which is equivalent to experimentation with the ability to set the value of the assumed cause to a desired value. Clearly, this is feasible in laboratory experiments and infeasible in natural processes. The authors resort to the "so-called *in silico experimentation*" which, despite the impressive name chosen, is intervention in a mathematical model that represents the process. Hence, objectively, they examine the "causality" that is embedded in the model rather than the natural causality. One may argue that this it totally unnecessary. It would be better to inspect the model's equations or code to investigate what causality has been embedded in the model instead of running simulations and calculating probabilities. In particular, if the models used are climate models as in [92], their inability to effectively describe (perform in "prime time") the real-world processes [50,95–100] makes the entire endeavour futile. Another notion these authors use is *exogeneity*, which is related to the so-called *causal graph*, reflecting the assumed dependencies among the studied variables. Specifically, they state "a sufficient condition for X to be exogenous wrt any variable is to be a top node of a causal graph".

Here, we will use the simple example of Section 4.2, temperature–clothes weight–sweat, to show that using the quantities FAR (or PN) and PS may give spurious results that do not correspond to necessary or sufficient conditions for causality, at least with their meaning in our paper.

We use the two-valued random variables $\underline{x}, \underline{y}, \underline{z}$ to model the states of temperature, clothes weight, and sweat, respectively. We designate the following states:

$x = 1$: being hot *above* a threshold;
$y = 1$: wearing clothes with weight *below* a threshold;
$z = 1$: sweat quantity *above* a threshold;

and the opposite states with $x = 0, y = 0, z = 0$, respectively. We choose the threshold of temperature so that $P\{\underline{x} = 0\} = P\{\underline{x} = 1\} = 0.5$ and that of clothes weight so that $P\{\underline{y} = 0\} = P\{\underline{y} = 1\} = 0.5$. We choose a small probability, 0.05, of wearing light clothes when cold, or heavy clothes when hot, i.e., $P\{\underline{y} = 1 | \underline{x} = 0\} = P\{\underline{y} = 0 | \underline{x} = 1\} = 0.05$ (generally, we avoid choosing zero probabilities; rather the minimum value we choose is 0.05).

Using the definition of conditional probability,

$$P\{\underline{y} = y | \underline{x} = x\} = \frac{P\{\underline{y} = y, \underline{x} = x\}}{P\{\underline{x} = x\}}, \tag{A12}$$

we find the probability matrix A with elements $a_{ij} = P\{\underline{x} = i, \underline{y} = j\}$ as follows:

$$A = \begin{array}{c} \\ x=0 \\ x=1 \end{array} \begin{array}{c} \begin{array}{cc} y=0 & y=1 \end{array} \\ \begin{bmatrix} 0.475 & 0.025 \\ 0.025 & 0.475 \end{bmatrix} \end{array} . \tag{A13}$$

Now, we assign plausible values to the conditional probabilities of high sweat, $P\{\underline{z} = 1 | \underline{x} = x, \underline{y} = y\}$, as follows:

Cold, heavy clothes: $P\{\underline{z} = 1 | \underline{x} = 0, \underline{y} = 0\} = 0.2$
Cold, light clothes: $P\{\underline{z} = 1 | \underline{x} = 0, \underline{y} = 1\} = 0.1$
Hot, heavy clothes: $P\{\underline{z} = 1 | \underline{x} = 1, \underline{y} = 0\} = 0.95$
Hot, light clothes: $P\{\underline{z} = 1 | \underline{x} = 1, \underline{y} = 1\} = 0.80$

Again, we have avoided setting any of the conditional probabilities to 0 (or 1), and we have used multiples of 0.05 for all of them.

Using the definition of conditional probability in the form

$$P\{\underline{z}=z|\underline{x}=x,\underline{y}=y\}=\frac{P\{\underline{z}=z,\underline{y}=y,\underline{x}=x\}}{P\{\underline{y}=y,\underline{x}=x\}}, \tag{A14}$$

we find the joint probabilities for each of the triplets $\{x,y,z\}$ that are shown in Table A1.

Table A1. Joint probabilities $P\{\underline{x}=x,\underline{y}=y,\underline{z}=z\}$ for all triplets $\{x,y,z\}$

x	y	$z=0$	$z=1$
0	0	0.38	0.095
0	1	0.0225	0.0025
1	0	0.00125	0.02375
1	1	0.095	0.38
	$P\{\underline{z}=z\}=$	0.49875	0.50125

Now, assume that we let an "artificial intelligence entity" (AIE) decide on causality based on the probability rules of the Hannart et al. [92] framework. Our AIE has access to numerous videos of people and is "trained" to assign accurate values of y and z, referring to clothes and sweat, based on the images in videos. In the video images, no thermometers are shown and, thus, our AIE cannot assign values of x, nor can it be aware of the notion of temperature. Our AIE tries to construct a causal graph putting, say, $\underline{y}$ as a top node and $\underline{z}$ as an end node; hence, it assumes that $\underline{y}$ is exogenous. Based on the huge information it can access, our AIE can (a) claim that it has constructed a prediction model based on one part of the data (e.g., using the so-called deep-learning technique) and, hence, is able to perform "in silico experimentation" (even though this is not absolutely necessary) and (b) accurately estimate the joint and conditional probabilities related to $\{y,z\}$ using either the model, the data, or both. Provided that the dataset is large enough, it will come up with the true values for the conditional probabilities, which are $b_{ij}=P\{\underline{y}=i,\underline{z}=j\}$ and $c_{ij}=P\{\underline{z}=j|\underline{y}=i\}$, and form the matrices B and C, respectively, with values as follows:

$$B=\begin{array}{c}\left[\begin{array}{cc}0.38125 & 0.11875\\ 0.1175 & 0.3825\end{array}\right]\\ z=0\quad z=1\end{array}\begin{array}{l}y=0\\ y=1\end{array},\quad C=\begin{array}{c}\left[\begin{array}{cc}0.7625 & 0.2375\\ 0.235 & 0.765\end{array}\right]\\ z=0\quad z=1\end{array}\begin{array}{l}y=0\\ y=1\end{array}. \tag{A15}$$

Here, the true values b_{ij} have been determined from the values of Table A1 noting that

$$b_{ij}=P\{\underline{y}=i,\underline{z}=j\}=P\{\underline{z}=j,\underline{y}=i,\underline{x}=0\}+P\{\underline{z}=j,\underline{y}=i,\underline{x}=1\} \tag{A16}$$

and the true values c_{ij} have been determined from the definition of conditional probability:

$$P\{\underline{z}=z|\underline{y}=y\}=\frac{P\{\underline{z}=z,\underline{y}=y\}}{P\{\underline{y}=y\}}. \tag{A17}$$

Our AIE will then implement the causality conditions of sweat on clothes weight, assigning $p_0=P\{\underline{z}=1|\underline{y}=0\}=0.2375$ and $p_1=P\{\underline{z}=1|\underline{y}=1\}=0.765$. It will further calculate the probability of necessary causality as PN = 0.690, and the probability of sufficient causality even higher, PS = 0.692. Hence, our AIE will inform us that there is all necessary and sufficient evidence that light clothes cause high sweat.

Now, coming to the study by Verbitsky et al. [93], we notice that it assumes that "each time series is a variable produced by its hypothetical low dimensional system of dynamical equations" and uses the technique of distances of multivariate vectors for reconstructing the system dynamics. As demonstrated in Koutsoyiannis [101], such assumptions and techniques are good for simple toy models but, when real-world systems are examined, low dimensionality appears as a statistical artifact because the reconstruction actually needs an incredibly high number of observations to work, which are hardly available. The fact that the sums of multivariate vectors of distances is a statistical estimator with huge uncertainty is often missed in studies of this type, which treat data as deterministic quantities to obtain unreliable results. We do not believe that the Earth system and Earth processes (including global temperature and CO_2) are of low dimensionality, and we deem it unnecessary to discuss the issue further. We only note the fact that global temperature and CO_2 virtually behave as Gaussian, which enables reliable estimation of standard correlations and dismiss the need to use the overly complex and uncertain correlation sums.

Appendix A.5. Additional Graphical Depictions

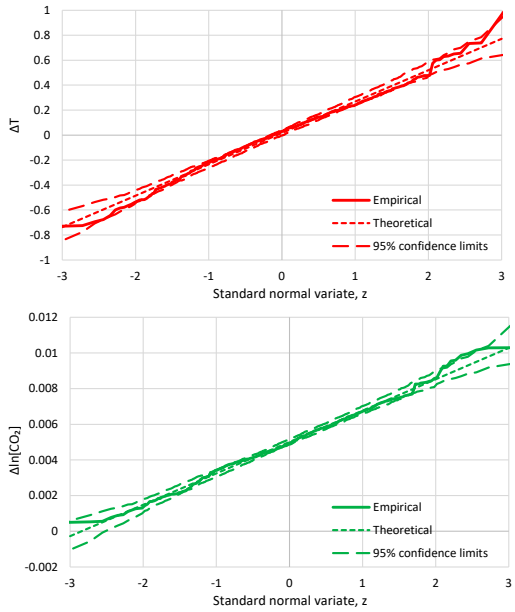

Figure A1. Normal probability plots of ΔT and $\Delta\ln[CO_2]$ where T is the UAH temperature and $[CO_2]$ is the CO_2 concentration at Mauna Loa at monthly scale.

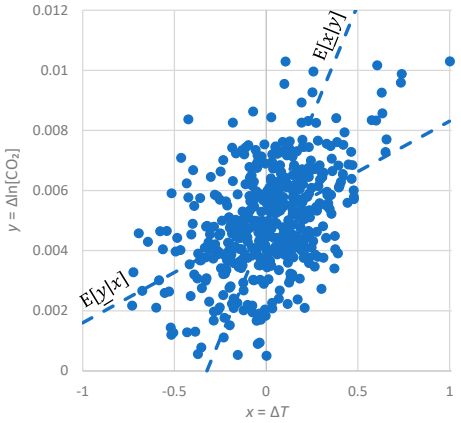

Figure A2. Scatter plot of ΔT and $\Delta\ln[CO_2]$ where T is the UAH temperature and $[CO_2]$ is the CO_2 concentration at Mauna Loa at monthly scale; the two quantities are lagged in time using the optimal lag of 5 months (Table 1). The two linear regression lines are also shown in the figure.

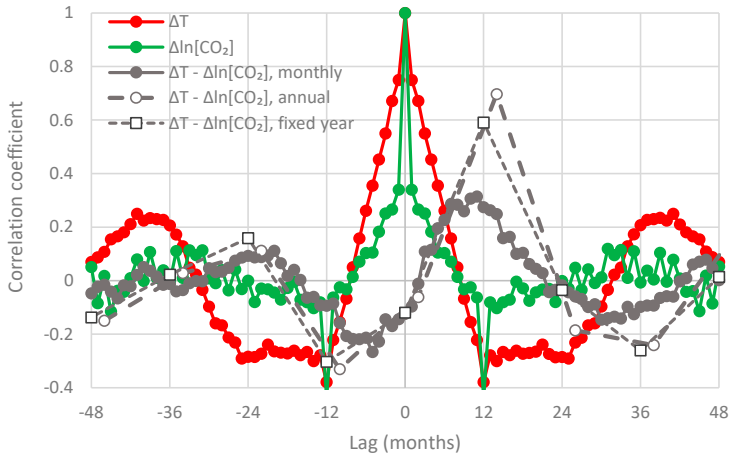

Figure A3. Auto- and cross-correlograms of the differenced time series of UAH temperature and Barrow CO_2 concentration.

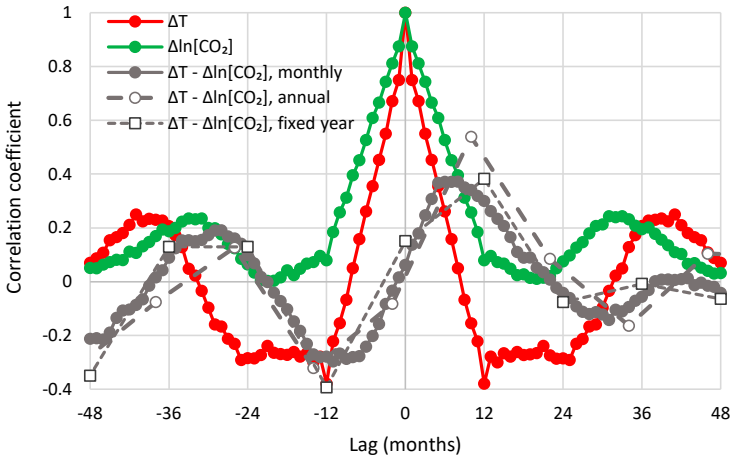

Figure A4. Auto- and cross-correlograms of the differenced time series of UAH temperature and South Pole CO_2 concentration.

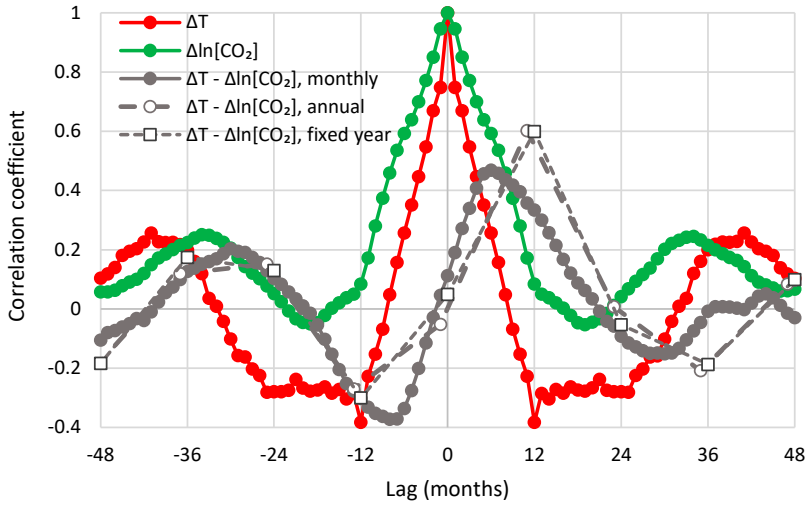

Figure A5. Auto- and cross-correlograms of the differenced time series of UAH temperature and global CO_2 concentration.

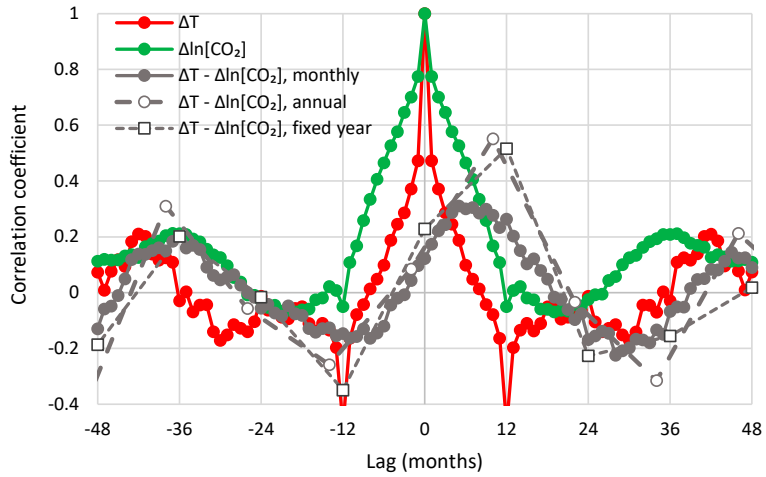

Figure A6. Auto- and cross-correlograms of the differenced time series of CRUTEM4 temperature and Mauna Loa CO_2 concentration.

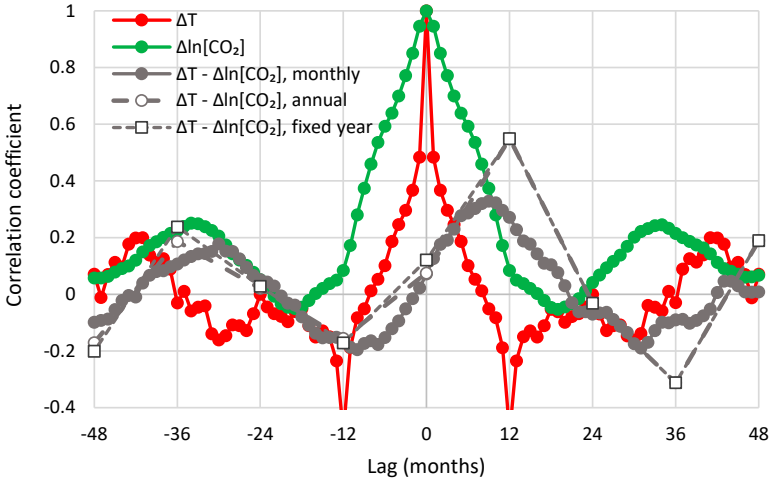

Figure A7. Auto- and cross-correlograms of the differenced time series of CRUTEM4 temperature and global CO_2 concentration.

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On Hens, Eggs, Temperatures and CO_2: Causal Links in Earth's Atmosphere

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Abstract: The scientific and wider interest in the relationship between atmospheric temperature (T) and concentration of carbon dioxide ($[CO_2]$) has been enormous. According to the commonly assumed causality link, increased $[CO_2]$ causes a rise in T. However, recent developments cast doubts on this assumption by showing that this relationship is of the *hen-or-egg* type, or even unidirectional but opposite in direction to the commonly assumed one. These developments include an advanced theoretical framework for testing causality based on the stochastic evaluation of a potentially causal link between two processes via the notion of the impulse response function. Using, on the one hand, this framework and further expanding it and, on the other hand, the longest available modern time series of globally averaged T and $[CO_2]$, we shed light on the potential causality between these two processes. All evidence resulting from the analyses suggests a unidirectional, potentially causal link with T as the cause and $[CO_2]$ as the effect. That link is not represented in climate models, whose outputs are also examined using the same framework, resulting in a link opposite the one found when the real measurements are used.

Keywords: causality; causal systems; stochastics; impulse response function; geophysics; hydrology; climate

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> *Science is generated by and devoted to free inquiry: the idea that any hypothesis, no matter how strange, deserves to be considered on its merits. The suppression of uncomfortable ideas may be common in religion and politics, but it is not the path to knowledge; it has no place in the endeavor of science. We do not know in advance who will discover fundamental new insights.*
>
> Carl Sagan [1]

1. Introduction

A recent (2020) study [2] examining data from measurements of temperature (T) and atmospheric concentration of carbon dioxide ($[CO_2]$) challenged the conventional, and well established, wisdom that increased $[CO_2]$ causes an increase in temperature. The study examined whether the commonly assumed causal chain is supported by data or, alternatively, whether a *hen-or-egg* (HOE) causal relationship is more plausible. The phrase "*hen or egg*" (originally in Greek, ὄρνις ἢ ὠόν) was first used in a philosophical context by Plutarch [3] to describe situations in which it is not clear which of two interrelated events or processes is the cause and which the effect.

The study examined a case where the causal link is not between two events but between two processes, represented as stochastic processes. Denoting these processes as

$\underline{x}(t)$ and $\underline{y}(t)$ (where we follow the Dutch notational convention of underlining stochastic variables), in a typical causal system, denoted as $x \rightarrow y$, earlier realizations of $\underline{x}(t)$ affect the current realization of $\underline{y}(t)$. In an HOE causal system, earlier realizations of $\underline{x}(t)$ affect the current realization of $\underline{y}(t)$, but also earlier realizations of $\underline{y}(t)$ affect the current realization of $\underline{x}(t)$.

In terms of its applications, the study used global temperature data from satellites (University of Alabama in Huntsville—UAH) and ground-based (CRUTEM.4.6.0.0 global T 2 m land temperature) and [CO_2] data at several sites (Mauna Loa, HI, USA; Barrow, AK, USA; South Pole; global average) with monthly time steps for the period 1980–2019. An innovative element of this study was that it explained the reasons why using the original T and [CO_2] data series yielded spurious results, and it proposed using the changes (differences in time) thereof instead. We note that differencing is of very common use in economics literature (e.g., [4,5]). In particular, for the [CO_2] it proposed taking the logarithm before differencing (something resembling techniques used in economics [5]) and thus the time series that were correlated were ΔT and $\Delta \ln[CO_2]$, where the differences are taken over 12 months. By studying lagged correlations of the two, the study asserted that, while both causality directions exist, the results support the hypothesis that the dominant direction is $T \rightarrow CO_2$. Changes in [CO_2] follow changes in T by about six months on a monthly scale or about one year on an annual scale. In turn, the study attempted to interpret this mechanism by referring to biochemical reactions, since at higher temperatures soil respiration, and hence CO_2 emission, increases.

In a subsequent (2022) two-paper study, Koutsoyiannis et al. [6,7] developed a more complete theoretical framework by revisiting causality over the entire knowledge tree, from philosophy to science and to scientific and technological application. By reviewing various approaches to causality, the study located several problems in identifying causal links. Hence, the study developed the theoretical background of a stochastic approach to causality, with the objective of formulating necessary conditions that are operationally useful in identifying or falsifying causality claims. It also developed an effective algorithm applicable to large-scale open systems, which are neither controllable nor repeatable. The proposed framework was illustrated and showcased in a number of case studies, some of which were controlled synthetic examples and others real-world ones arising from interesting scientific problems in geophysics and, in particular, hydrology and climatology. The relationship of globally averaged temperature with [CO_2] concentration (again in terms of differences ΔT and $\Delta \ln[CO_2]$ over 12 months) was included in the thirty case studies presented. In brief, the related analyses pointed to the following (quoting from [7]):

> *Clearly, the results* [...] *suggest a (mono-directional) potentially causal system with T as the cause and [CO_2] as the effect. Hence the common perception that increasing [CO_2] causes increased T can be excluded as it violates the necessary condition for this causality direction.*
>
> [...] *in other words, it is the increase of temperature that caused increased CO_2 concentration. Though this conclusion may sound counterintuitive at first glance, because it contradicts common perception* [...], *in fact it is reasonable. The temperature increase began at the end of the Little Ice Period, in the early nineteenth century, when human CO_2 emissions were negligible* [...].

However, the scope of that study [6,7] was to formulate a general methodology for the detection of causality—in particular, necessary conditions thereof—rather than to study a specific system in detail. Therefore, no detailed modeling was made in the case studies, including the hydrological and climatic applications. However, given the enormous interest in the T-[CO_2] relationship, here we will go deeper into this.

Specifically, this paper, after summarizing the methodology (Section 2) and the data used (Section 3), focuses on the latter relationship with the following objectives:

1. To expand the time frame of the investigation backward and forward by exploiting the longest available data series (Section 4).
2. To check whether seasonality, as reflected in different phases of [CO_2] time series at different latitudes, plays any role that could modify or possibly reverse the detected causality relationship (Section 5).
3. To propose and apply a method for investigating the effect of the timescale in causality detection (Section 6).
4. To extend the methodology for disambiguating cases in which the type of causality, HOE or unidirectional, is not quite clear (Section 7).
5. To exploit the methodology in defining a type of data analysis that, regardless of the detection of causality per se, could shed light on modeling performance by comparing observational data with model results (Section 8).
6. To discuss possible extensions of the scope of the methodology, i.e., from detecting possible causality to building a more detailed model of stochastic type (Section 9).
7. To provide logical support for the findings by revisiting the carbon balance in the atmosphere (Appendix A.1) and investigating additional processes that may have caused increases in temperature (Appendices A.2–A.4).

2. Summary of the Stochastic Approach to Causality

The methodology in [6,7] is based on the impulse response function (IRF) between two processes $\underline{x}(t)$, $\underline{y}(t)$, denoted as $g(h)$ where h denotes time lag, based on the convolution

$$\underline{y}(t) = \int_{-\infty}^{\infty} g(h)\underline{x}(t-h)\mathrm{d}h + \underline{v}(t) \tag{1}$$

where $\underline{v}(t)$ is another stochastic process representing the part that is not explained by the causal link. To see that the function $g(h)$ is the impulse response function (IRF) of the system $(\underline{x}(t), \underline{y}(t))$, we set $\underline{v}(t) \equiv 0$ and $\underline{x}(t) = \delta(t)$ (the Dirac delta function, representing an impulse of infinite amplitude at $t = 0$ and attaining the value of 0 for $t \neq 0$), and we readily get $\underline{y}(t) = g(t)$.

On the other hand, if we set $g(h) = b\,\delta(h - h_0)$ (with constant b and h_0), which means that the IRF is zero for every lag except for the specific lag h_0, then Equation (1) becomes $\underline{y}(t) = b\underline{x}(t - h_0) + \underline{v}(t)$. This special case is equivalent to simply correlating $\underline{y}(t)$ with $\underline{x}(t - h_0)$ at any time instance t. It is easy to find (cf. linear regression) that in this case the multiplicative constant b is the correlation coefficient of $\underline{y}(t)$ and $\underline{x}(t - h_0)$ multiplied by the ratio of the standard deviations of the two processes. In general, however, we expect that the actual $g(h)$ is not a Dirac delta function but a continuous one over some domain. Thus, the IRF is a much more powerful tool than correlation as it integrates the correlations in the entire spectrum of lags.

For any two processes $\underline{x}(t)$ and $\underline{y}(t)$, Equation (1) has infinitely many solutions in terms of the function $g(h)$ and the process $\underline{v}(t)$. An obvious and trivial one is $g(h) \equiv 0, \underline{y}(t) \equiv \underline{v}(t)$. The sought solution is the one that corresponds to the minimum variance of $\underline{v}(t)$, called the least-squares solution. Equivalently, this solution maximizes the explained variance ratio:

$$e := 1 - \frac{\gamma_v}{\gamma_y} \tag{2}$$

where γ_v and γ_y denote the variances of the processes $\underline{v}(t)$ and $\underline{y}(t)$, respectively. (This is similar as in the correlation at a single time lag.) If the attained maximum e is close to zero, this will mean that the two processes are uncorrelated and thus no causality condition can exist between them (a non-causal system).

Otherwise, we may assume, without loss of generality, that processes $\underline{x}(t)$ and $\underline{y}(t)$ are positively correlated (i.e., an increase in $\underline{x}(t)$ would result in an increase in $\underline{y}(t)$). In the opposite case (if the processes are negatively correlated), by multiplying one of the

two series by -1 we make the correlation positive. Therefore, we impose a nonnegativity constraint for the sought IRF,

$$g(h) \geq 0 \tag{3}$$

In the estimation of IRF, we may also impose a roughness constraint,

$$E \leq E_0 \tag{4}$$

where E is the roughness of the IRF determined in terms of the second derivative of $g(h)$:

$$E := \int_{-\infty}^{\infty} (g''(h))^2 \mathrm{d}h \tag{5}$$

Further justification for the two constraints is provided in [6].

In applications, the continuous time representation is replaced by a discrete time one, the IRF becomes a sequence of values g_j, where j denotes the time lag, the infinite range of the time lag h becomes a finite window of time lag j, specified in the interval $[-J, J]$, the integrals are replaced by sums, and the true values of statistics are replaced by estimates. Furthermore, the roughness E is standardized as

$$\varepsilon := \frac{E}{8\sum_{j=-J}^{J} g_j^2} \tag{6}$$

where ε ranges in (0,1) for nonnegative g_j. The determination of the IRF ordinates g_j is thus formulated as a constrained optimization problem, whose numerical solution is always possible, simple and fast, and can be attained even by commonly available solvers, e.g., in commercial or open source spreadsheet software.

We note that in applications, each of the directions $x \to y$ and $y \to x$ is investigated separately, as there is no symmetry (or antisymmetry) in the produced IRFs in the two directions. When we refer to direction $y \to x$ we mean that we interchange the time series x and y and still estimate the IRF in the same way, as described in our equations in which the direction $x \to y$ is assumed.

In applications investigating causality, we start by assuming a potentially hen-or-egg (HOE) causal model with a fixed number of weights g_j, $j = -J, \ldots, 0, \ldots J$, where in most of the cases studied in [7] the value $J = 20$ was adopted, and this is also followed here. Depending on the results of the estimation procedure, if e is non-negligible, the system is deemed:

- *Potentially HOE causal* if we have $g_j > 0$ for both some positive and some negative lags j,
- *Potentially causal* if $g_j = 0$ for all $j < 0$, and
- *Potentially anticausal* if $g_j = 0$ for all $j > 0$

Note that *anticausal* means that the actual causality direction is opposite to that assumed. These three cases are graphically illustrated in Figure 1. The adverb "potentially" in the above characterizations highlights the fact that the conditions tested provide necessary but not sufficient conditions for causality.

In a potentially causal (or anticausal) system, the time order is explicitly reflected in the above characterizations. In a potentially HOE causal system, the time order needs to be clarified by defining the principal direction. The most natural indices for this are: (a) the time lag h_c maximizing the absolute value of cross-covariance; (b) the mean (time average) μ_h of the function $g(h)$; and (c) the median $h_{1/2}$ of the function $g(h)$. We note that h_c, which was the basis in the original study [2], is completely independent from the $g(h)$. The other two, μ_h and $h_{1/2}$, depend on the $g(h)$ that is determined. However, extensive analyses in [7] showed that their estimation is quite robust; for example, the use of the roughness constraint, while affecting the resulting $g(h)$, practically does not affect the values of μ_h and

$h_{1/2}$. In general, the characteristic lags μ_h and $h_{1/2}$ do not differ substantially from each other, and any of them could be chosen for further use. Here we prefer to note both, as well as h_c, as they all provide useful information about the relationship of the two processes (like in the case of using both mean and median in the characterization of the probability distribution of a single variable).

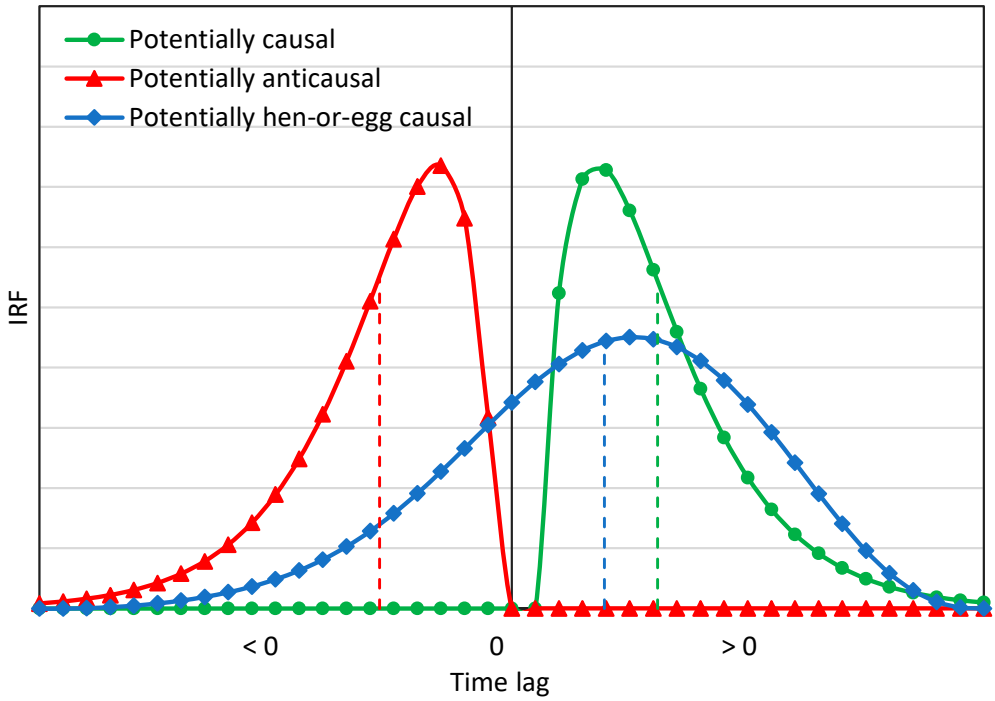

Figure 1. Explanatory sketch for the definition of the different potential causality types. For each graph, the mean μ_h is also plotted with a dashed line.

Needless to say, the literature offers a spectrum of alternative methods for estimating an IRF, using different tools such as auto- and cross-correlations functions [8,9], power spectra and cross-spectra based on the Fourier transform [10] or on a wavelet transform [11], as well as principal component analysis [12]. The method described above has some advantages over these alternatives, as it is a direct method that can work with time series of observations per se, rather than transformations thereof, being easily understandable and reproducible by any reader using simple computational means. Additionally, it is more reliable as it avoids using uncertain estimates of autocorrelation functions or their more uncertain transformations, such as the power spectrum, i.e., the Fourier transform of the autocorrelation function. Note that here we also used autocorrelation, but only to validate and confirm our results—not in the estimation procedure.

Additionally, as detailed in [6], our method differs conceptually and computationally from the so-called "Granger causality" [13,14] (a misnomer, as the method does not infer causality but prediction) and more recently reformulated in the study of Moraffah et al. [15], which also discusses other similar methods. Finally, our method has substantial differences from a framework proposed by Pearl and collaborators [16–18] as again discussed in detail in [6].

3. Data and Case Studies

To explore the T-[CO_2] relationship, case studies #23 and #24 in [7] used satellite-based temperature series (UAH) for the lower troposphere and [CO_2] data from Mauna Loa. Temperature data of the other two satellite levels for the troposphere were also examined, where the results were very similar to those reported for case studies #23 and #24.

Here we present additional case studies, listed in Table 1. In addition to the satellite-based temperature series in [7], here we use surface data (at 2 m) from the NCEP/NCAR Reanalysis 1 by the National Centers for Environmental Prediction (NCEP) and the National Center for Atmospheric Research (NCAR) [19], which are publicly available. The temporal coverage of the NCEP/NCAR Reanalysis 1 includes data collected four times daily to provide daily and monthly values from 1948 to the present at a horizontal resolution of 1.88° (∼210 km at the equator). It uses a state-of-the-art analysis and forecast system to perform data assimilation using observations and a numerical weather prediction model. The data assimilation and the model used are identical to the global system implemented operationally at NCEP, except for the horizontal resolution. A large subset of the data is available as daily and monthly averages.

Table 1. Main case studies and resulting summary indices. Δt is the time step of differencing; h_c is the time lag maximizing the cross-covariance $c_{yx}(h)$, or equivalently the cross-correlation $r_{yx}(h) := c_{yx}(h)/\sqrt{c_{xx}(0)c_{yy}(0)}$; μ_h is the mean (time average) of the function $g(h)$; $h_{1/2}$ is the median of the function $g(h)$; e is the explained variance ratio; and ε is the roughness ratio. The case studies #1 and #2 are contained in [7] as case studies #23 and #24 and are included in the table only for comparison.

Case System	#	Direction	h_c	μ_h	$h_{1/2}$	$r_{yx}(h_c)$	e	ε
Monthly timescale, varying Δt								
T: UAH; $[CO_2]$: Mauna Loa, 1979–2020 (from [7]), $\Delta t = 1$ year	1	$\Delta T \to \Delta \ln[CO_2]$	5	7.70	6.35	0.48	0.31	1.3×10^{-5} *
	2	$\Delta \ln[CO_2] \to \Delta T$	–5	–5.67	–5.49	0.48	0.23	7.3×10^{-4} *
T: NCEP/NCAR; $[CO_2]$: Mauna Loa, 1958–2021, $\Delta t = 1$ year	3	$\Delta T \to \Delta \ln[CO_2]$	8	7.75	6.86	0.56	0.34	3.1×10^{-4} *
	4	$\Delta \ln[CO_2] \to \Delta T$	–8	−6.31	–6.30	0.56	0.23	4.4×10^{-3} *
As #3 and #4, $\Delta t = 2$ years	5	$\Delta T \to \Delta \ln[CO_2]$	8	8.19	7.08	0.57	0.31	3.4×10^{-4} *
	6	$\Delta \ln[CO_2] \to \Delta T$	–8	−6.31	–6.31	0.57	0.21	4.5×10^{-3} *
As #3 and #4, $\Delta t = 4$ years	7	$\Delta T \to \Delta \ln[CO_2]$	9	10.65	10.32	0.53	0.29	1.0×10^{-4} *
	8	$\Delta \ln[CO_2] \to \Delta T$	–9	−6.28	–6.28	0.53	0.14	3.8×10^{-3} *
As #3 and #4, $\Delta t = 8$ years	9	$\Delta T \to \Delta \ln[CO_2]$	8	11.00	11.00	0.47	0.27	5.6×10^{-5} *
	10	$\Delta \ln[CO_2] \to \Delta T$	–8	−6.55	–6.54	0.47	0.11	3.6×10^{-3} *
As #3 and #4, $\Delta t = 16$ years	11	$\Delta T \to \Delta \ln[CO_2]$	6	11.74	12.15	0.45	0.31	3.4×10^{-5} *
	12	$\Delta T \to \Delta \ln[CO_2]$	6	9.98	11.13	0.45	0.33	7.6×10^{-6}
	13	$\Delta \ln[CO_2] \to \Delta T$	–6	−6.33	–6.31	0.45	0.12	7.7×10^{-3} *
T: NCEP/NCAR; $[CO_2]$: South Pole, 1975–2021, $\Delta t = 1$ year	14	$\Delta T \to \Delta \ln[CO_2]$	10	9.76	8.91	0.40	0.35	2.0×10^{-4} *
	15	$\Delta \ln[CO_2] \to \Delta T$	–10	–8.51	–8.35	0.40	0.18	1.1×10^{-3} *
Annual timescale, $\Delta t = 1$ year								
T: CMIP6 mean, SSP2-4.5; $[CO_2]$: SSP2-4.5, 1850–2100, w/o roughness constraint	16	$\Delta T \to \Delta \ln[CO_2]$	0	–3.75	–6.20	0.36	0.90	0.095
	17	$\Delta \ln[CO_2] \to \Delta T$	0	9.95	15.30	0.36	0.15	0.46
As #16 and #17 but for 1850–2021	18	$\Delta T \to \Delta \ln[CO_2]$	0	–6.23	–8.58	0.31	0.72	0.10
	19	$\Delta \ln[CO_2] \to \Delta T$	0	16.18	16.16	0.31	0.10	0.295
As #16 and #17 but with roughness constraint	20	$\Delta T \to \Delta \ln[CO_2]$	0	–3.65	–5.55	0.36	0.84	3.5×10^{-5}
	21	$\Delta \ln[CO_2] \to \Delta T$	0	6.86	1.63	0.36	0.13	7.7×10^{-3}
As #18 and #19 but with roughness constraint	22	$\Delta T \to \Delta \ln[CO_2]$	0	–7.34	–8.99	0.31	0.64	8.3×10^{-5}
	23	$\Delta \ln[CO_2] \to \Delta T$	0	11.26	14.77	0.31	0.13	9.4×10^{-3}

* The roughness was calculated without considering the second derivative at zero.

For CO_2 concentration, in addition to the Mauna Loa data set, which we updated to include the latest measurements of more than one year, we also added the South Pole data set compiled by the US National Oceanic and Atmospheric Administration (NOAA). The measurements began in 1975 and are taken for two cases, flask and in situ, of which we used the former on a mean monthly basis, except in a few cases of missing data where we filled in with in situ data.

Some of the analyses presented here refer to climate model outputs. Here we used the mean (CMIP6 mean) of the output series of the Coupled Model Intercomparison Project (CMIP6) averaged over the globe. The model outputs also go back to the past, extending over the time period of 1850–2100. When we studied past behaviors, we used the data up to 2021, as in the other case studies, but in some cases, we also used the entire data

set up to 2100. In the latter case, among the scenarios provided, we used Scenario Shared Socio-Economic Pathways 245 (SSP2-4.5, [20]).

The $[CO_2]$ time series used in climate models for scenario SSP2-4.5 have also been retrieved and analyzed. We note, though, that these time series are given on an annual timescale, unlike all other data that are provided on a monthly scale.

To check whether the results of our methodology would change if we chose any particular member of the ensemble instead of the mean, we also retrieved outputs from a single model, namely the UK Earth System Model (UKESM1 [21]). For the sake of brevity of this paper, we give this latter analysis (whose results eventually do not differ from those of the CMIP6 mean) in the Supplementary Information (and therefore we do not list it in Table 1). The main case studies in which these data were used are summarized in Table 1, along with the summary indices of g_j that are related to potential causality. The details of the case studies are given in the following sections. In all of them, we started by assuming a potentially hen-or-egg (HOE) causal model with a fixed number of weights g_j, namely 41 (i.e., $J = 20$, as in [7]).

Additional case studies examining additional data sets have also been performed but are kept out of the body of the paper and contained in Appendices A.2–A.4. All data used are available online for free and the related links are given in the Data availability section.

4. Investigating the Maximum Time Span That Modern Data Allow

The longest time series of systematic $[CO_2]$ measurements is that of Mauna Loa, which began in 1958. The global temperature at 2 m of the NCEP/NCAR reanalysis series goes back to 1948 and thus allows studying the T-$[CO_2]$ relationship for the period 1958–2022 (two additional decades of data in comparison to those studied in [7]).

As seen in Table 1, this provided better characteristics than the UAH/Mauna Loa case examined in [7]: maximum cross correlation $r_{yx}(h_c) = 0.56$ against 0.48; explained variance e = 34% against 31%, at time lags greater than or equal to those in [7] (close to 8 months). As seen in Figure 2, again, we have a potentially causal system with the directionality being $\Delta T \rightarrow \Delta \ln[CO_2]$, while the possible causality $\Delta \ln[CO_2] \rightarrow \Delta T$ can be excluded as not satisfying the necessary condition of time precedence.

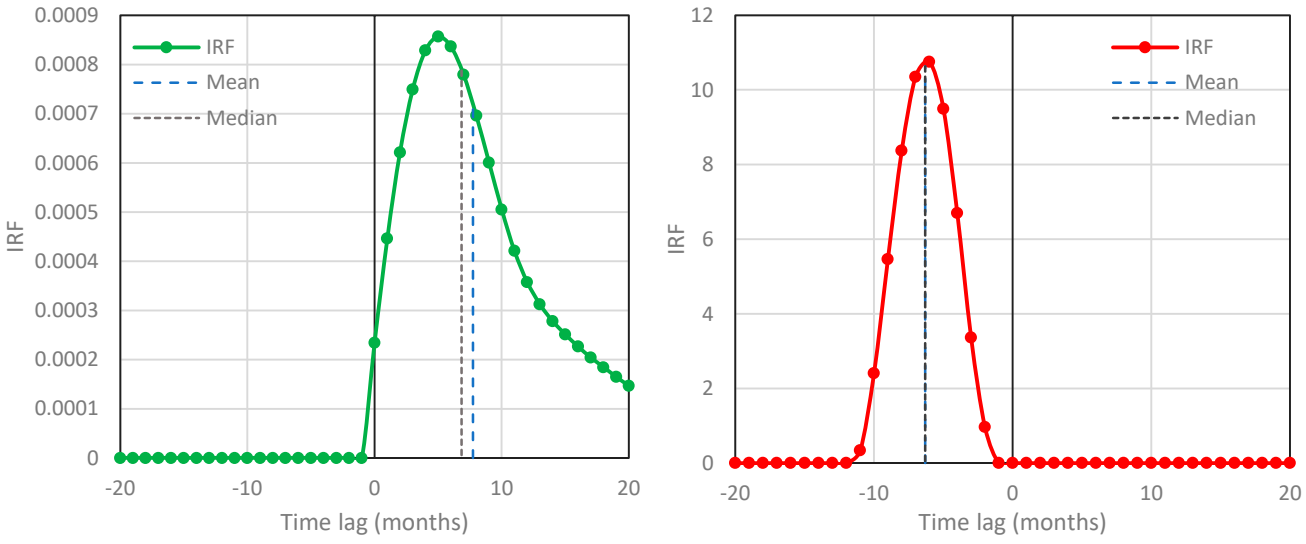

Figure 2. IRFs for temperature–CO_2 concentration based on the NCEP/NCAR Reanalysis temperature at 2 m and Mauna Loa $[CO_2]$ time series, respectively—case studies #3 (**left**; $\Delta T \rightarrow \Delta \ln[CO_2]$; potentially causal system) and #4 (**right**; $\Delta \ln[CO_2] \rightarrow \Delta T$; potentially anticausal system).

5. Investigating the Possible Effect of Seasonality

To enrich our results and also check whether seasonality, as reflected in different phases of [CO_2] time series at different latitudes, could modify or possibly reverse the detected causality relationship, we have conducted an additional analysis with the South Pole [CO_2] measurements, which began in 1975.

As seen in Table 1, this again provided better characteristics than the UAH/Mauna Loa case examined in [7] in terms of explained variance (e = 35% against 31%) and time lags higher than in [7] (close to 10 months). As seen in Figure 3, again, we have a potentially causal system with the directionality being $\Delta T \rightarrow \Delta \ln[CO_2]$, while again the possible causality $\Delta \ln[CO_2] \rightarrow \Delta T$ can be excluded as not satisfying the necessary condition of time precedence.

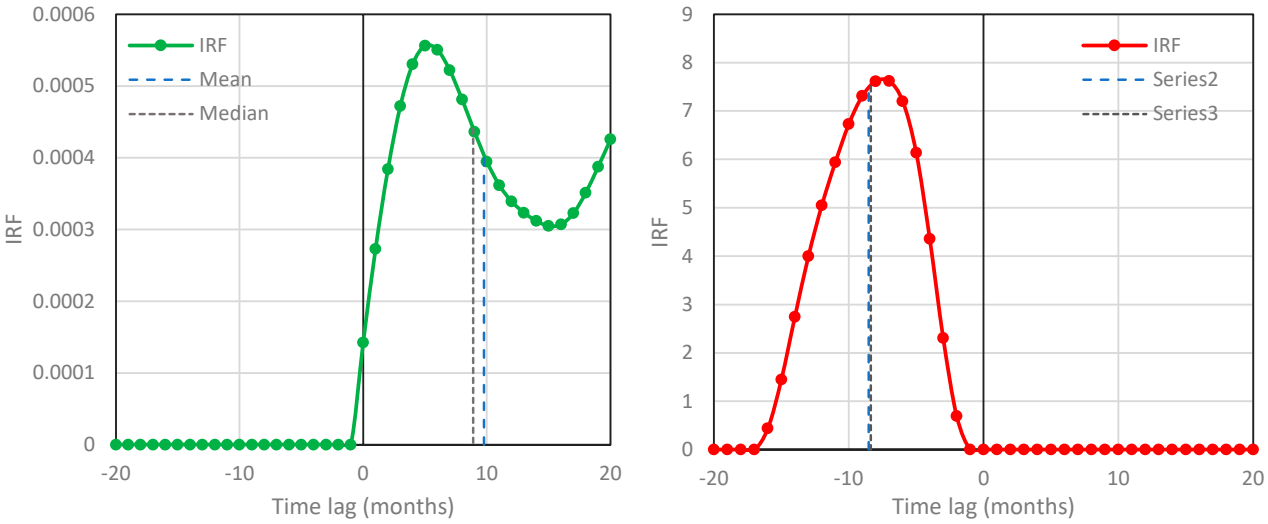

Figure 3. IRFs for temperature–CO_2 concentration based on the NCEP/NCAR Reanalysis temperature at 2 m and the South Pole time series, respectively—case studies #14 (**left**; $\Delta T \rightarrow \Delta \ln[CO_2]$; potentially causal system) and #15 (**right**; $\Delta \ln[CO_2] \rightarrow \Delta T$; potentially anticausal system).

Summarizing the two case studies in Sections 4 and 5—and similarly to what we found in [7]—we note that:

- The system T-[CO_2] appears to be potentially causal (unidirectional) in the direction $\Delta T \rightarrow \Delta \ln[CO_2]$, rather than hen-or-egg causal.
- All characteristic time lags ($h_c, \mu_h, h_{1/2}$) are positive in the direction $\Delta T \rightarrow \Delta \ln[CO_2]$ (ranging from about 7 to about 10 months), and negative in the direction $\Delta \ln[CO_2] \rightarrow \Delta T$.
- The explained variance ratio is greater in the direction $\Delta T \rightarrow \Delta \ln[CO_2]$ (about 1/3) than in the direction $\Delta \ln[CO_2] \rightarrow \Delta T$ (around 1/5).

6. On the Timescale of Validity of Results

Overall, our results in this paper are those allowed by the available data at the time periods and timescales resolved by those data—more than 6 decades at the monthly scale. What would happen at other times—or if the data sets were longer and would resolve intermediate or even longer timescales—we cannot tell. The climate system is too complex to allow for hasty generalizations.

One may not exclude the case that the timescale of analysis is important in a detected potential causality relationship and that the latter would change if the timescale changed. This raises the question: up to which timescale does the validity of certain results hold? Certainly, this timescale is a fraction (not greater than 1/2) of the length of the time series. An indication can be obtained by inspecting the empirical cross-covariance function and how this compares with the theoretical one. As shown in [6], the latter ($c_{yx}(h) :=$

$\text{cov}\left[\underline{y}(t+h), \underline{x}(t)\right]$) for lag h, is related to the autocovariance function of $\underline{x}$, $c_{xx}(h) := \text{cov}[\underline{x}(t+h), \underline{x}(t)]$, by:

$$c_{yx}(h) = \int_{-\infty}^{\infty} g(a) c_{xx}(h-a) \mathrm{d}a \tag{7}$$

Thus, $c_{yx}(h)$ can be estimated from the IRF and the empirical $c_{xx}(h)$ from the data. Figure 4 shows the autocorrelation and cross-correlation functions (which are covariances standardized by standard deviations). For the $\Delta T \to \Delta \ln[CO_2]$ case (i.e., case study #3; upper panels of Figure 4), the reconstructed cross-correlation function, calculated from the IRF (seen in Figure 2) and the empirical autocorrelation function of temperature (seen in the upper left panel of Figure 4) using the discretized version of equation (7), agrees well with the empirical function for time lags up to ± 10 years, i.e., spanning 20 years (1/3 of the series length). As time lag has an equivalence relationship with timescale [22], we may conclude that the potential causality relationship detected is valid for timescales of two decades. For comparison, the lower panels of Figure 4 show the reverse case, $\Delta \ln[CO_2] \to \Delta T$, (case study #4), where there is no longer good agreement between empirical and reconstructed cross-correlation, which provides additional support for the claim that the true causality link is $\Delta T \to \Delta \ln[CO_2]$.

A final observation in Figure 4 is the appearance of six peaks in 20 years, which may be interpreted as indicating a quasi-periodic behavior with an average period of 3.33 years, i.e., much different from the annual. However, this does not reflect periodicity but rather antipersistence imposed by the differencing operation, which necessarily results in some negative autocorrelations [23].

A more direct technique to deal with timescales is to average the time series on aggregate timescales and again investigate the causality relationships on these scales. This technique could detect whether a similar relationship holds for the larger timescales. In our case, since we are differencing the process, taking the average at a timescale k is equivalent to taking a difference for a time step k (notice that $(x_2 - x_1) + (x_3 - x_2) + \ldots + (x_{k+1} - x_k) = x_{k+1} - x_1$). Therefore, to increase the timescales it suffices to increase the time step of differencing. In Figure 2, this was 1 year. Now we increase the time step of differencing, replacing the 1-year step with 2, 4, 8 and 16 years. The results are shown in Figure 5 and in Table 1 (case studies #5 to #13). They are essentially the same, except that, as the differencing time step increases, the explained variance slightly decreases (from 0.34 down to 0.27) in the direction $\Delta T \to \Delta \ln[CO_2]$, and is again much higher than that in the direction $\Delta \ln[CO_2] \to \Delta T$. The time lags increase in the former direction and are again negative in the latter direction.

A characteristic pattern is that, as the time step increases, so does the rightmost ordinate of the IRF, g_{20}. This behavior, i.e., the increasing limb of g_j beyond some time lag, has been explained in [7] and is an artifact of an insufficient (small) window of time lag for determining IRF. Thus, it suggests that a higher J should be used. It is quite reasonable to expect that if the differencing time step increases, so should the window size do. In particular, it is interesting to observe that in the lowest panel of Figure 5, corresponding to a differencing time step of 16 years, while the time window of IRF is only 40 months (a little more than 3 years), the IRF is a monotonously increasing function. Apparently, this is an artifact due to the too small window of time lag. In such a case, it is also reasonable to expect some nonnegative estimates of IRF ordinates for negative lags, even if the system is unidirectionally causal. Indeed, this has appeared in the case of a differencing time step of 16 years, even though the lowest panel of Figure 5 shows the purely unidirectional version of the IRF. This may create some ambiguity in the identification of causality, which we analyze and resolve in the next section.

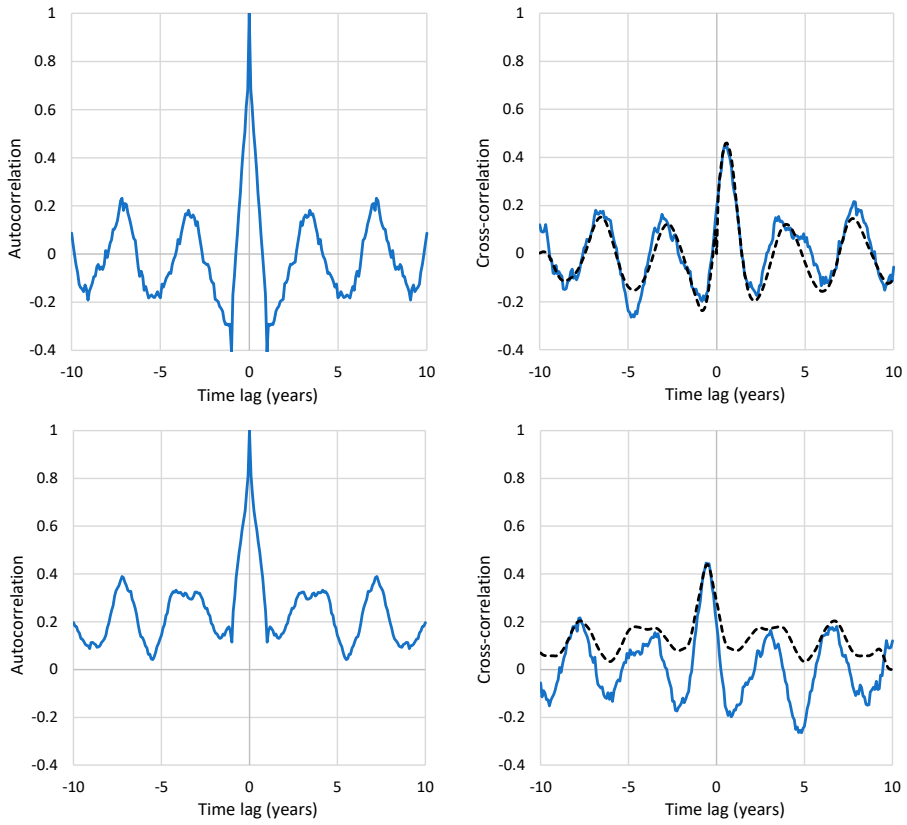

Figure 4. (**Left column**) Empirical autocorrelation function for the period 1958–2021 and for monthly timescale of (**upper**) the NCEP/NCAR ΔT time series and (**lower**) the $\Delta \ln[CO_2]$ time series for Mauna Loa. (**Right column**) Empirical cross-correlation function of the two time series (continuous lines in blue), compared with those reconstructed from the IRF and the autocorrelation function on the left panel using the discretized version of Equation (7) (dashed line), for case studies (**upper**) #3 and (**lower**) #4.

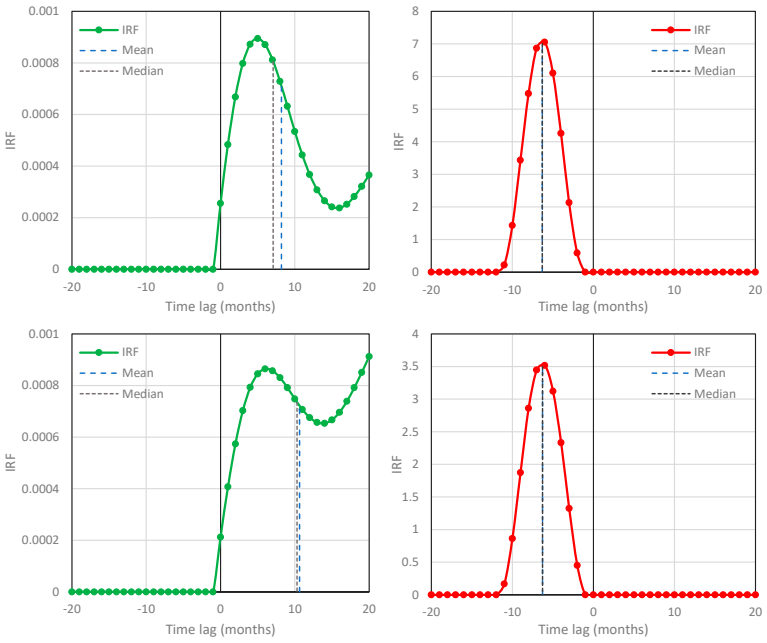

Figure 5. *Cont.*

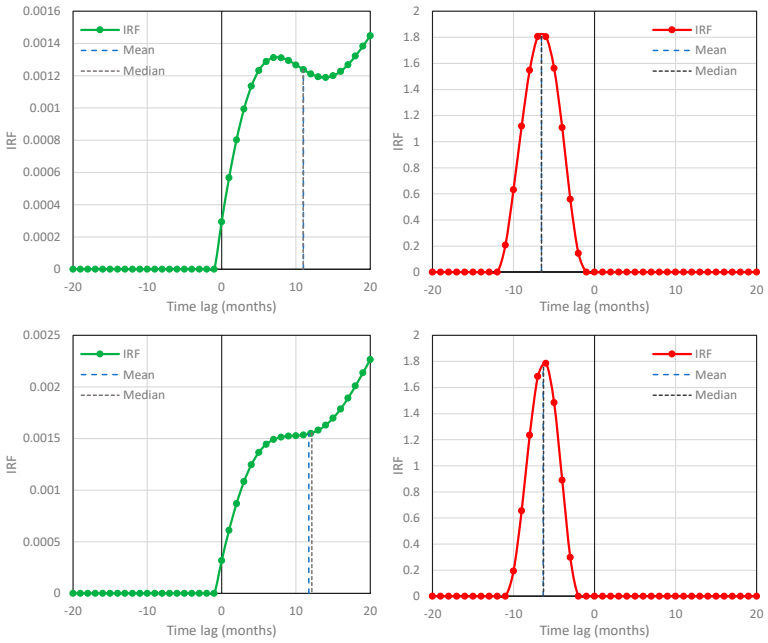

Figure 5. IRFs for temperature–CO_2 concentration based on the NCEP/NCAR Reanalysis temperature at 2 m and Mauna Loa time series, respectively, as in Figure 2, but for differencing time steps equal (from upper to lower) 2, 4, 8 and 16 years; **left**: $\Delta T \to \Delta \ln[CO_2]$ (potentially causal system); **right**: $\Delta \ln[CO_2] \to \Delta T$ (potentially anticausal system).

7. Possible Ambiguities and Disambiguation

In some applications, the detection of the type of causality, unidirectional or HOE, is direct, but in other cases, it may be more difficult. This is illustrated in Figure 6. The left panel is equivalent to that of Figure 2 (left) but not neglecting some very small ordinates g_j that originally the algorithm produced for negative j. The right panel is equivalent to that of Figure 5 (bottom left) but letting the optimization algorithm produce g_j for negative j, which in this particular case seem not negligible. Both figure panels refer to the same processes with the differencing time step being 1 and 16 years for the left and right panels, respectively. For the 16-year step, in comparison to the IRF of Figure 5, which explains a fraction 0.31 of the variance, that of Figure 6 yields a slightly higher explained variance, 0.325, while it has some small weights at negative lags. Should we conclude then that it indicates a potential HOE, rather than unidirectional, causality? Even if our reply is affirmative, it is important to note that the characteristic lags are again positive, suggesting a principal direction $\Delta T \to \Delta \ln[CO_2]$.

However, the reply is not necessarily affirmative. The explained variance of 0.31 is associated with 21 IRF ordinates, while that of 0.325 is associated with 41 IRF ordinates. Is it reasonable to accept 20 additional parameters for an increase in the explained variance of 0.015?

Arguably, it is more reasonable in this case to change from a symmetric to a non-symmetric window of time lag. Hence, we use a window of length 21 and slide it so that the lowest nonzero time lag vary from -20 to 0. Only the case where this is 0 denotes a potential unidirectional causality, where all 20 other cases correspond to potential HOE causality. The resulting IRFs are plotted in Figure 7, while the fraction of explained variance is plotted in Figure 8 as a function of the lowest nonzero time lag. It may be noticed that the curve for the lowest time lag 0 is different from Figure 5 (bottom left). In particular, the ordinate at 0 is higher in Figure 7, thus producing a concave shape of IFR. This is a result of the fact that the window length is fixed, while the lowest ordinate no longer contributes to the roughness (no second derivative can be determined for the lowest point and thus the algorithm can increase the ordinate at 0 at no cost). In turn, the explained variance further increased to 0.327.

Clearly, the result of this investigation is a unidirectional, rather than HOE, potential causality, as the explained variance reaches its maximum when the lowest j is 0.

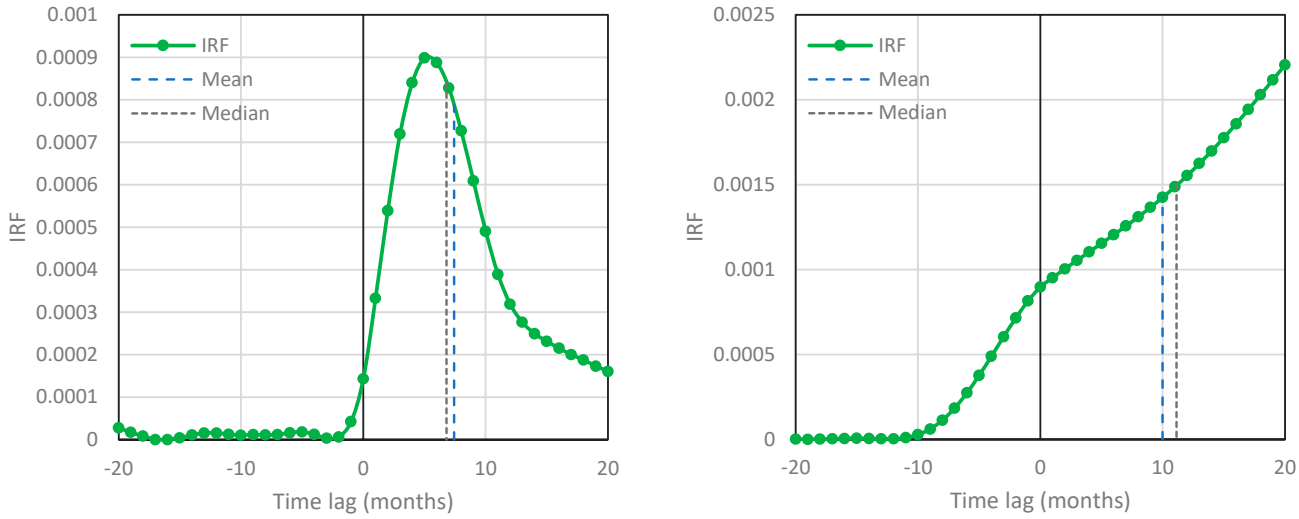

Figure 6. IRFs for temperature–CO_2 concentration based on the NCEP/NCAR Reanalysis temperature at 2 m and Mauna Loa time series, respectively, also enabling negative lags (HOE) for causality direction $\Delta T \rightarrow \Delta \ln[CO_2]$ and for differencing time step of 1 year (**left**, corresponding to Figure 2, left) and 16 years (**right**, corresponding to Figure 5, bottom left).

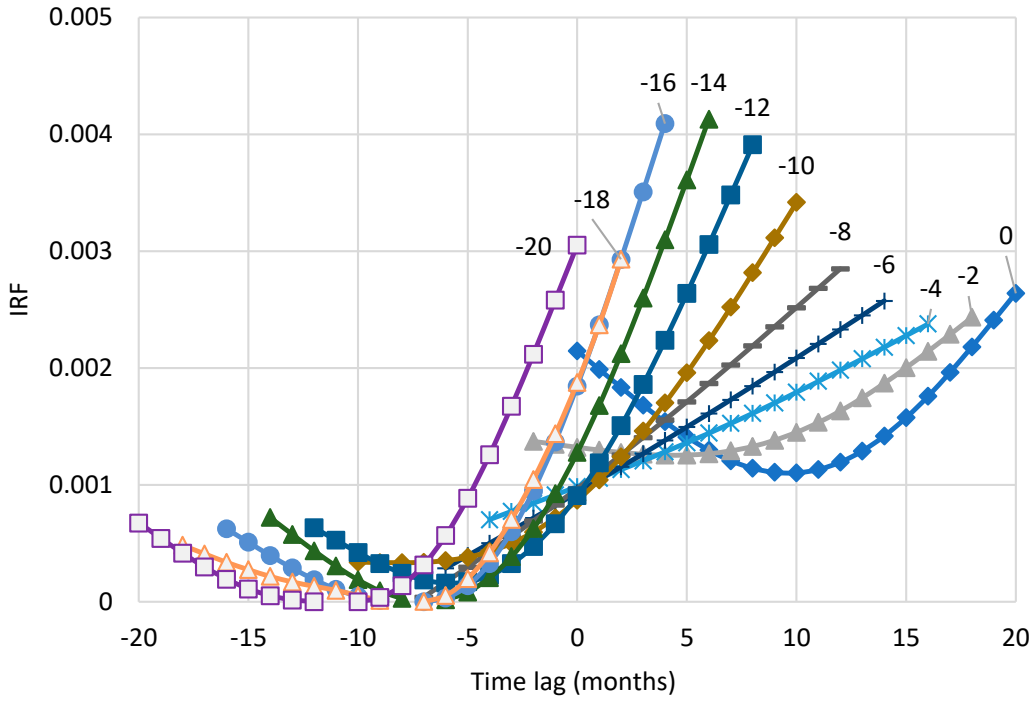

Figure 7. IRFs for temperature–CO_2 concentration based on the NCEP/NCAR Reanalysis temperature at 2 m and Mauna Loa time series, for 21 time lags, differencing time step of 16 years and direction $\Delta T \rightarrow \Delta \ln[CO_2]$. The lowest nonzero lag of each IRF is marked at the upper-right end of its curve.

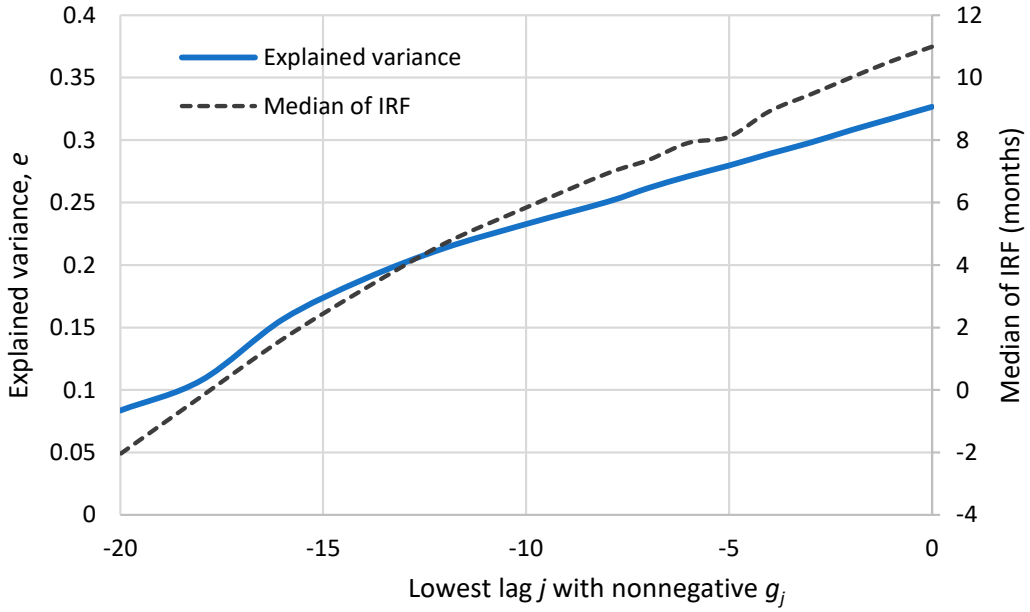

Figure 8. Explained variance and median of IRF as a function of the lowest nonzero lag of the IRFs in Figure 7 for the investigation of Section 7.

8. Comparing Observational Data with Model Results

Investigation of causality in systems that can be isolated from the environment is generally based on experiments. These are typically performed in laboratories and presuppose control actions (intervention) by the experimenter. In the absence of such intervention, it has long been regarded that we cannot say what causes what (Strotz and Wold, 1960 [24]). In complex systems, such as Earth's climatic system, experimentation is impossible. Yet it is a widespread belief that climate models are faithful representations of the climatic system and hence offer the possibility of so-called *in silico experimentation* (Hannart et al. [25]). Furthermore, it has been claimed (Hannart and Naveau [26]) that "in silico *experimentation* [is] *the only option*" and that "*the increasing realism of climate system models renders such an* in silico *approach plausible*". Such claims are epistemologically problematic. A hypothetical "causality" that is incorporated in any model, particularly of a complex system, is not necessarily identical to natural causality. In addition, the agreement of climate model outputs with reality has been questioned (e.g., [27–31]).

Our methodology can help with this epistemological problem in two ways. First, it provides a different option to test causality, showing that the so-called in silico experimentation is not the only option as claimed. Second, it can additionally test whether there is indeed realism in the representation of causality of the climatic system by the climate models. As already stated in the Introduction, our methodology, regardless of the detection of causality per se, can define a type of data analysis that could shed light on modeling performance by comparing observational data with model results. This is particularly useful in the case of climate modeling. In other words, it could help in verifying or falsifying the commonly accepted theory, which is incorporated in the climate models.

Specifically, we can test whether the climate model results are consistent with the findings of our T-[CO_2] causality analysis, which is based on measurements. To this aim, we use climate model outputs as specified in Section 3, in the case studies #16 to #23 detailed in Table 1. Numerical results of our analysis are shown in Table 1, and graphical depictions of IRFs are shown in Figure 9 for the cases in which no roughness constraint is used and in Figure 10 for the cases in which the roughness constraint is used.

Unfortunately, and unlike the [CO_2] time series of measurements, which are available on a monthly scale, the SSP2 [CO_2] data series is provided on an annual scale. Therefore, case studies #16 to #23 had to be made on an annual scale. If we did the analysis for the period 1958–2021, as in case studies #3 and #4 (NCEP/NCAR Reanalysis temperature at

2 m; and Mauna Loa [CO_2] time series), the annual data would be too few to support estimation of the IRFs (63 data values to estimate 41 coefficients). Therefore, in case studies #16 to #23 we extended the period back to 1850, which is covered by the climate model outputs. We performed separate analyses for the periods 1850–2100 (entire period covered by climate models) and 1850–2021 (only the past).

The results of these case studies allow us to make the following observations.

1. There is no essential difference between the results for the periods 1850–2100 and 1850–2021.
2. While, as expected, the IRFs differ if they are calculated with or without constraining roughness, the characteristic lags are similar in the two cases (with the exception of $h_{1/2}$ in cases #17 and #21).
3. In all cases, the lags are negative in the direction $\Delta T \rightarrow \Delta \ln[CO_2]$ and positive in the direction $\Delta \ln[CO_2] \rightarrow \Delta T$, suggesting a HOE causality with principal direction $\Delta \ln[CO_2] \rightarrow \Delta T$.
4. Clearly, the finding in point 3, resulting from climate model outputs, is opposite to the results found when real measurements are used (NCEP/NCAR Reanalysis temperature and Mauna Loa [CO_2] time series).
5. Oddly, while the principal direction suggested by the models is $\Delta \ln[CO_2] \rightarrow \Delta T$, the explained variance is impressively low (10–15%) in this direction and impressively high (reaching 90%) in the opposite direction, $\Delta T \rightarrow \Delta \ln[CO_2]$.

One may argue that the main result of this analysis, i.e., the point 4 above, may be affected by the difference in the study periods, i.e., 1958–2021 for the real measurements and 1850–2021 for the model outputs. To examine whether the origin of the different behavior is the time period or the system dynamics (actual vs. modeled), we performed an additional analysis, graphically depicted in Figures 11 and 12.

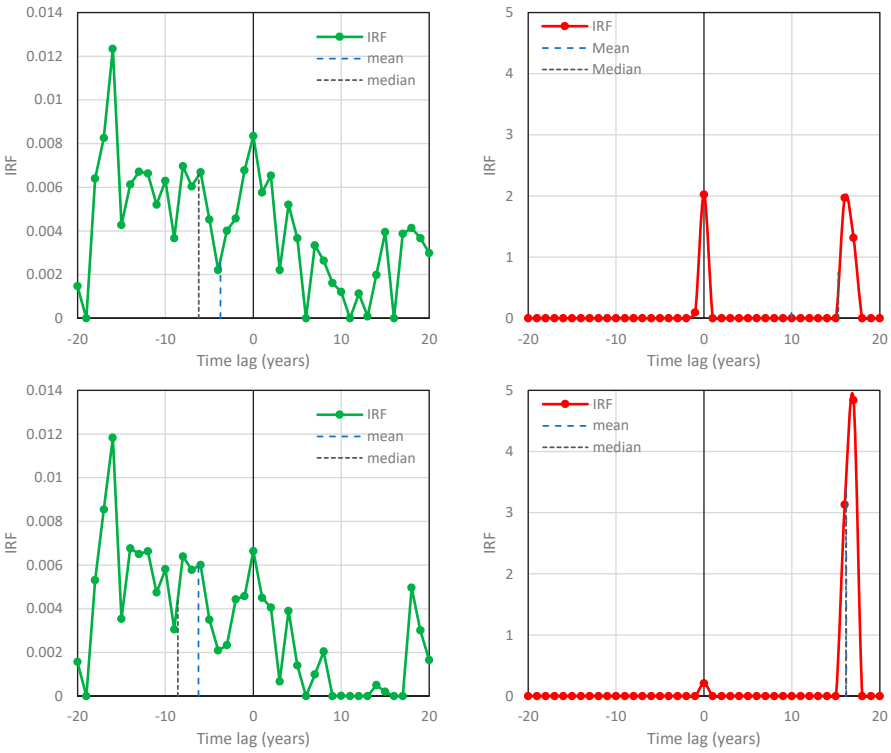

Figure 9. IRFs for temperature–CO_2 concentration based on the CMIP6 mean temperature and SSP2-4.5 CO_2 time series, respectively, calculated without using the roughness constraint; **upper row**: period 1850–2100—case studies #16 (**left**; $\Delta T \rightarrow \Delta \ln[CO_2]$) and #17 (**right**; $\Delta \ln[CO_2] \rightarrow \Delta T$); **lower row**: period 1850–2021—case studies #18 (**left**; $\Delta T \rightarrow \Delta \ln[CO_2]$) and #19 (**right**; $\Delta \ln[CO_2] \rightarrow \Delta T$).

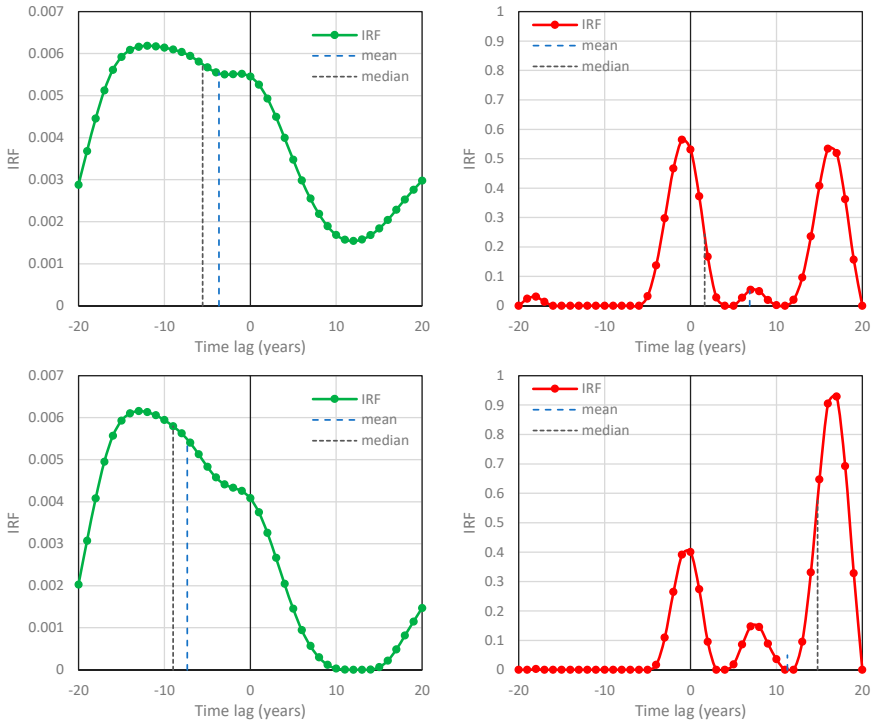

Figure 10. IRFs for temperature–CO_2 concentration based on the CMIP6 mean temperature and SSP2-4.5 CO_2 time series, respectively, as in Figure 9 but calculated using the roughness constraint; **upper row**: period 1850–2100—case studies #20 (**left**; $\Delta T \rightarrow \Delta \ln[CO_2]$) and #21 (**right**; $\Delta \ln[CO_2] \rightarrow \Delta T$); **lower row**: period 1850–2021—case studies #22 (**left**; $\Delta T \rightarrow \Delta \ln[CO_2]$) and #23 (**right**; $\Delta \ln[CO_2] \rightarrow \Delta T$).

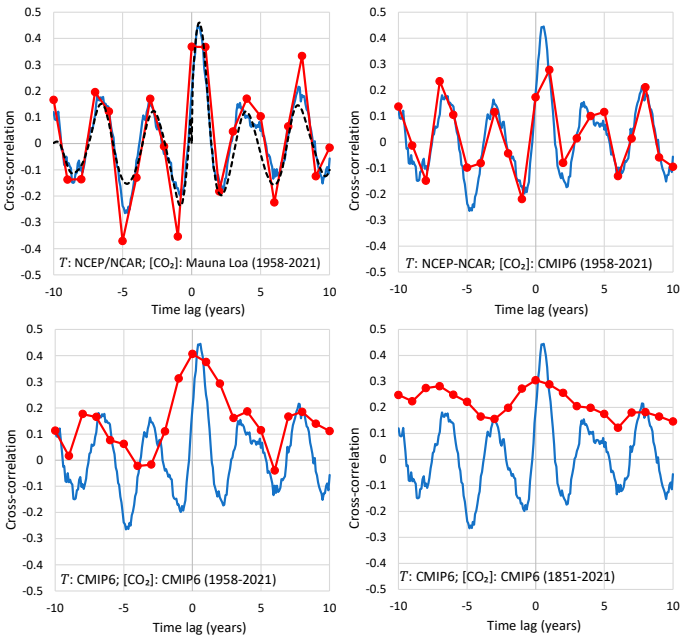

Figure 11. Empirical cross-correlation functions for monthly and annual timescales (continuous lines in blue without markers and red lines with circles, respectively) for the data sets indicated in each panel. In all panels, the plot for the monthly scale is that of the NCEP/NCAR data for T and Mauna Loa data for $[CO_2]$, for the period 1958–2021. The upper-left panel also shows the cross-correlation function reconstructed from the IRF and the autocorrelation function using the discretized version of Equation (7) (dashed line).

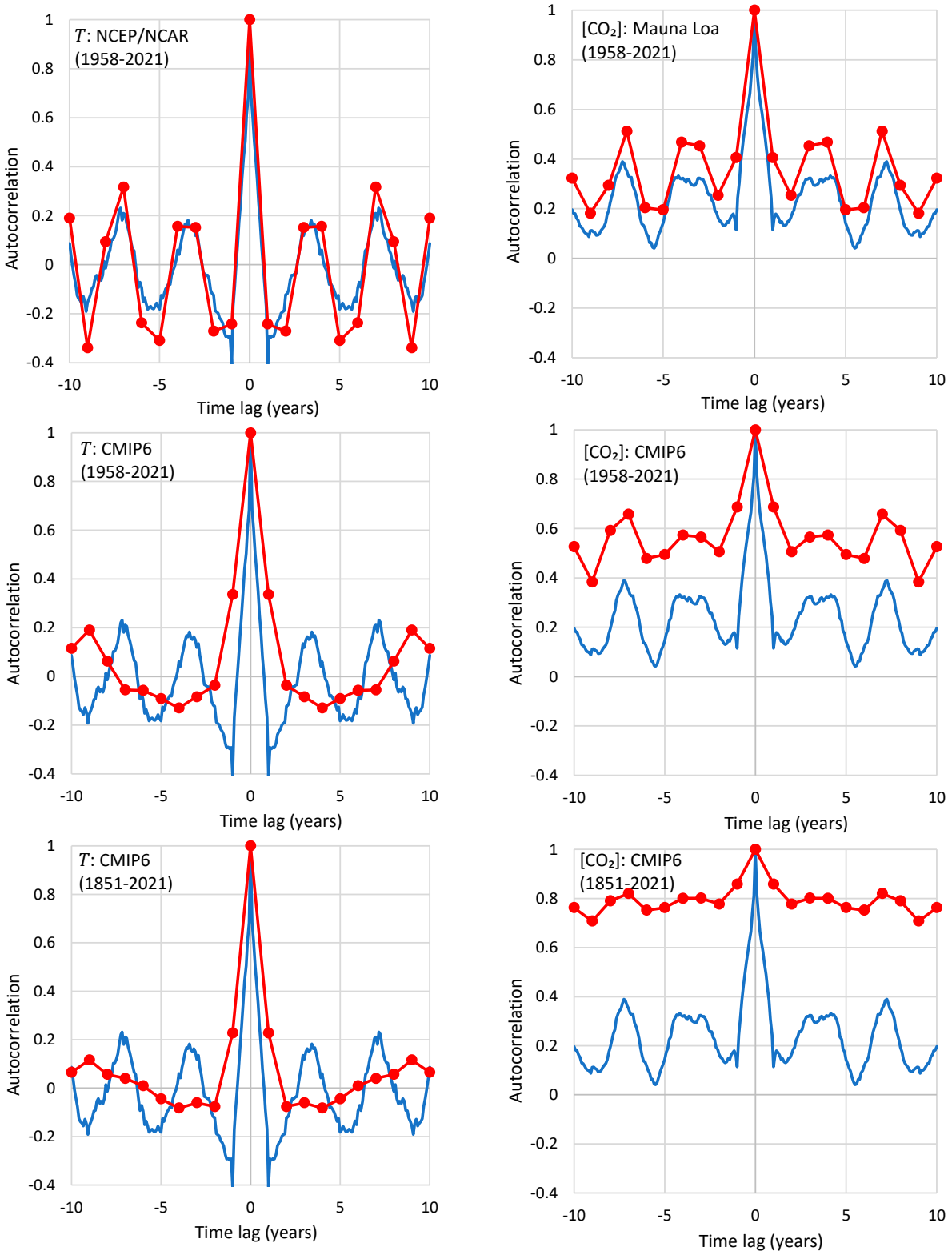

Figure 12. Empirical autocorrelation functions for monthly and annual timescales (continuous lines in blue without markers and red lines with circles, respectively) for the data sets indicated in each panel. In all panels, the plot for the monthly scale is that of the NCEP/NCAR data for T and Mauna Loa data for [CO_2], for the period 1958–2021.

The upper left panel of Figure 11 is similar to that in Figure 4 (upper right), where, in addition, we have plotted the empirical cross-correlation function for the same data but

averaged at the annual scale. This agrees relatively well with the empirical function at the monthly scale, which provides a basis for the comparisons that follow.

The empirical cross-correlation function at the monthly scale is copied in all other panels of Figure 11 and serves as a basis for the comparisons. In the upper right panel, where we replaced the Mauna Loa time series for [CO_2] with the CMIP6 time series for the same period, 1958–2021, while keeping the NCEP/NCAR time series for T, there is still agreement of the annual with the monthly cross-correlations. However, when we also replace the NCEP/NCAR time series for T with the CMIP6 series (lower left plot), the two plots decouple. The decoupling is even more prominent if we go to the longer period 1850–2021 (lower right panel).

Similar observations can be made about autocorrelations in Figure 12. In particular, the CMIP6 autocorrelation of T decouples from the actual one for both periods 1958–2021 and 1850–2021, while the two latter do not differ substantially from each other. These observations allow us to assert that the main cause of disagreement has to do with problems with the modeling of system dynamics rather than the time period of study.

9. Discussion and Further Results

The mainstream assumption of the causality direction [CO_2] $\rightarrow T$ makes a compelling narrative, as everything is blamed on a single cause, the human CO_2 emissions. Indeed, this has been the popular narrative for decades. However, popularity does not necessarily mean correctness, and here we have provided strong arguments against this assumption. Since we have identified atmospheric temperature as the cause and atmospheric CO_2 concentration as the effect, one may be tempted to ask the question: What is the cause of the modern increase in temperature? Apparently, this question is much more difficult to reply to, as we can no longer attribute everything to any single agent.

We do not claim to have the answer to this question, whose study is far beyond the article's scope. Neither do we believe that mainstream climatic theory, which is focused upon human CO_2 emissions as the main cause and regards everything else as feedback of the single main cause, can explain what happened on Earth for 4.5 billion years of changing climate.

Nonetheless, as a side product, in the Appendices to the paper, we provide several indications of the following:

1. The dependence of the carbon cycle on temperature is quite strong and indeed major increases of [CO_2] can emerge as a result of temperature rise. In other words, we show that the natural [CO_2] changes due to temperature rise are far larger (by a factor > 3) than human emissions (Appendix A.1).
2. There are processes, such as the Earth's albedo (which is changing in time as any other characteristic of the climate system), the El Niño–Southern Oscillation (ENSO) and the ocean heat content in the upper layer (represented by the vertically averaged temperature in the layer 0–100 m), which are potential causes of the temperature increase, unlike what is observed with [CO_2], their changes precede those of temperature (Appendices A.2–A.4).
3. On a large timescale, the analysis of paleoclimatic data supports the primacy of the causal direction $T \rightarrow$ [CO_2], even though some controversy remains about this issue (Appendix A.5).

In terms of the carbon cycle (point 1 above), several physical, chemical, biochemical and human processes are involved in it. The human CO_2 emissions due to the burning of fossil fuels have largely increased since the beginning of the industrial age. However, the global temperature increase began succeeding the Little Ice Period, at a time when human CO_2 emissions were very low. To cast light on the problem, we examine the issue of CO_2 emissions vs. atmospheric temperature further in the Supplementary Information, where we provide evidence that they are not correlated with each other. The outgassing from the sea is also highlighted sometimes in the literature among the climate-related mechanisms. On the other hand, the role of the biosphere and biochemical reactions is often

downplayed, along with the existence of complex interactions and feedback. This role can be summarized in the following points, examined in detail and quantified in Appendix A.1.

- Terrestrial and maritime respiration and decay are responsible for the vast majority of CO_2 emissions [32], Figure 5.12.
- Overall, natural processes of the biosphere contribute 96% to the global carbon cycle, the rest, 4%, being human emissions (which were even lower in the past [33]).
- The biosphere is more productive at higher temperatures, as the rates of biochemical reactions increase with temperature, which leads to increasing natural CO_2 emission [2].
- Additionally, a higher atmospheric CO_2 concentration makes the biosphere more productive via the so-called carbon fertilization effect, thus resulting in greening of the Earth [34,35], i.e., amplification of the carbon cycle, to which humans also contribute through crops and land-use management [36].

In addition to the biosphere, there are other factors that drive the Earth's climate in periodic and non-periodic way. Orbital parameters of Earth's revolution change quasi-cyclically in a multi-millennial scale (variations in eccentricity, axial tilt, and precession of Earth's orbit), as interpreted by Milanković [37–41], and changes in the orbit geometry influence the amount of insolation. The non-periodic drivers of the Earth's climate variability include volcanic eruptions and collisions with large extraterrestrial objects, e.g., asteroids. An important climate driver is water in its three phases [33]. Another apparent factor is solar activity (including solar cycles) and the solar radiation (im)balance on Earth (e.g., albedo changes; see [33] and Appendix A.2). Notably, a recent study [42], by assessing 20 years of direct observations of energy imbalance from Earth-orbiting satellites, showed that the global changes observed appear largely from reductions in the amount of sunlight scattered by Earth's atmosphere.

ENSO and ocean heating, both of which affect temperature, are examined in Appendices A.3 and A.4, respectively. The results of Appendices A.2–A.4 are summarized in the schematic of Figure 13. Changes in all three examined processes, albedo, ENSO and the upper ocean heat, precede in time the changes in temperature and even more so those in $[CO_2]$. Generally, the time lags shown in Figure 13 complete a consistent picture of potential causality links among climate processes and always confirm the $T \rightarrow [CO_2]$ direction.

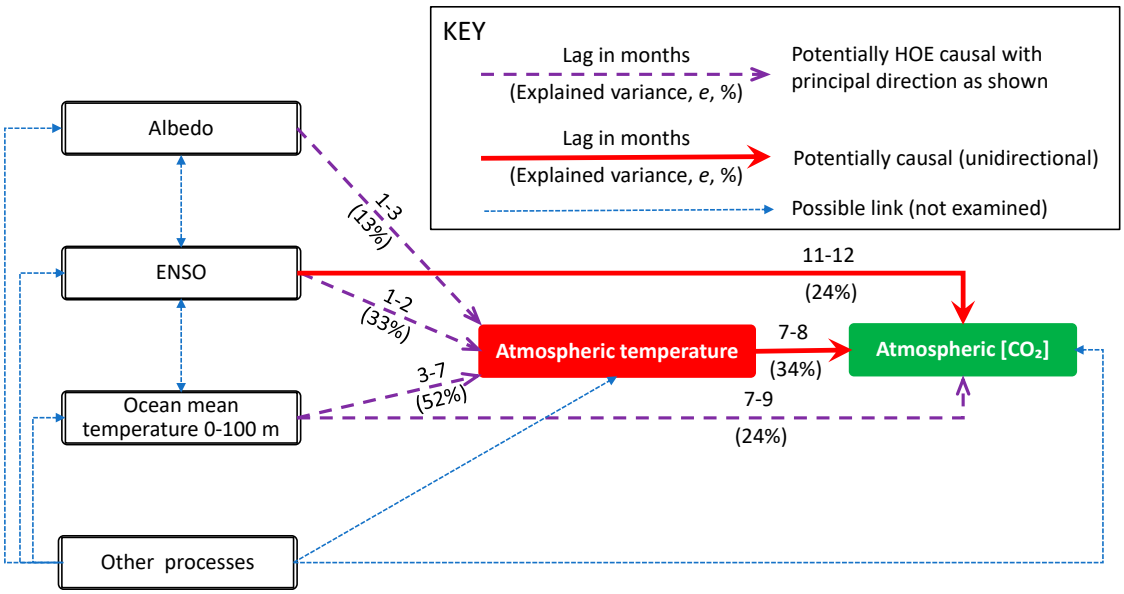

Figure 13. Schematic of the examined possible causal links in the climatic system, with noted types of potential causality, HOE or unidirectional, and its direction. Other processes, not examined here, could be internal of the climatic system or external.

The examined processes in the Appendices are internal to the climatic system. Other processes affecting T, not examined here, could also be external (e.g., solar and astronomical [43,44] and geological [45–49]). Generally, in complex systems, an identified causal link, even though it gives some explanation of a phenomenon, raises additional questions, e.g., what caused the change in the identified cause, etc. In turn, causal links in complex systems may form endless sequences. For this reason, it is naïve to expect complete answers to problems related to complex systems or to assume that a complex system is in permanent equilibrium and that an external agent is needed to "kick" it out of the equilibrium and produce change. Yet the investigation of a single causal link between two processes, as is the focus of this paper, provides useful information, with possible significant scientific, technical, practical, epistemological and philosophical implications. These are not covered in this paper. Readers interested in epistemological and philosophical aspects of causality are referred to Koutsoyiannis et al. [6], while those interested in the perennial changes in complex systems are referred to Koutsoyiannis [50,51].

As already clarified, the scope of our work is not to provide detailed modeling of the processes studied but to check causality conditions. We highlight the fact that the relationship we established explains only about 1/3 of the actual variance of $\Delta\ln[CO_2]$. This is not negligible for investigating causality, but also leaves a margin for many other climatic factors to act.

Nonetheless, our results can certainly be improved if we change our scope to more detailed modeling. To illustrate this, we provide the following toy model. Based on our result that the T-$[CO_2]$ system is potentially causal with direction $\Delta T \to \Delta\ln[CO_2]$, we estimate $\Delta\ln[CO_2]$ as

$$\Delta\ln[CO_2] = \sum_{j=0}^{20} g_j \Delta T_{\tau-j} + \mu_v \tag{8}$$

and we proceed a step further, assuming that the mean μ_v also depends on past temperature, averaged at timescale m, i.e.,

$$\mu_v = \alpha(T_m - T_0) \tag{9}$$

where T_m is the average temperature of the previous m years, and α and T_0 are constants (parameters). Such a simple linear relationship is supported by the above-listed points related to the productivity of the biosphere. Equation (9) will result in negative values μ_v if $T_m < T_0$ and positive otherwise.

By re-evaluating the IRF coordinates g_j simultaneously with the parameters of Equation (9), we find the modified version of the IRF plotted in Figure 14. The optimized additional parameters are $m = 4$ (years), $\alpha = 0.0034$, $T_0 = 285.84$ K. Similarly to [6], we used a common spreadsheet software solver to perform the optimization, adding the two parameters α and T_0 to the unknown coordinates g_j of the IRF and performing the (nonlinear) optimization for all unknowns (m was found by trial-and-error). A graphical comparison of the actual $\Delta\ln[CO_2]$ and $[CO_2]$ with those simulated by the model of Equations (8) and (9) is given in Figure 15. The explained variance for $\Delta\ln[CO_2]$ was drastically increased from 34% to 55.5% and that for $[CO_2]$ is an impressive 99.9%.

For the convenience of the readers who are interested in repeating the calculations, we also give a parametric expression of IRF and summarize the toy model as:

$$\begin{gathered} \Delta\ln[CO_2] = \sum_{j=0}^{20} g_j \Delta T_{\tau-j} + \mu_v, \\ g_j = 0.00076\, j^{0.67} e^{-0.2j}/\mathrm{K}, \mu_v = 0.0034\,(T_4/\mathrm{K} - 285.84) \end{gathered} \tag{10}$$

(where K is the unit of kelvin).

We emphasize, however, that we do not exploit the impressive result of explained variance of 99.9% to assert that we have built a decent model, even though this toy model is both accurate (in the lower panel of Figure 15, the simulated curve is indistinguishable from the actual) and parsimonious (the model expression in (10) contains only 5 fitted

parameters). We prefer to highlight the fact that the hugely complex climate system entails high uncertainty, and its study needs reliable data that provide the basis for the modeling and testing of hypotheses.

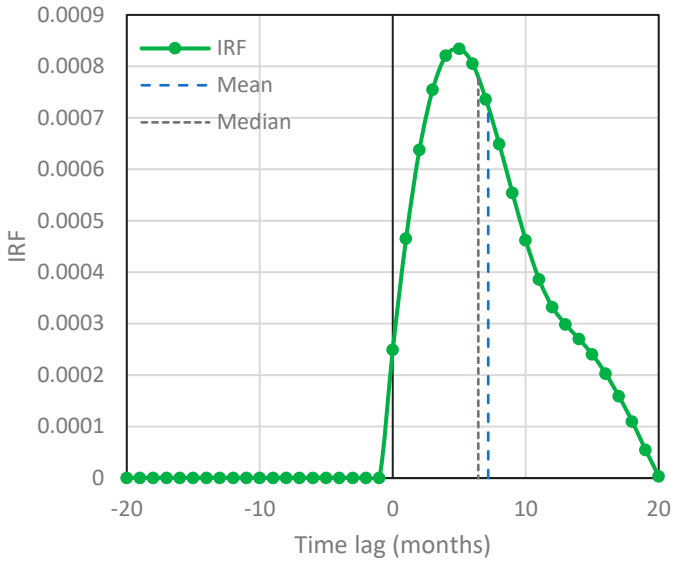

Figure 14. Modified IRF for temperature–CO_2 concentration based on the NCEP/NCAR Reanalysis temperature at 2 m and Mauna Loa time series, respectively, similar to Figure 2 but with IRF coordinates simultaneously optimized with the parameters of Equation (9).

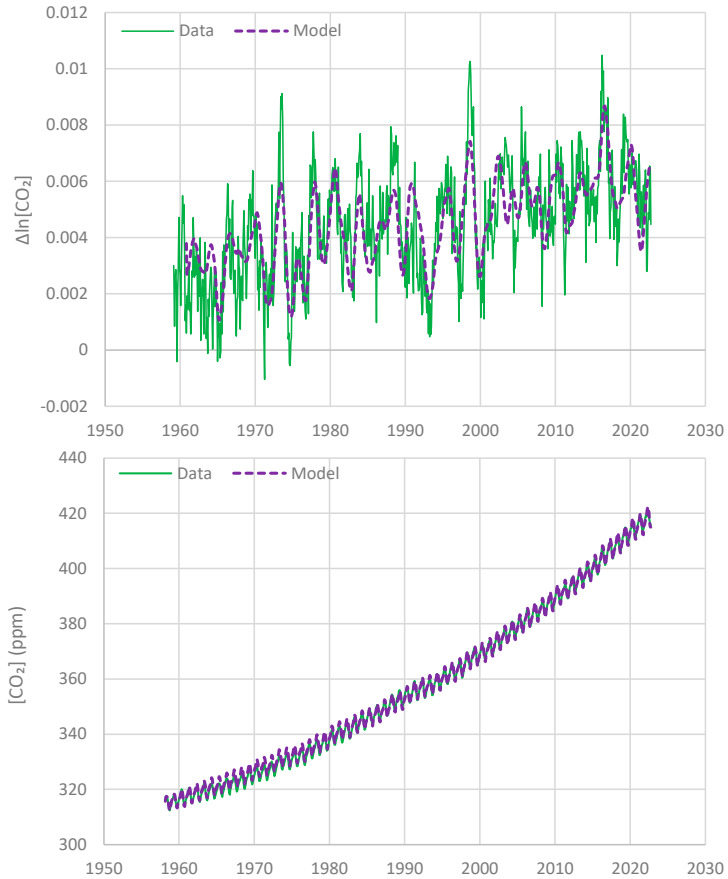

Figure 15. Comparison of the actual $\Delta\ln[CO_2]$ (**upper**) and $[CO_2]$ (**lower**) with those simulated by the model of Equations (8) and (9).

10. Conclusions

With reference to points 1–7 of the Introduction setting the paper's scope, the results of our analyses can be summarized as follows.

1. All evidence resulting from the analyses of the longest available modern time series of atmospheric concentration of [CO_2] at Mauna Loa, Hawaii, along with that of globally averaged T, suggests a unidirectional, potentially causal link with T as the cause and [CO_2] as the effect. This direction of causality holds for the entire period covered by the observations (more than 60 years).
2. Seasonality, as reflected in different phases of [CO_2] time series at different latitudes, does not play any role in potential causality, as confirmed by replacing the Mauna Loa [CO_2] time series with that in South Pole.
3. The unidirectional $T \rightarrow \ln[CO_2]$ potential causal link applies to all timescales resolved by the available data, from monthly to about two decades.
4. The proposed methodology is simple, flexible and effective in disambiguating cases where the type of causality, HOE or unidirectional, is not quite clear.
5. Furthermore, the methodology defines a type of data analysis that, regardless of the detection of causality per se, assesses modeling performance by comparing observational data with model results. In particular, the analysis of climate model outputs reveals a misrepresentation of the causal link by these models, which suggest a causality direction opposite to the one found when the real measurements are used.
6. Extensions of the scope of the methodology, i.e., from detecting possible causality to building a more detailed model of stochastic type, are possible, as illustrated by a toy model for the T-[CO_2] system, with explained variance of [CO_2] reaching an impressive 99.9%.
7. While some of the findings of this study seem counterintuitive or contrary to mainstream opinions, they are logically and computationally supported by arguments and calculations given in the Appendices.

Overall, the stochastic notion of a causal system, based on the concept of the impulse response function, proved to be very effective in studying demanding causality problems. A crucial characteristic of our methodology is its direct use of the data per se, in contrast with other methodologies that are based on uncertain estimates of autocorrelation functions or on the more uncertain tool of the power spectrum, i.e., the Fourier transform of the autocorrelation function. The methodology has the potential for further advances, as we first reported here (e.g., the asymmetric time lag window, the definition of a type of data analysis to be used in assessing modeling performance, and the extensions of its scope from detecting possible causality to building a more detailed model).

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/sci5030035/s1: Section SI1, Additional analysis of climate model behavior; Section SI2, On correlations of temperature with CO_2 emissions.

Author Contributions: Conceptualization, D.K.; methodology, D.K., C.O., Z.W.K. and A.C.; software, D.K.; validation, D.K., C.O., Z.W.K. and A.C.; formal analysis, D.K., C.O., Z.W.K. and A.C.; investigation, D.K., C.O., Z.W.K. and A.C.; data curation, D.K.; writing—original draft preparation, D.K., C.O., Z.W.K. and A.C; writing—review and editing, D.K., C.O., Z.W.K. and A.C.; visualization, D.K.; supervision, D.K., C.O., Z.W.K. and A.C.; project administration, D.K. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement: All data used in the paper are available online for free. The NCEP/NCAR temperature time series and the Mauna Loa CO_2 time series are readily available on a monthly

scale from the climexp (http://climexp.knmi.nl/ (accessed on 1 January 2023) platform, namely from http://climexp.knmi.nl/data/inair_0-360E_-90-90N_n.dat and http://climexp.knmi.nl/getindices.cgi?WMO=CDIACData/maunaloa_f&STATION=Mauna_Loa_CO2 (accessed on 1 January 2023). The South Pole CO_2 concentration data are provided by the Global Monitoring Laboratory of the USA's National Oceanic and Atmospheric Administration (NOAA) at https://gml.noaa.gov/dv/data/index.php?parameter_name=Carbon%2BDioxide&site=SPO (accessed on 1 January 2023). The data retrieved are "Monthly Averages" for Type "Flask" and "Insitu". The CO_2 time series used in climate models have been downloaded from https://gmd.copernicus.org/articles/13/3571/2020/gmd-13-3571-2020-supplement.zip (accessed on 1 January 2023); from the Excel file provided, the data from the column "CO_2 ppm World" of the tabs "T2—History Year 1750 to 2014" and "T5—SSP2-4.5" have been retrieved. The climate model outputs were downloaded from the climexp platform, http://climexp.knmi.nl/selectfield_cmip6.cgi (accessed on 1 January 2023); specifically, from the "Monthly CMIP6 scenario runs", the globally averaged time series on "CMIP6 mean over all members" and "UKESM1-0-LL f2" have been derived through the platform. The CERES data were downloaded from https://ceres-tool.larc.nasa.gov/ord-tool/jsp/SSF1degEd41Selection.jsp (accessed on 17 March 2023). The SOI data were downloaded from https://www.ncdc.noaa.gov/teleconnections/enso/indicators/soi/ (accessed on 17 March 2023). The data on monthly global upper ocean mean temperature were downloaded from http://climexp.knmi.nl/getindices.cgi?WMO=NODCData/temp100_global&STATION=global_upper_ocean_mean_temperature (accessed on 17 March 2023).

Acknowledgments: We acknowledge a plethora of comments about our earlier papers [2,6,7]. Although few engaged with the methodology, they increased our confidence in our results. We also acknowledge the comments in five reviews in the two rounds of the review process of this paper, which triggered an expansion of the study by adding the Appendices, not contained in the original version, and their discussion in the body of the paper. We believe that the revised version is more complete.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A.

Appendix A.1. Notes on Carbon Cycle and its Dependence on Temperature

The carbon cycle is typically presented as a system with components that are in permanent equilibrium, except for the perturbation caused by anthropic activities. For example, the recent (2022) comprehensive study by Friedlingstein et al. [52], in its Figure 2 shows an absolute equilibrium in both the terrestrial and maritime parts of Earth, with inputs and outputs matching each other ($\pm$130 Gt C/year for the terrestrial part and $\pm$80 Gt C/year for the maritime part), to which a human perturbation (9.6 $\pm$ 0.5 Gt C/year from the fossil fuel CO_2 emissions and 1.2 $\pm$ 0.7 Gt C/year from land-use change) is imposed and then distributed into several components. This representation is misleading, missing the large changes (by orders of magnitude) in the historical evolution of the abundance of CO_2 in Earth's atmosphere. A different approach and account has recently been provided by Stallinga [53], according to whom humans add 38 Gt of per year to the atmosphere-ocean system, a quantity equivalent to 10.4 Gt C/year.

Here, we follow the IPCC's [32] account in its recent (2021) Assessment Report (AR6). Its schematic (Figure 5.12 in that Report) does not hide (a) the imbalances in the different parts of Earth and (b) the fact that the natural carbon inputs and outputs in the atmosphere change over time—even though the IPCC's schematic implicitly assumes that "natural" is the budget that occurred in the preindustrial age (1750) and that any change that occurred since is anthropogenic. Interestingly, in an alternative view by Hansen et al. [54], civilization always produced greenhouse gases and aerosols, and humans likely contributed to the increase of both in the past 6000 years, thus resulting in climate forcings.

Based on the IPCC's representation, we have summarized in Figure A1 the information given in the IPCC's schematic, in terms of annual carbon balance. When seen in the entire picture, the human emissions due to fossil fuel combustion (9.4 Gt C/year including cement production) is a small part (4%) of the total CO_2 inflows to the atmosphere.

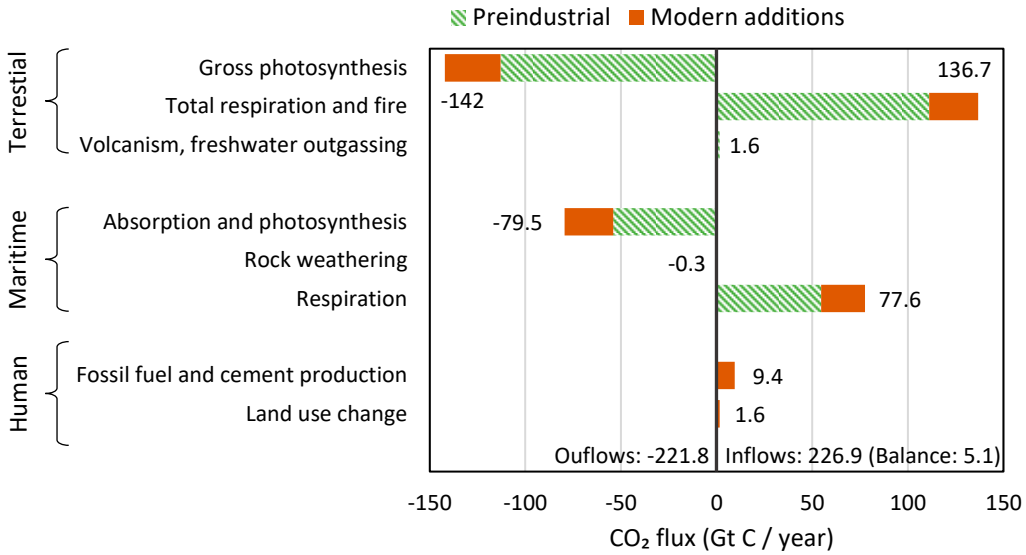

Figure A1. Annual carbon balance in the Earth's atmosphere in Gt C/year, based on the IPCC [32] estimates. The balance of 5.1 Gt C/year is the annual accumulation of carbon (in the form of CO_2) in the atmosphere.

The greatest part of the inflows is due to the respiration of the biosphere, i.e., the biochemical reaction whereby living organisms convert organic matter (e.g., glucose) to CO_2, releasing energy and consuming molecular oxygen [32]. As seen in Figure A1 (and in several publications, e.g., [55]), respiration has increased in recent years, the main reason for this being the increased temperature. Photosynthesis, the biochemical process that removes CO_2 from the atmosphere, producing carbohydrates in plants, algae and bacteria using the energy of light [32], has also increased, resulting in the greening of Earth [34–36] due to the increased atmospheric concentration of CO_2, which is plants' food.

It is not difficult to quantify the increase in respiration due to the temperature rise. The mechanism has been known in chemistry for more than a century. The rate of a chemical reaction k_T at temperature T is an increasing function of T, given by the Arrhenius equation [56]:

$$k_T = A\exp\left(-\frac{a}{R_* T}\right) \tag{A1}$$

where A and a are free parameters and R_* is the universal gas constant. Typically, the rate is measured in moles per unit volume, but it can readily be expressed in mass units. Expressing the relationship at a reference temperature T_0 and dividing with (A1), we obtain:

$$\frac{k_T}{k_0} = \exp\left(-\frac{a}{R_*}\left(\frac{1}{T}-\frac{1}{T_0}\right)\right) \tag{A2}$$

Taking the logarithms and setting $\Delta T := T - T_0$ we find

$$\begin{aligned}\ln\left(\tfrac{k_T}{k_0}\right) &= -\tfrac{a}{R_*}\left(\tfrac{1}{T}-\tfrac{1}{T_0}\right) = \tfrac{a}{R_* T_0}\left(1-\tfrac{T_0}{T}\right) = \tfrac{a}{R_* T_0}\left(\tfrac{\Delta T}{T_0+\Delta T}\right) \\ &= \tfrac{a}{R_* T_0}\left(\tfrac{\Delta T}{T_0} - \left(\tfrac{\Delta T}{T_0}\right)^2 + \left(\tfrac{\Delta T}{T_0}\right)^3 - \ldots\right)\end{aligned} \tag{A3}$$

and assuming that $\Delta T/T_0$ is small (nb., T_0 is of the order of 300 K, while typical values of ΔT is of the order of 1–10 K). We can neglect all terms beyond first order and find:

$$\frac{k_T}{k_{T0}} = \exp\left(\frac{a}{R_* T_0^2}\Delta T\right) = \left(\exp\left(\frac{a}{R_* T_0^2}\right)\right)^{\Delta T} = Q_1^{\Delta T} = Q_{10}^{\Delta T/10} \tag{A4}$$

where

$$Q_1 := \exp\left(\frac{a}{R{*}T_0^2}\right), Q_{10} := Q_1^{10} \tag{A5}$$

Notice that both Q_1 and Q_{10} are dimensionless numbers > 1. The exponential expression in which Q_{10} is raised to power $\Delta T/10$ is known as the Q_{10} model [57].

The exponential increase of the process rate with temperature is a general chemical behavior, also extending to biochemical reactions. This is not a hypothesis or speculation but a proven fact that is widely used in engineering. For example, the metabolic rate in wastewater and sewer systems is expressed by the so-called effective BOD (EBOD, with BOD standing for biochemical oxygen demand). It has been known for more than 75 years that the metabolic rate increases with temperature, as microorganism activity generally increases with temperature. The relationship of EBOD with temperature has been expressed by Pomeroy and Bowlus [58] as $[\text{EBOD}] = [\text{BOD}]\ (1.07)^{T-20}$, which is similar to (A4), where the reference temperature is $T_0 = 20\ ^\circ\text{C}$ and $Q_1 = 1.07$ ($Q_{10} = 2.0$). The latter relationship is the standard of engineering design in sewer systems.

To apply this framework to find the increase of respiration in the last 65-year period investigated in our study, we first retrieved the global temperature separately for land and sea from the NCEP/NCAR Reanalysis data set. These are shown on an annual timescale in Figure A2. The resulting linear trends, also shown in Figure A2, yield an increase $\Delta T = 1.69\ ^\circ\text{C}$ for the terrestrial and 0.78 °C for the maritime part for the 65-year period.

Now the literature gives representative average Q_{10} values of 3.05 for terrestrial respiration [57] and 4.07 for maritime respiration [59]. If R_B and R_E denote the respiration rate at the beginning and the end of the 65-year period, and $\Delta R := R_\text{E} - R_\text{B}$, then according to (A4),

$$\frac{R_\text{E}}{R_\text{B}} = Q_{10}^{\Delta T/10} \tag{A6}$$

and hence

$$\Delta R = R_\text{E}\left(1 - \frac{1}{Q_{10}^{\Delta T/10}}\right) \tag{A7}$$

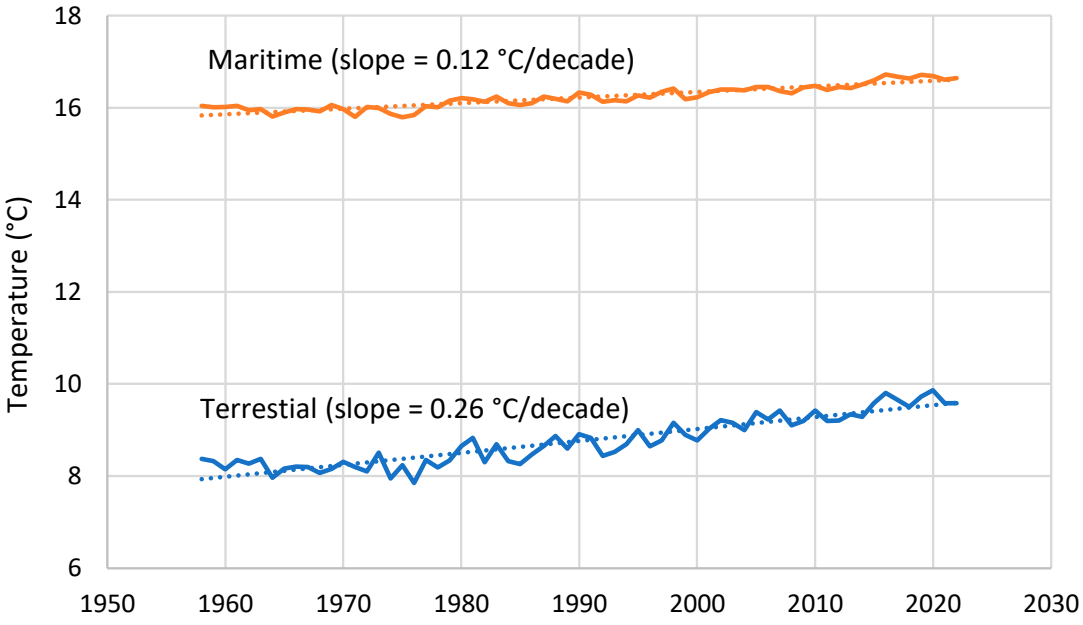

Figure A2. Evolution of global land (terrestrial) and sea (maritime) temperature at 2 m from the NCEP/NCAR Reanalysis data set, retrieved from the ClimExp platform, and resulting slopes of linear trends.

For the above given values of Q_{10} and ΔT, the expression in parentheses becomes 0.172 for the terrestrial part and 0.104 for the maritime part. Multiplying these by the R_E values shown in Figure A1, i.e., 136.7 and 77.6 Gt C/year, respectively, we find $\Delta R = 23.5$ and 8.1 Gt C/year, respectively, i.e., a total global increase in the respiration rate of $\Delta R = 31.6$ Gt C/year. This rate, which is a result of natural processes, is 3.4 times greater than the CO_2 emission by fossil fuel combustion (9.4 Gt C /year including cement production).

Appendix A.2. Investigation of Causality between Albedo and Atmospheric Temperature

There are several factors causing changes to the Earth's temperature. Solar radiation is a principal one, yet the changes in it have not been substantial at timescales of a few years. However, the Earth's response to solar radiation may change on such scales. Here, we investigate the changes of Earth's albedo. In the 21st century, the albedo at the top of the atmosphere (TOA) can be estimated from satellite data. Specifically, this can be done using the data from the ongoing project Clouds and the Earth's Radiant Energy System (CERES). This is part of NASA's Earth Observing System, designed to measure both solar-reflected and Earth-emitted radiation from the TOA to the Earth's surface. The data we used here are from the TERRA platform for the monthly timescale and are available online [60] for the period of March 2000 to date. The global TOA albedo was calculated as the ratio for each month of the globally integrated observed TOA shortwave flux (all-sky) over the globally observed TOA solar insolation flux. The resulting time series is shown in Figure A3. A falling linear trend of –0.0019/decade is also shown in the figure. A falling trend means that less solar radiation is reflected by the Earth, which may result in an increase in temperature. For the entire period, the decline of the albedo is about 0.004. As the average incoming solar radiation (insolation), according to the same data set, is 340 W/m^2, this implies a difference (imbalance) of received energy by Earth of $0.004 \times 340 = 1.4$ W/m^2. This result does not disagree with that of Hansen et al. [54], who found that in the period January 2015 through March 2022, the global absorbed solar energy is +1.01 W/m^2 higher than the mean for the first 10 years of data (2000–2009). These figures are greater than the average imbalance (net absorbed energy) of the Earth, which, if calculated from the ocean heat content data, is about 0.4 W/m^2 [33]. According to mainstream science, this imbalance is attributed to the increase of [CO_2], but the analyses in this study do not support this hypothesis. Moreover, it is hard to see how the albedo fall could be caused by increased [CO_2] (and for this reason, it is usually blamed on aerosols).

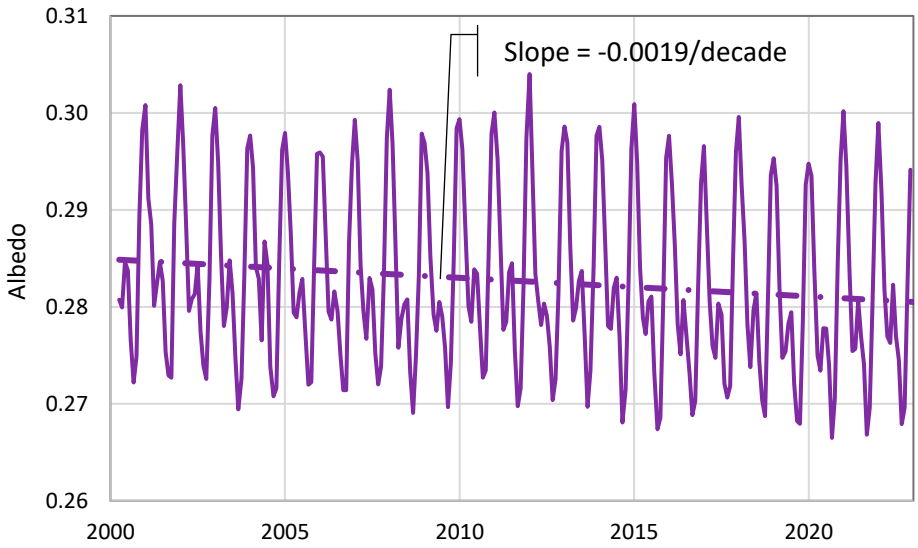

Figure A3. TOA albedo time series (continuous line), as provided by NASA's Clouds and the Earth's Radiant Energy System (CERES), along with linear trend (dashed line).

However, the potential causal link of albedo (α) with atmospheric T can be more thoroughly investigated by the stochastic framework discussed here. The resulting characteristics are shown in Table A1 and the resulting IRFs are shown in Figure A4. Notice that, as an increase of α is expected to cause a decrease of T, we changed the sign in albedo differences ($-\Delta\alpha$) so as to have a positive correlation with temperature differences (ΔT). The IRF determined suggests a potential HOE causation, with principal direction $\alpha \rightarrow T$ and time lags of 1–3 months. However, the explained variance is small, 13%.

Table A1. Summary indices of the case studies related to albedo. Data are on a monthly timescale and the time step of differencing is 1 year; for explanation of symbols see Table 1.

Case System	#	Direction	h_c	μ_h	$h_{1/2}$	$r_{yx}(h_c)$	e	ε
Albedo, α: CERES, TERRA;	24	$-\Delta\alpha \rightarrow \Delta T$	3	1.08	2.90	0.24	0.13	9.1×10^{-4}
T: NCEP/NCAR; period: 2000–2022	25	$\Delta T \rightarrow -\Delta\alpha$	–3	–0.31	–2.46	0.24	0.06	3.6×10^{-4}

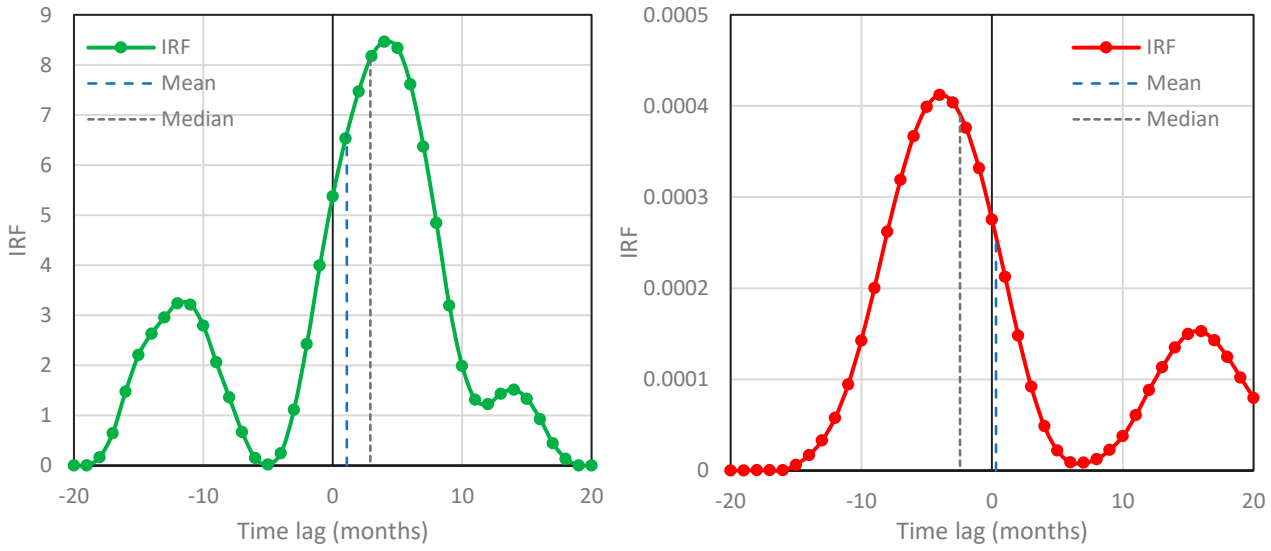

Figure A4. IRFs for albedo–temperature based on the CERES albedo time series and the NCEP/NCAR Reanalysis temperature at 2 m, respectively—case studies #24 (**left**; $-\Delta\alpha \rightarrow \Delta T$];) and #25 (**right**; $\Delta T \rightarrow -\Delta\alpha$).

Appendix A.3. Investigation of Causality between El Niño, Atmospheric Temperature and CO_2

A second process that is known to affect atmospheric temperature globally is the El Niño–Southern Oscillation (ENSO) (see [12,61] and a recent study by Kundzewicz et al. [62] for details). ENSO is associated with irregular variations in sea surface temperature and air pressure over the tropical Pacific Ocean. Several indices associated with ENSO are used in climatic studies, among which the most popular is US NOAA's Southern Oscillation Index (SOI), the time series of which is plotted in Figure A5.

Our stochastic methodology was previously applied with SOI along with satellite temperature data for the period 1979–2021 in [7]. Here we repeat the investigation replacing the temperature data with those of the NCEP/NCAR reanalysis and expanding the data back to 1951 (the beginning of the availability of SOI data) and forth to 2022. We also examined the potential causality between SOI and [CO_2]. In both cases, we tested differences with a time step of differencing of 1 year (thus reducing the effect of seasonality) and to make the correlation positive, we used $-\Delta$SOI (as in the albedo case).

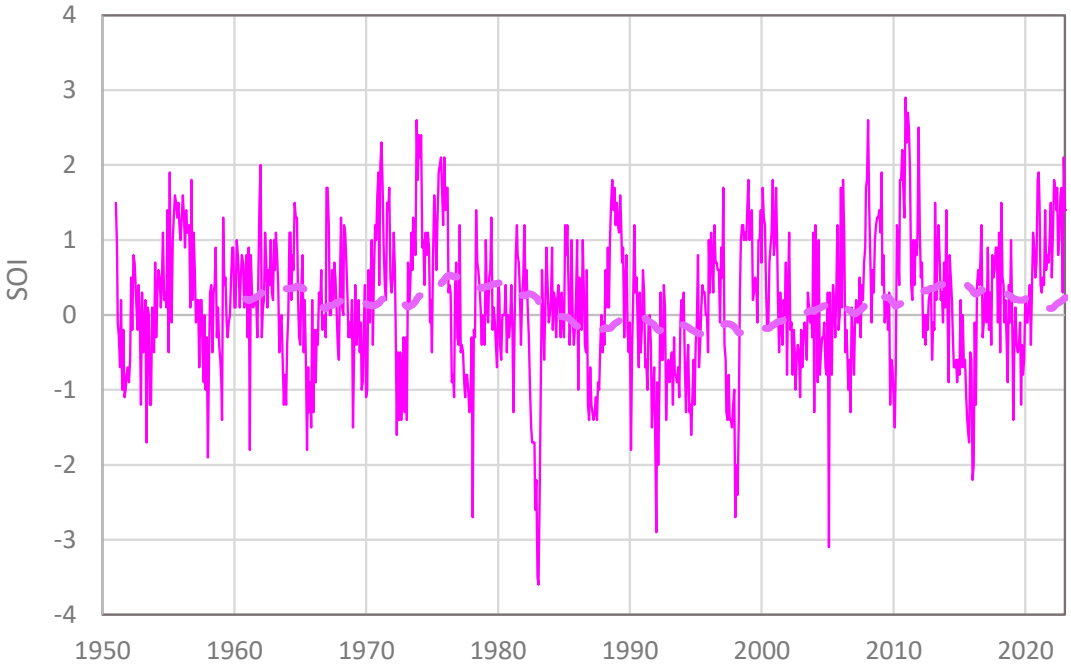

Figure A5. SOI time series (continuous line) along with rolling (right-aligned) 10-year average (dashed line). Negative and positive values indicate the El Niño and La Niña phases, respectively.

The results are shown in Table A2, Figures A6 and A7. The principal directions are SOI $\rightarrow T$ and SOI $\rightarrow [CO_2]$. In the former case, the explained variance is 33%, and the causality type is HOE but very close to unidirectional with a time lag of 4 months. In the latter case, the explained variance is 30%, and the causality type is unidirectional with a lag of about a year.

Table A2. Summary indices of the case studies related to ENSO. Data are on a monthly timescale and the time step of differencing is 1 year; for explanation of symbols see Table 1.

Case System	#	Direction	h_c	μ_h	$h_{1/2}$	$r_{yx}(h_c)$	e	ε
SOI: NOAA; T: NCEP/NCAR; period: 1951–2022	26	$-\Delta$SOI $\rightarrow \Delta T$	3	4.14	3.85	0.46	0.33	8.1×10^{-4}
	27	$\Delta T \rightarrow -\Delta$SOI	3	–2.15	–0.93	0.46	0.30	2.3×10^{-3}
SOI: NOAA; $[CO_2]$: Mauna Loa, period: 1958–2022	28	$-\Delta$SOI $\rightarrow \Delta \ln[CO_2]$	11	11.62	11.15	0.32	0.24	6.6×10^{-4}
	29	$\Delta \ln[CO_2] \rightarrow -\Delta$SOI	–11	–3.73	–3.84	0.32	0.08	0

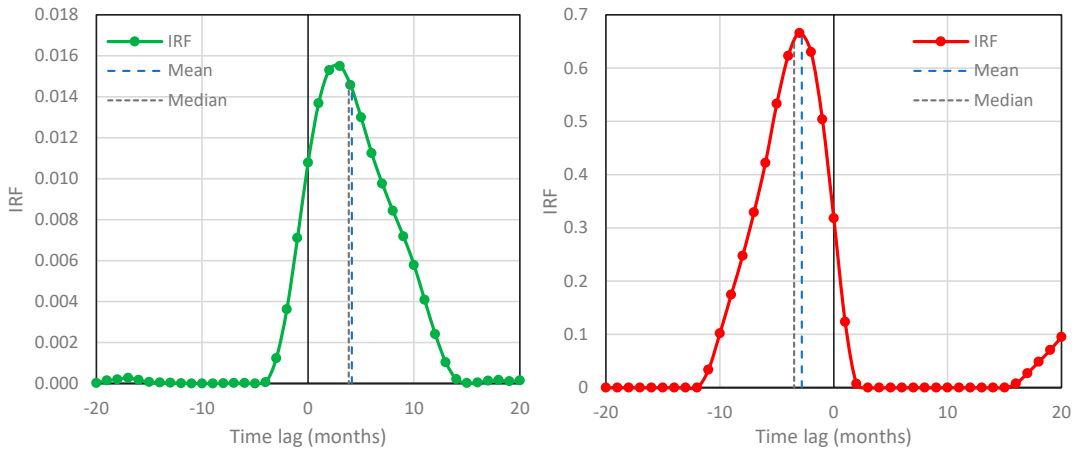

Figure A6. IRFs for ENSO–temperature based on the SOI time series and the NCEP/NCAR Reanalysis temperature at 2 m, respectively—case studies #26 (**left**; $-\Delta$SOI $\rightarrow \Delta T$];) and #27 (**right**; $\Delta T \rightarrow -\Delta$SOI).

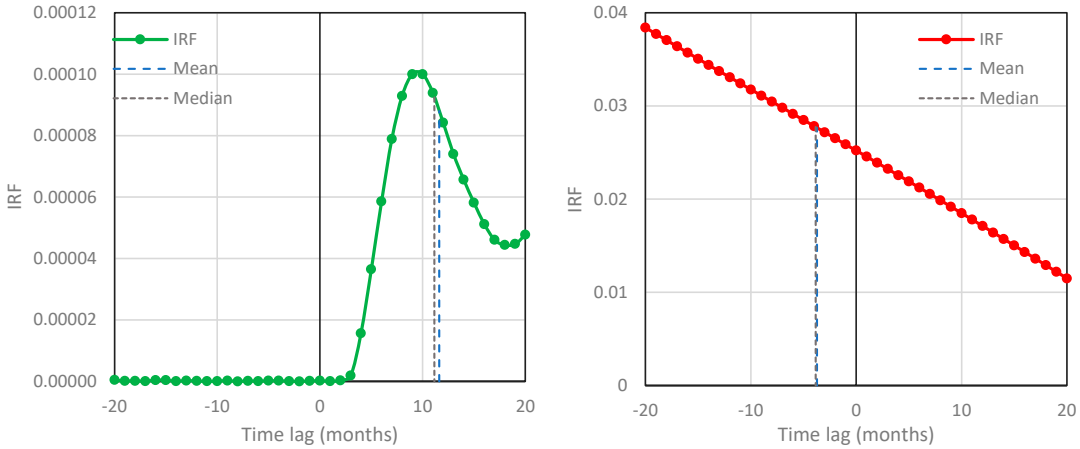

Figure A7. IRFs for ENSO–[CO_2] based on the SOI and the Mauna Loa time series, respectively—case studies #28 (**left**; $-\Delta SOI \rightarrow \Delta \ln[CO_2]$;) and #29 (**right**; $\Delta \ln[CO_2] \rightarrow -\Delta SOI$).

Appendix A.4. Investigation of Causality between Ocean Heat Content, Atmospheric Temperature and CO_2

A third process examined in connection to both T and [CO_2] is the heat content of the upper-layer ocean. This is indirectly represented by data of the upper ocean mean temperature of the layer 0–100 m [63] (OMT0–100), also known as Vertically Averaged Temperature Anomaly (0–100 m layer) [64]. These are based on historical ocean temperature data, bathythermograph data and Argo data [65] and are made available at the timescale of three months by the National Oceanographic Data Center of the US NOAA [64], as well as by the ClimExp platform, which we used to download the data. The time series, starting in 1955, is plotted in Figure A8.

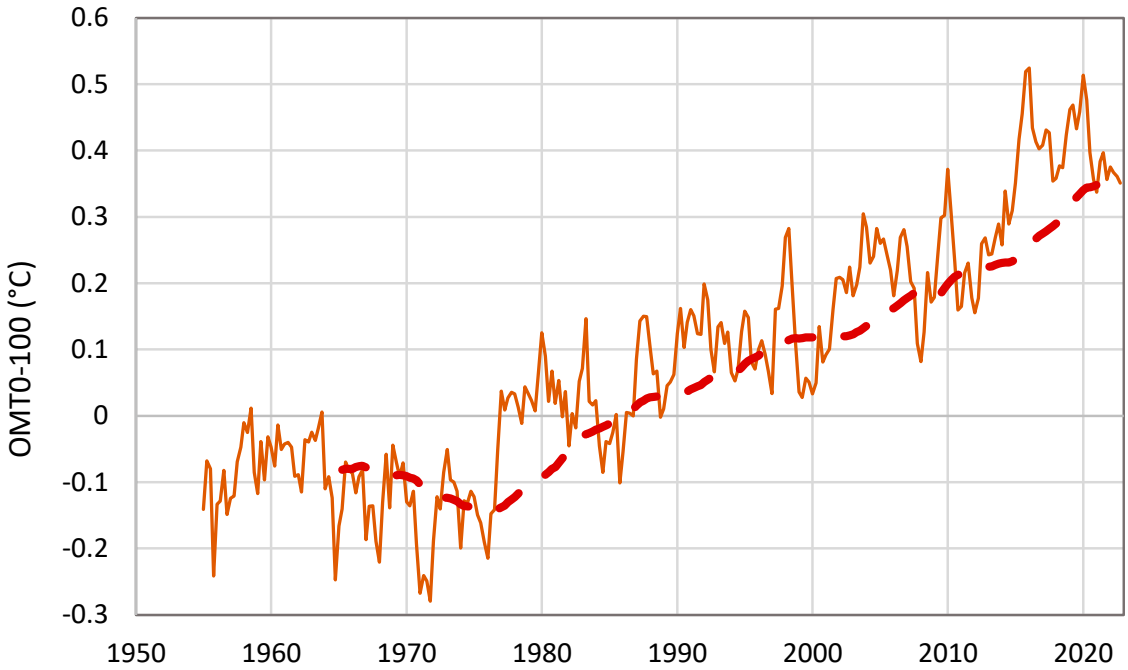

Figure A8. OMT0–100 time series (continuous line) along with rolling (right-aligned) 10-year average (dashed line).

The results of the stochastic analyses are shown in Table A3, Figures A9 and A10. The principal directions are OMT0–100 $\rightarrow T$ and OMT0–100 $\rightarrow$ [CO_2] and the causality type is HOE. In the former case, the explained variance is substantial, 53%, and the time

lag is 3–7 months, depending on the metric used (nb., the time lags in Table A3 are given in 3-monthly steps). In the latter case, the explained variance is 35%, and the time lag is greater, 7–9 months.

Table A3. Summary indices of the case studies related to OMT0–100. Data are on a three-month timescale and the time step of differencing is 1 year; for explanation of symbols see Table 1.

Case System	#	Direction	h_c	μ_h	$h_{1/2}$	$r_{yx}(h_c)$	e	ε
OMT0–100: NOAA; *T*: NCEP/NCAR; period: 1955–2022	30	ΔOMT0–100 $\rightarrow \Delta T$	0	2.42	0.98	0.68	0.53	7.1×10^{-3}
	31	$\Delta T \rightarrow \Delta$OMT0–100	0	–2.15	–0.93	0.68	0.52	3.8×10^{-3}
OMT0–100: NOAA; [CO_2]: Mauna Loa; period: 1958–2022	32	ΔOMT0–100 $\rightarrow \Delta\ln[CO_2]$	2	2.22	2.93	0.46	0.35	5.8×10^{-4}
	33	$\Delta\ln[CO_2] \rightarrow \Delta$OMT0–100	–2	–2.73	–2.82	0.46	0.21	5.6×10^{-3}

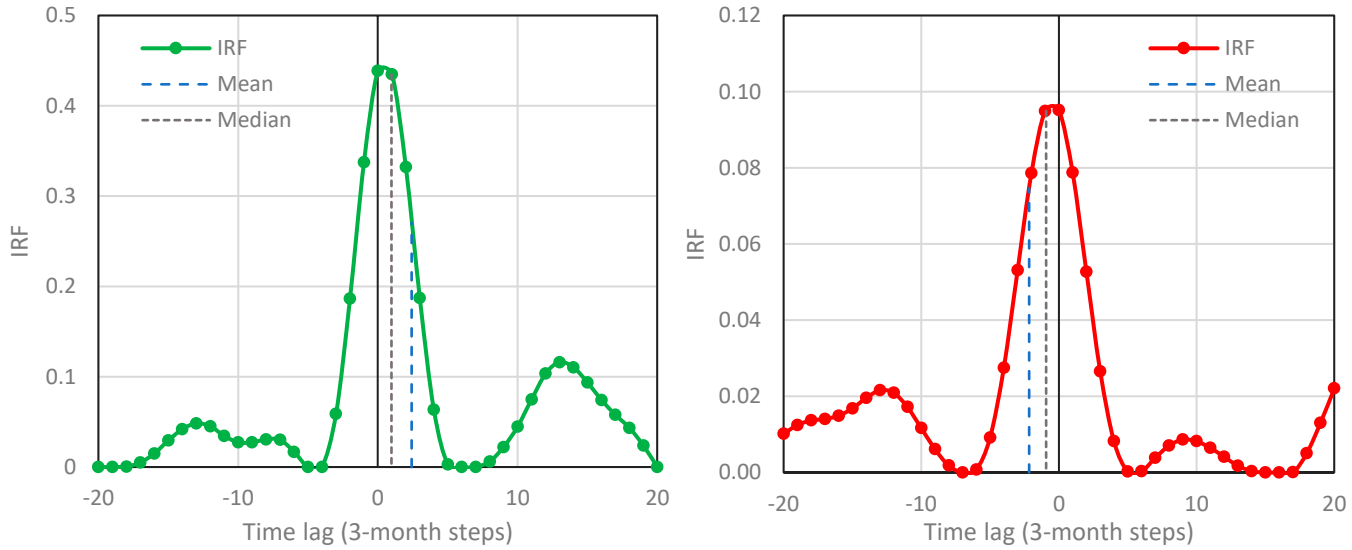

Figure A9. IRFs for upper ocean temperature—atmospheric temperature based on the OMT0–100 and the NCEP/NCAR Reanalysis data, respectively—case studies #30 (**left**; ΔOMT0–100 $\rightarrow \Delta T$];) and #31 (**right**; $\Delta T \rightarrow \Delta$OMT0–100).

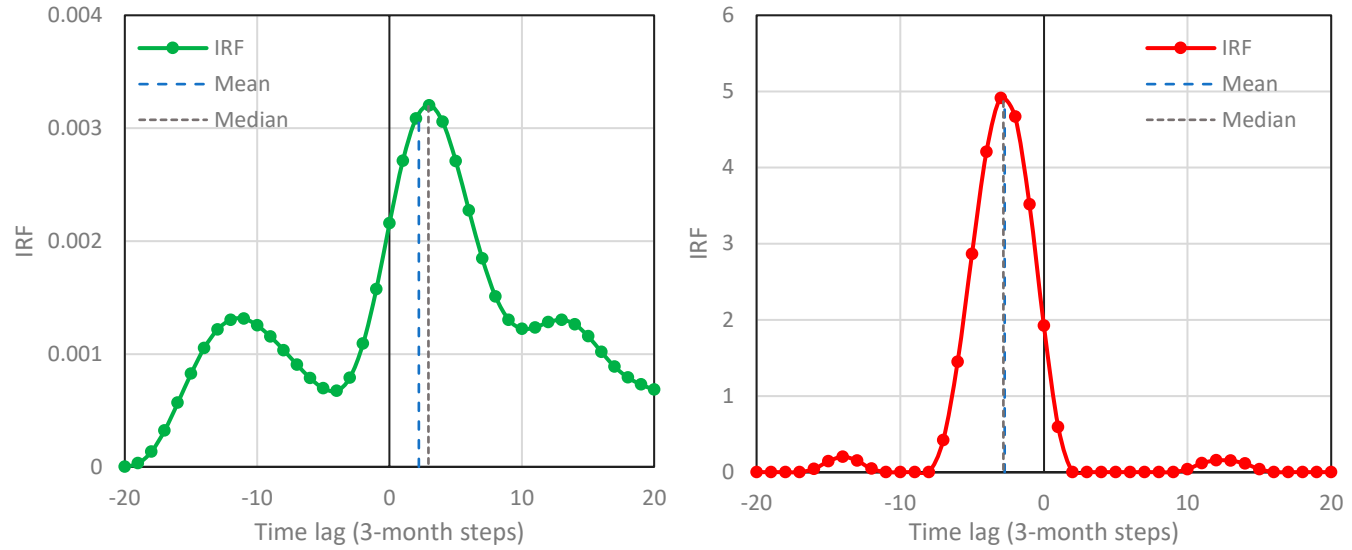

Figure A10. IRFs for upper ocean temperature—[CO_2] based on the OMT0–100 and the NCEP/NCAR Reanalysis data, respectively—case studies #32 (**left**; ΔOMT0–100 $\rightarrow \Delta\ln[CO_2]]$;) and #33 (**right**; $\Delta\ln[CO_2] \rightarrow \Delta$OMT0–100).

Appendix A.5. Notes on the T-*[CO_2] Relationship on Large Timescales*

While the scope of this study is the modern period covered by reliable CO_2 concentration measurements (about six decades), it may be useful to refer to studies that used paleoclimatic proxies to assess the *T*-[CO_2] relationship on much larger timescales. Berner and Kothavala [66] studied the entire phanerozoic (the last 530 million years) and asserted that "*over the long term there is indeed a correlation between CO_2 and paleotemperature*", while their Figure 13 showed that the atmospheric [CO_2] was much higher (up to 27 times) than the current one for most of the time during the phanerozoic. They also emphasized the "*importance of considering ALL factors affecting CO_2 when modelling the long term carbon cycle and not concentrating* [on] *only one cause*". On the other hand, Veizer et al. [67] presented evidence for decoupling atmospheric CO_2 and global climate during the phanerozoic, questioning the role of the (partial pressure of) CO_2 as the main driving force of past global (long-term) climate changes, at least during two of the four main cool climate modes of the phanerozoic.

Several studies, based on paleoclimatic reconstructions and mostly the Vostok ice cores [68,69] covering the most recent ~400 thousand years, have identified the change of *T* as the cause and that in [CO_2] as the effect, with estimates of the time lag varying from 50 to 1000 years, depending on the time period and the particular study [23,70–72]. Claims that CO_2 concentration leads (i.e., a negative lag) have not generally been made in these studies. At most, a synchrony claim has been sought on the basis that the estimated positive lags are often within the 95% uncertainty range [73], while in one of them [72], it has been asserted that a "*short lead of CO_2 over temperature cannot be excluded*".

Synchrony was also claimed for the last deglacial warming in another study by Parrenin et al. [74], who stated that they found no significant asynchrony between Antarctic temperature and atmospheric [CO_2]. For the same period, another study by Shakun et al. [75] gave different lead-lag relationships for the north and south hemispheres. Generally, it appears that the issue remains controversial, as illustrated, for example, in a recent report (2021) by NOAA (in the framework of Paleo Perspectives [76]), which states: "*While it might seem simple to determine cause and effect between carbon dioxide and climate from which change occurs first*, [. . .] *the determination of cause and effect remains exceedingly difficult*."

On the other hand, a convincing explanation about why, in the long run, change in temperature leads and in CO_2 concentration follows has been given by Roe [40], who demonstrated that in the Quaternary it is the effect of Milanković cycles, rather than of atmospheric CO_2 concentration, that explains the glaciation process. Specifically, he found that "*variations in atmospheric CO_2 appear to lag the rate of change of global ice volume. This implies only a secondary role for CO_2—variations in which produce a weaker radiative forcing than the orbitally-induced changes in summertime insolation—in driving changes in global ice volume.*"

The Vostok ice cores covering the most recent ~400 thousand years have also been examined, applying the same method as in this paper, by Koutsoyiannis et al. [7], who concluded that "*the causal relationship of atmospheric T and CO_2 concentration, as obtained by proxy data, appears to be of HOE type with principal direction $T \rightarrow [CO_2]$*", same as in the records of the modern period, but with a much higher time lag, of the order of 1000 years.

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Vincent Caboara

This comment is submitted to provide evidence of a viable technical solution for Scope 3 compliance within the pulp, paper, and energy sectors. Arboreum Commercial Solutions (ACS) has established a standard for replacing virgin timber feedstock with agricultural waste through an energy-independent, closed-loop, carbon-negative process. As the Architect of this IP (filed 12/17/25, see attached receipt), I am notifying the Board that 'unfeasibility' claims by industrial entities are no longer factually supported. ACS provides the necessary industrial floor to meet 2026 reporting requirements today. 007.1

UNITED STATES PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
19/424,106	**12/17/2025 11:24:20 PM Z ET**	**1126P001**

Title of Invention

INTEGRATED LIGNOCELLULOSIC WASTE PROCESSING

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	2951	FILED BY	KATHY MOU
PATENT CENTER #	73649505	FILING DATE	-
CUSTOMER #	210830	FIRST NAMED INVENTOR	Vincent Pietro Caboara
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	MARK HAGLER

Documents

TOTAL DOCUMENTS: 14

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
1126P001 ADS.pdf	8	Application Data Sheet	2202 KB
1126P001 Declaration.pdf	2	Oath or Declaration filed	252 KB
1126P001 POA.pdf	2	Power of Attorney	391 KB
1126P001 Certification of Micro Entity Status.pdf	2	Certification of Micro Entity (Gross Income Basis)	159 KB
1126P001 IDS.pdf	5	Information Disclosure Statement (IDS) Form (SB08)	1315 KB
1126P001 Figures.pdf	3	Drawings-only black and white line drawings	148 KB
1126P001 Application-APP.TEXT.docx	16	Application body structured text document	56 KB

Vincent Caboara

ADDENDUM: Formal Legal Entity Clarification for ACS

Please note that previous submissions under the name 'ACS' refer to the legal entity Arboreum Commercial Solutions, LLC. All technical feasibility data remains as filed on 12/17/25. 008.1

The American Waterways Operators

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Suite 223
Seattle, WA 98103

PHONE: 206.406.3922
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Peter J. Schrappen, CAE
Pacific Region Vice President & Regional Team Lead

February 3, 2026

Ms. Lauren Sanchez
Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Ms. Sanchez:

The American Waterways Operators (AWO) is the tugboat, towboat, and barge industry's advocate, resource, and united voice for safe, sustainable, and efficient transportation on America's waterways, oceans, and coasts. As the largest segment of the nation's 40,000-vessel domestic maritime fleet, our industry safely and efficiently moves 665 million tons of cargo each year and enables the flow of goods through ports on the inland and intracoastal waterways; the Atlantic, Pacific and Gulf coasts; and the Great Lakes.

On behalf of our more than 300 member companies, we appreciate the opportunity to comment on the initial regulations for the California Corporate Greenhouse Gas (GHG) Reporting and Climate-Related Financial Risk Disclosure Programs.

AWO members are proud to be an integral part of the most environmentally safe and efficient mode of freight transportation, emitting 43 percent less greenhouse gases than rail and 832 percent less than trucks. With California home to the largest and busiest ports on the West Coast, this commitment to environmental stewardship is especially meaningful to our members. At the same time, state regulations must remain operationally practical, ensuring that the marine transportation system continues to function safely and efficiently. In the spirit of our shared goals of environmental stewardship and efficiency, AWO is pleased to offer the following comments.

In 2023, California's legislature enacted the Climate Corporate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Reporting Act (SB 261). These statutes require certain companies doing business in California to disclose GHG emissions and climate-related financial risks. SB 253, mandating the Corporate GHG Reporting Program, applies to entities

with over $1 billion in annual revenue and requires annual reporting of Scope 1, Scope 2, and Scope 3 GHG emissions. SB 261 establishes the Climate-Related Financial Risk Disclosure Program and applies to entities with over $500 million in annual revenue, requiring biennial reporting of climate-related financial risks and mitigation strategies.

Both programs require fee collection to fund program administration and implementation. CARB's proposed regulation would establish the administration fee, specify certain key definitions necessary for developing the fee, and set a first-year reporting deadline for entities regulated under SB 253. The proposed regulation also defines key terms such as "revenue" and "doing business in California," to determine which entities will be covered by these programs.

Definitions

CARB proposes that "doing business in California" means doing business and meeting either of the criteria outlined in subsections 23101(b)(1) or 23101(b)(2) of the California Revenue and Taxation Code (CTC). Subsection 23101(b)(1) regards any taxpayer as "doing business" in California if it is organized under the state's law or is commercially domiciled in the state. Subsection 23101(b)(2) treats any taxpayer as "doing business" in the state if their sales in the state exceed the lesser of $500,000 or 25 percent of the taxpayer's total sales worldwide. This economic nexus approach could capture primarily out-of-state marine operators with few California touchpoints, such as a limited number of voyages, de minimis in-state sales, or California-sourced revenue that is small relative to overall company size, and in doing so, effectively force reporting and fees for companies with minimal activity in the state. 009.1

The regulation also equates "revenue" with "gross receipts" under section 25120(f)(2) of the CTC, defined as the gross amount of money realized from the sale or exchange of property, performance of services, or the use of property or capital. This approach could over-capture high-volume, low-profit operators, thereby triggering obligations even when California operations are small. 009.2

Fees

We ask CARB to bear in mind that excessive compliance costs will divert resources from actual emissions reduction investments on an industry and company level. 009.3 The annual estimated cost for both programs is $13.9 million, preceded by a one-time set-up cost of $20.7 million. Per the proposed regulation for both programs, CARB will divide total program costs among the number of covered entities, resulting in a flat fee, and entities covered by both programs will have to pay both sums. There is no sliding scale for emissions or California footprint, meaning comparatively smaller and environmentally cleaner maritime operations may be required to contribute a disproportionate amount compared to larger entities that dominate statewide emissions and risks. 009.4

Emissions Reporting

Under the Corporate GHG Reporting Program, the first Scope 1 and 2 emissions reports are due by August 10, 2026. Companies with fiscal year-end dates after February 1 must generally report the previous fiscal year, unless the most recent year's data is already available. Marine operators typically need months to aggregate data from vessels and third-party service providers such as shipyards, terminals, utilities, and assurance providers. The suggested timelines are too constrained, especially given that emissions reports cannot always be reviewed and assured by qualified third parties within the specific timeframes. 009.5

Furthermore, the proposed deadline does not account for the diversity of business calendars and the time needed to finalize data and complete assurance. Many companies, particularly smaller entities, lack the systems, expertise, and infrastructure to measure and verify emissions to the required standard in such a short period. Timing of data availability and reporting varies by entity and industry. We encourage CARB to adopt a later initial deadline and allow reporting entities to use the most recently closed fiscal year for reporting purposes, with assurance grace periods. Allowing this would ease reporting for regulated parties and, in turn, increase compliance. 009.6

Maritime operators' emissions often comprise customers' Scope 3 emissions while also including operators' Scope 1 and 2 emissions. This conflation, which the program does not adequately address, risks double-counting emissions data. Without clear guidance, operators face inconsistent data disclosure that could inaccurately reflect their company's actual output. To mitigate this, we encourage CARB to promptly issue Scope 3 guidance tailored to marine transport and allow modeled factors where data is impractical or imprecise. 009.7

SB 253 does not impose a minimum emissions threshold to trigger reporting duties; rather, reporting duties are based on company revenue, not emissions levels. This approach unfairly burdens industries like ours, which emit significantly fewer greenhouse gases than other transportation modes, while potentially exempting higher-emitting companies with smaller revenues but perhaps much larger carbon footprints. This approach undermines California's climate goals because it hurts low-emitting industries while possibly exempting higher-emitting ones. AWO urges CARB to consider adjustments that align reporting obligations with actual emissions impacts. 009.8

Parent & Subsidiary Companies

The proposed regulation defines "parent" and "subsidiary" using greater than 50 percent ownership or control tests. CARB proposes to define "subsidiary" as a business entity that another business entity has ownership interest in or control over through direct corporate association. A subsidiary may operate as a separate legal entity but be under the control of the parent entity due to this direct corporate association which can influence the subsidiary's operations, management, or financial decisions. Similarly, a "parent" is a business entity that holds an ownership interest in or control over another entity through direct corporate association, implying it can influence the subsidiary's operations, management, and financial decisions, even if the subsidiary operates independently.

Maritime company structures often involve multiple levels. A 50 percent test may misrepresent operational control, creating uncertainty about which entity must report or pay fees. To enable clear delegation and reporting planning, we encourage CARB to explicitly clarify reporting duties between parent and subsidiary entities. 009.9

Penalties, Exemptions, & Data

Each day during any portion of which a violation occurs is considered a separate offense, potentially resulting in surmounting penalties. In addition, failure to pay the full amount of any fee required constitutes a single, separate violation for each day without payment. With this structure, disputes over regulated status, such as whether a firm truly "does business" in California, could expose operators to per-day penalties while their applicability remains uncertain. To ensure entities are not penalized for circumstances beyond their control, such as delayed regulation guidance, we ask that CARB establish good-faith compliance protections. 009.10

The proposed regulation excludes insurers, non-profits, government entities, and entities whose California activity is limited to payroll or telework but provides no sector-specific relief for marine operators. Maritime is a unique industry that faces specialized practices, contractual obligations, safety requirements, and data constraints, yet the proposed regulation grants no tailored compliance pathway for this sector, even as CARB acknowledges exemptions elsewhere. We ask that CARB recognize marine-sector realities and offer credit for existing climate disclosures to reduce duplicative work. 009.11

Reported data gathered under SB 253 and SB 261 will be made publicly available to provide increased transparency and support the state's environmental planning efforts. AWO urges CARB to provide clarity on how the data collected will be used, as such disclosures could result in significant implications for the reporting entities. To avoid unintended consequences, we ask that CARB use the information to inform state emissions reduction initiatives and guide reduction strategies rather than as a punitive tool. Doing so will not only safeguard entities' operations but also support compliance and good faith efforts to reduce emissions and report transparently. 009.12

Timeline

SB 261 is currently enjoined pending appeal, meaning the Climate-Related Financial Disclosure Program is temporarily suspended. SB 261 requires companies to publish climate-related financial risk reports by January 1, 2026. While the public docket will remain open until July 1, 2026, the January 1 deadline places significant compliance pressure and creates uncertainty. If SB 261 is not overturned on appeal, we urge CARB to consider a reporting window, rather than a fixed date, to better reflect companies' differing fiscal years and reporting cycles. 009.13

Maritime businesses already face extensive federal environmental regulations promulgated by the Environmental Protection Agency and U.S. Coast Guard. Businesses still lack clear guidance and templates to prepare reports that meet California's requirements, and entities

must retain records proving that they do or do not meet the revenue and doing-business thresholds for five years. We ask that CARB pursue every opportunity to streamline the reporting required under SB 261 and provide supplemental draft regulations and templates as soon as possible to avoid confusion, clarify compliance, and make recordkeeping as easy to maintain as possible. Being mindful of the excessive delays and the burdensome nature of this reporting process, we urge CARB to consider a phased-implementation approach to allow entities ample time to develop compliance tools. 009.14

Conclusion

CARB's regulatory documents confirm that the proposed regulation is preliminary and focuses on definitions, fees, and an initial reporting deadline, with broader program details to follow. As the foundational framework for the SB 261 and SB 253 programs, this initial regulation underscores the importance of CARB finalizing the definitions, fee structures, and deadlines.

Thank you again for the opportunity to comment on the California Corporate GHG Reporting and Climate-Related Financial Risk Disclosure Programs' initial regulation. We appreciate CARB's consideration of our comments and would be pleased to answer any questions or provide further information to assist with your review and decision-making.

Sincerely,

Peter Schrappen
Pacific Region Vice President & Regional Team Lead

February 3, 2026

VIA ELECTRONIC FILING

California Air Resources Board (CARB)
Clerks' Office
1001 I Street
Sacramento, California 95814
Email: https://ww2.arb.ca.gov/lispub/comm/bclist.php

Re: Public Comment on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Members of the California Air Resources Board:

Neste submits this comment letter regarding the above-referenced Proposed Regulation establishing fees and a first-year reporting deadline for Health and Safety Code section 38532, more commonly known as SB 253. Neste is the world's largest producer of renewable diesel and SAF. Our operations in the U.S. include feedstock development, sourcing, and trading as well as fuel production, imports, and sales. We are proud to produce renewable diesel in California via our Martinez Renewables Joint Venture (JV), however SB 253 reporting for the biorefinery is managed by our JV partner Marathon. Neste has consistently been a partner in supporting California's ambitious climate goals, and we look forward to working with CARB on this rulemaking.

I. INTRODUCTION

Neste supports California's leadership in addressing climate change and the transparency goals underlying SB 253. We are committed to meaningful climate disclosure and eager to comply with reasonable, clear reporting requirements. However, the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation ("Proposed Regulation") and associated guidance documents establish compliance obligations that are fundamentally vague, contradictory, arbitrary, and unfair. These deficiencies will result in uneven treatment of similarly situated entities and undermine the very transparency goals the statute seeks to advance. 010.1

Specifically, the "good faith" compliance standard articulated in CARB's December 2024 Enforcement Notice ("Enforcement Notice") and the Proposed Regulation's Initial Statement of Reasons ("ISOR") creates a vague compliance framework. The Proposed Regulation compounds these problems by failing to clarify essential aspects of compliance, including fee obligations for non-reporting entities, the scope of "good faith" efforts, and corporate structure determinations. 010.2

Neste therefore urges CARB to consider pausing implementation of the first-year reporting deadline until comprehensive reporting guidance and regulations are developed or until ongoing litigation challenging the constitutionality of the statute is resolved, whichever is later. Such a pause would allow CARB to establish a fair, predictable, and legally sound compliance framework that achieves the statute's goals. Neste also encourages CARB to

establish a workgroup composed of reporting entities to ensure a smooth implementation of SB 253 reporting.

II. THE "GOOD FAITH" COMPLIANCE STANDARD IS VAGUE AND FUNDAMENTALLY INADEQUATE

A. The "Good Faith" Standard Lacks Necessary Specificity and Will Result in Unequal Treatment

The Enforcement Notice states that "CARB will exercise enforcement discretion for the first report due in 2026, on the condition that entities demonstrate good faith efforts to comply with the requirements of the law." The ISOR similarly explains that "CARB has indicated that it will exercise enforcement discretion for the first report due in 2026, allowing reporting entities to submit Scope 1 and Scope 2 emissions for their prior fiscal year based on information they already have or were collecting when this Notice was issued. Entities that were not collecting data or were not planning to collect data, at the time the Enforcement Notice was issued, are not expected to submit Scope 1 and Scope 2 reporting data for this first reporting cycle." 010.3

This "good faith" standard is fundamentally inadequate as a compliance framework for several reasons:

First, "good faith" is inherently subjective and will mean different things to different entities. Some companies will interpret this standard to require comprehensive data collection efforts across all operations, incurring substantial costs for data systems, consultants, and internal resources. Other companies will take a minimalist approach, providing only readily available data with limited verification. Without clear metrics or benchmarks, similarly situated companies will make vastly different compliance investments, creating competitive disparities and undermining the goal of comparable disclosure.

Second, regulated entities have no assurance against arbitrary future enforcement. While CARB characterizes this as "enforcement discretion," entities face significant legal and financial risk if CARB later determines their good faith efforts were insufficient. The Enforcement Notice provides no criteria for evaluating good faith, no safe harbors, and no examples of what would constitute adequate compliance. Entities making good faith compliance decisions in 2026 could face penalties years later when CARB retroactively applies different standards. This uncertainty defeats the purpose of the enforcement discretion.

Third, and most critically, there is a direct contradiction between the Enforcement Notice and the ISOR regarding who must comply. The Enforcement Notice states that CARB "will exercise enforcement discretion for the first reporting cycle, on the condition that entities demonstrate good faith efforts to retain all data relevant to emissions reporting for the entity's prior fiscal year." This language suggests all reporting entities must make good faith efforts to collect and retain relevant data for their prior fiscal year—defined in Proposed Section 96076 as fiscal year 2024-25 or 2025-26 depending on when the fiscal year ends.

However, the ISOR introduces an entirely different standard, stating: "Entities that were not collecting data or were not planning to collect data, at the time the Enforcement Notice was issued, are not expected to submit Scope 1 and Scope 2 reporting data for this first reporting

cycle." The ISOR repeats this formulation multiple times, making clear that entities not collecting data as of December 5, 2024—more than 20 months before the August 10, 2026 reporting deadline—have no compliance obligation whatsoever in the first reporting year, even though the Enforcement Notice had already put them on notice that they should begin undertaking good faith efforts at the time.

B. The Contradictory Guidance Creates an Arbitrary Tiered Compliance System

This guidance creates a three-tiered compliance system with fundamentally different obligations:

Tier 1: Entities that voluntarily collected Scope 1 and 2 data before December 5, 2024, must report that data by August 10, 2026.

Tier 2: Entities that had not been collecting data but had plans to collect data as of December 5, 2024, arguably must make "good faith efforts" to collect and report data, though the standard remains undefined. The ISOR lacks clarity in that it affirmatively states that it is allowing entities to report “based on information they already have or were collecting” when the Enforcement Notice was issued but then, in the next sentence, indicates that “planning to collect data” as of the Enforcement Notice date will result in a good faith compliance obligation. As a result of the inconsistency, some companies that were planning to collect data but had not yet collected data may reasonably sort themselves into Tier 2 or Tier 3. 010.7

Tier 3: Entities that were not collecting data and had no plans to collect data as of December 5, 2024, have no reporting obligation whatsoever in 2026.

This tiered system is arbitrary and directly penalizes entities that voluntarily undertook climate disclosure efforts prior to the statute's enactment. Companies that responsibly collected emissions data now face mandatory reporting obligations while less proactive competitors have no compliance obligations.

III. THE PROPOSED REGULATION FAILS TO ADDRESS FEE OBLIGATIONS FOR NON-REPORTING ENTITIES

The Proposed Regulation establishes a fee structure in Sections 96073 and 96074 that clearly applies to reporting entities—but it fails to clarify whether entities that do not report in the first year remain obligated to pay the implementation fee. This omission creates additional unfairness and inconsistency.

Section 96074(a) states that "Beginning in fiscal year 2026 and for each year thereafter, on or by September 10, the Executive Officer shall provide a written fee determination notice to each affected entity of the amount due." However, the regulation does not define "affected entity" in this context or specify whether entities exempt from first-year reporting under the good faith framework remain "affected entities" for fee purposes. 010.8

Basic principles of fairness dictate that **all entities meeting the statutory definition of "reporting entity" should pay the implementation fee regardless of whether they report in the first year.** As described in the ISOR, the fee is designed to recover CARB's costs for "implementing the programs established by sections 38532 or 38533 of the Health and Safety

Code, including personnel salaries and benefits, legal defense costs, and contracting expenses." These costs do not diminish simply because some entities do not report.

If entities that voluntarily collected data before December 2024 must both report and pay fees, while entities that did not collect data escape both obligations, the unfairness described above would be dramatically exacerbated. Entities that took voluntary climate action would effectively subsidize program implementation for entities that avoided such efforts. This outcome would be unjust and contrary to the polluter-pays principle that underlies much of California's environmental law.

CARB should consider pausing implementation until it can establish a fair fee structure that does not penalize voluntary climate disclosure efforts. Alternatively, if CARB moves forward with reporting and fee collection, at a minimum CARB must clarify that all reporting entities as defined in Section 96072(a)(11) must pay the implementation fee, regardless of first-year reporting status.

IV. THE SCOPE OF "GOOD FAITH EFFORTS" BEYOND DATA COLLECTION REMAINS UNCLEAR

The Enforcement Notice and ISOR focus exclusively on "good faith efforts" related to data collection. However, the Proposed Regulation does not clarify whether the good faith framework extends to other critical compliance determinations, particularly the identification of proper reporting entities and organizational boundaries.

Despite additional definitional guidance in Proposed Section 96072 regarding "Parent," "Subsidiary," and "doing business in California," determining the appropriate reporting entity remains a highly complex exercise for many corporate structures. Section 96072(a)(16) defines "Subsidiary" using six different indices of control based on Title 17, California Code of Regulations, section 95833. Section 96072(a)(10) defines "Parent" by reference to the same framework. These definitions require detailed analysis of ownership structures, voting rights, and control relationships across potentially dozens of affiliated entities. It also requires a detailed analysis of the relationships between related US-based and non-US-based entities with interdependent supply chains.

For Neste and many similarly situated entities, determining which subsidiaries, affiliates, and controlled entities must be included in Scope 1 and 2 reporting requires substantial legal and accounting analysis. Different reasonable interpretations of the control definitions could yield significantly different reporting boundaries. If the good faith framework extends only to data collection and not to organizational boundary determinations, entities could face penalties for reasonable but incorrect boundary decisions—even if they collected complete data for their reasonably chosen boundaries.

If the Proposed Regulation goes forward, CARB must clarify that good faith enforcement discretion extends to all aspects of first-year reporting, including:

- Determinations of which entities meet the "reporting entity" definition;
- Analysis of parent-subsidiary relationships and organizational boundaries;

010.9

- Interpretation of "doing business in California" requirements; and
- Decisions regarding inclusion or exclusion of specific operations or affiliates.

Without such clarity, the vague good faith standard creates liability exposure that will force entities to make overly conservative (and costly) boundary determinations or face potential enforcement risk for reasonable interpretations.

V. NESTE'S ANTICIPATED REPORTING APPROACH ILLUSTRATES THE NEED FOR ADDITIONAL GUIDANCE

Neste's corporate structure illustrates the practical challenges created by the Proposed Regulation's lack of clarity. **If the Proposed Regulation proceeds as currently drafted, Neste plans to report Scope 1 and 2 emissions data for its U.S.-based subsidiary only, even though the supply chain for that subsidiary is heavily intertwined with affiliated companies both within and outside the United States.**

Neste believes this approach represents a reasonable interpretation of its reporting obligations under the current regulatory framework. However, given the lack of detailed guidance, Neste cannot be certain this approach will satisfy CARB's eventual compliance expectations.

If Neste's intended approach is not appropriate, CARB should issue additional guidance well in advance of the August 10, 2026 deadline. Providing such guidance only months or weeks before the deadline, or after the deadline through post-hoc enforcement interpretations, would be fundamentally unfair and would undermine the transparency goals of the statute. 010.10

This example demonstrates why comprehensive reporting guidance must precede any enforceable compliance deadline. Without clear rules regarding organizational boundaries, transfer pricing, intercompany transactions, and allocation methodologies, entities cannot produce comparable, reliable disclosures regardless of their good faith efforts.

VI. THE APPROPRIATE PATH FORWARD:

Neste strongly supports climate disclosure and California's leadership in addressing climate change. We recognize the importance of transparent, reliable emissions reporting and are committed to meaningful compliance with reasonable regulatory requirements. 010.11

However, the problems identified above are not minor technical issues that can be resolved through clarifying FAQs or informal guidance. They represent fundamental deficiencies in the regulatory framework that make fair, consistent implementation impossible in 2026.

Neste therefore urges CARB to consider **pausing implementation of the first-year reporting deadline until:**

1. **Comprehensive reporting regulations are developed and adopted through a formal rulemaking process and with input from reporting entities**, including detailed specifications for: 010.12

- Organizational boundary determinations and consolidation approaches;
- Data collection, calculation, and estimation methodologies;
- Reporting formats and assurance requirements;
- Clear compliance examples and safe harbors;
- Transparent enforcement criteria.

2. **Ongoing constitutional litigation challenging SB 253 is resolved**, providing regulatory certainty regarding the statute's enforceability. 010.13

Whichever of these occurs later should trigger implementation.

This pause would serve multiple important purposes:

First, it would allow CARB to develop the complete regulatory framework contemplated by Health and Safety Code section 38532(c). That provision requires CARB to "adopt regulations to implement this section" by July 1, 2025, and then allows regulated entities to begin compliance "starting in 2026." The Proposed Regulation represents only the beginning of this rulemaking process, establishing fees and a single deadline but leaving vast portions of the regulatory framework undefined. It would be unfair for CARB to have missed its own deadline of July 1, 2025 but then turn around and insist that the 2026 deadline for others is immovable. The clear statutory intent of the time between the July 1, 2025 deadline and the 2026 reporting deadline was to give regulated parties time to prepare based on known final regulations. Completing this rulemaking before requiring compliance would fulfill this statutory purpose and ensure entities can make informed, consistent compliance decisions. 010.14

Second, a pause would eliminate the arbitrary tiered compliance system described above. Rather than penalizing entities that voluntarily collected data while excusing entities that did not, CARB could establish uniform requirements that apply fairly to all reporting entities once clear rules exist. It would ensure that all entities report and pay fees simultaneously.

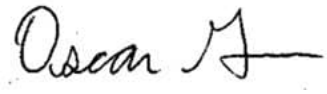
Third, delaying implementation pending litigation resolution would conserve both state and regulated entity resources. If courts ultimately determine that SB 253 is unconstitutional or must be significantly modified, compliance efforts made by some entities in 2026 may be wasted. Waiting for judicial clarity would ensure resources are invested in a legally sound program.

The ISOR acknowledges that "other program requirements, including, but not limited to, reporting and assurance requirements and enforcement provisions, will be developed and adopted through a subsequent rulemaking." If these fundamental requirements are not yet developed, it is premature to require compliance. CARB should complete its regulatory framework before establishing binding deadlines.

February 3, 2026

Neste appreciates the opportunity to comment on the Proposed Regulation and would welcome the opportunity to discuss these concerns with CARB staff.

Respectfully submitted,



Oscar Garcia
Senior Regulatory Affairs Manager
Neste US, Inc.

Jacqueline Moore (Jacqueline Moore)

On behalf of the members of the Pacific Merchant Shipping Association (PMSA), we submit the attached comments in response to the request for public feedback on California Air Resources Board's (CARB) proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Regulation (Regulation).

PACIFIC MERCHANT SHIPPING ASSOCIATION

February 5, 2026

Rajinder Sahota, Deputy Executive Officer
California Air Resources Board
1001 I St.
Sacramento, CA 95814
Submitted to the Electronic Docket and climatedisclosure@arb.ca.gov

RE: Comments on the Proposed Climate Data and Financial Risk Reporting Fee Regulation and Public Hearing - December 23, 2025

Dear Deputy Executive Officer Sahota,

On behalf of the members of the Pacific Merchant Shipping Association (PMSA), we submit the following comments in response to the request for public feedback on California Air Resources Board's (CARB) proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Regulation (Regulation). PMSA is a nonprofit trade association which represents owners and operators of U.S. and foreign flagged vessels, marine terminals, and maritime and goods movement businesses operating along the U.S. West Coast which will be impacted both directly and indirectly by the proposed Regulation.

PMSA appreciates the opportunity to comment on the proposed Regulation, and we respectfully submit these recommendations to CARB as staff further refine the proposed disclosure obligations, a subject matter which both the state and many regulated industries all have very little experience.

Climate Corporate Data Accountability Act – GHG Disclosure

Move the Deadline to Report to No Earlier Than December 31, 2026

While the proposed reporting deadline was delayed to August 10th, PMSA strongly recommends the reporting deadline be set to no earlier than December 31, 2026, and also allow entities to elect a reporting deadline consistent with a set period after the conclusion of their own fiscal year. Allowing up to 12 months after the close of a fiscal year is necessary in order to ensure adequate time to receive and compile the necessary data via internal sources and from third parties, then conduct QA/QC regarding these data streams, draft a report, and then complete the third-party assurance and verification process. A more realistic deadline provides adequate time for an entity to begin to undertake this extensive and complex exercise and provide the most accurate data with a high rate of confidence. 011.1

For example, in our industry, it takes the Ports of Long Beach and Los Angeles approximately 10 to 11 months to complete their respective annual emission inventories. These reports are the model

worldwide for the industry, have consistent methodologies, and have been honed over several decades of work; if it takes these experts 10 months to conduct such an exercise for well-understood and regularly executed emissions inventories for a set universe of local inputs with baseline accounting, then the time required to capture the complexities that will be experienced by the thousands of entities which have never undertaken these new and technically demanding efforts, including the integration of data from third-party sources around the globe without a universal accounting approach, will inevitably take much more time. .

As this is a disclosure statute, and not a performance standard, the speed of reporting should be less important than the accuracy and reliability of the disclosures.

Provide a Request Process for Extensions, Compliance Pathways for 3rd Party Delays, and a Safe Harbor

PMSA strongly urges CARB to incorporate into the proposed Regulation an extension for the reporting party acting to in good faith to comply. For example, if a delay is caused by the independent third-party who must be contracted with to provide the technical components of the assurance report a compliance extension should apply. Other compliance extensions should be considered when a reporting party experiences a delay in receiving data (especially scope 3) from a third-party, or experiences delays in consolidation efforts and enhancing data quality. If an entity is waiting on data from a supplier, for example, they should be provided additional time to receive and process these data. The alternative of submitting incomplete, presumption-based, or simply inaccurate reports to meet a deadline and then having to amend a report for corrections is not conducive for staff or the covered entities' time. A clear process to request such extensions is necessary and should be outlined in the proposed regulation.

011.2

Further, CARB should provide a safe harbor and affirmatively grant enforcement discretion for good faith efforts to comply and to provide a clear pathway for reporting entities to identify errors that are subsequently corrected without penalty, especially for the first five years as entities become familiar with the process.

011.3

Regulatory Fees

Annual Undetermined Fees Require Sufficient Payment Period of 90 days to Process

The proposed Regulation provides 60 days to pay the required fees upon receipt of a fee determination notice from CARB. As the fees are based on the program costs in a given fiscal year and the number of reporting entities, both of which can vary every year, an entity will be unable to accurately budget for such costs, which are expected to be in the thousands of dollars. As such, there

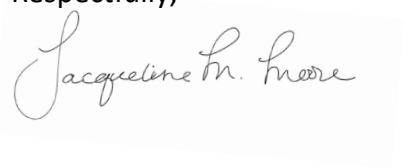
011.4

should be a process for any reporting entity to be granted additional time of a 90-day payment period upon request and without conditions, as these changes are likely to necessitate additional processes internally and then execution of payment. Further, late fees are proposed to be assessed, which are undetermined at this time, as well as a Payment Violation for each day after the payment period.

A 90-day payment window is to the benefit of both CARB and reporting parties. Providing an additional 90-day payment window, upon request, should allow sufficient time to fully process the fee payment and eliminate unnecessary enforcement activities.

PMSA appreciates the opportunity to comment on the significant and complex proposed climate disclosure Regulation. While we understand there will be further rulemaking on additional and more technical components of the regulation, we believe these administrative recommendations are critical to be incorporated at this time to set the regulation and stakeholders up for success and the most feasible path forward. Should there be any questions, please do not hesitate to contact PMSA at jmmoore@pmsaship.com.

Respectfully,



Jacqueline M. Moore
Vice President

California Public Employees' Retirement System (CalPERS) (Marcie Frost)

See attached

California Public Employees' Retirement System
Executive Office
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Chair Lauren Sanchez
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Submitted electronically at **https://ww2.arb.ca.gov/lispub/comm/bclist.php**

February 6, 2026

Subject: Proposed California Corporate Greenhouse Gas Reporting and Climate-related Financial Risk Disclosure Initial Regulation

Dear Chair Sanchez and Staff,

012.1 On behalf of the California Public Employees' Retirement System (CalPERS), I am writing to express our continued support for the implementation of SB 253 and SB 261, as amended by SB 219, and our appreciation for the California Air Resources Board's (CARB) solicitation of feedback to inform the proposed initial regulation. The implementation of these statutes will provide institutional investors, consumers, and policy makers with a consistent source of valuable emissions and climate-related financial risk reporting data and allow investors to address such risk through asset allocation, voting, or engagement.

As the largest public defined benefit pension fund in the United States, CalPERS manages approximately $600 billion in global assets on behalf of nearly 2.4 million members. We seek long-term and sustainable returns through efficient capital allocation and stewardship in line with our fiduciary duty.

We are guided by CalPERS' Investment Beliefs which recognize that "Long term value creation requires effective management of three forms of capital: financial, physical and human." Fulfilling the retirement promises made to our members requires fair, accurate, timely, and assured reporting on how companies manage their financial, physical, and human capital to generate sustainable returns. It also requires clear information about how they identify, monitor, and mitigate risks to those three forms of capital.

CalPERS has advocated for increased transparency on climate risk and portfolio company emissions for more than a decade. 012.2 We believe that companies should disclose consistent, comparable, and reliable information in regulatory reports to help shareowners more easily

identify, assess, and manage climate risk and opportunity, and to better understand the full financial implications of climate-related data.

012.3 The actions CARB is taking will help ensure consistent, comparable, reliable, and decision-useful information for companies and investors navigating diverse reporting requirements.

Climate change is a global challenge and as long-term investors, with inviolable fiduciary duty to our members, we cannot afford to ignore its effects upon our investments that we rely upon to generate the returns that pay benefits.

Please find our responses to CARB's proposed initial regulation as documented in Article 6: California Climate Disclosures. Thank you for your consideration.

Subarticle 1: General Requirements for California Climate Disclosures Reporting
§ 96201. Applicability.

We appreciate the clearer guidance on applicability and specifically on the clarification that the article does not apply to the following entities:

012.4 *(1) Non-profit or charitable organizations that are tax-exempt under the Internal Revenue Code;*

(2) A business entity that is subject to regulation by the Department of Insurance in this state, or that is in the business of insurance in any other state;

(3) Federal, state, and local government entities, and companies that are majority-owned by government entities (>50.00%);

(4) A business entity whose only activity within California consists of wholesale electricity transactions; and

(5) A business entity whose only business in California is employee compensation or payroll expenses, including teleworking employees.

Subarticle 2: Fees
§ 96203. Calculation of Fees.

Based on the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation staff report, both parent and subsidiary companies will be required to pay fees if they individually meet the applicability criteria. The fee calculation section states that the fee is a flat amount assessed across "all entities in scope" and does not list an exemption for subsidiaries of paying parent companies. It also states that this fee structure across

012.5 all entities in scope was proposed "to reduce administrative burden associated with calculating, verifying, and managing a variable fee."

While we agree with the spirit of this proposal to reduce such burdens, we believe the fee structure does not take into consideration the administrative burden of large and complex entities that may have dozens of subsidiaries. Through our engagement with publicly traded companies, we have noted that the administrative burden of assessing all subsidiaries on an annual basis is significant. In

fact, the costs of administration and assessment for these companies can exceed the cost of the aggregated subsidiary fees themselves.

We believe that fees should only be assessed at parent company entities or for entities that file a report. We expect most companies to file an aggregate report at the parent company level, that incorporates its subsidiaries and therefore should only be assessed a fee as one entity. The statute requires fees to cover the "actual and reasonable costs" of administration. If a parent entity files one consolidated report, CARB staff only reviews/audits one document. Charging 50 separate fees for 50 subsidiaries when only one report is filed creates a "revenue-to-cost" mismatch rather than aligning fees with the actual work CARB performs (reviewing one report). Additionally, SB 219 explicitly amended the law to allow for consolidated reporting at the parent level. The fee structure should mirror the reporting structure. If the legislature recognized that consolidated reporting is sufficient for transparency, the fee structure should reflect that same unit of compliance.

012.6

If CARB dismisses the suggestion above, we believe that CARB should place a cap, e.g., 10, on the number of subsidiary entities that would pay a fee for any parent company.

012.7

If CARB also dismisses the above "cap" option, then CARB should allow for a Tiered Consolidation Fee. This would significantly reduce the administrative burden for complex companies while still providing the fee revenue expected by CARB. For example, if a parent entity estimates that it has between 50 and 100 in scope entities, it could opt to pay for the 100-fee tier. This allows the entity to satisfy its obligation without the burdensome assessment of determining whether it has a precise number of fee eligible entities between 50 and 100.

012.8

Thank you for the opportunity to share our comments. Please do not hesitate to contact Travis Antoniono, Investment Director, Sustainable Investments, at (916) 795-2238, or Danny Brown, Chief of our Legislative Affairs Division, at (916) 795-2565, if we can be of any assistance.

Sincerely,

Marcie Frost
Chief Executive Officer

TransAlta Energy Marketing U.S. (TEMUS) (Denelle Peacey)

TransAlta Energy Marketing U.S. (TEMUS) appreciates the opportunity to submit comments on the California Air Resources Board's (CARB) Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation as proposed on December 23 2025. TEMUS, a wholly owned subsidiary of TransAlta Corporation, is wholesale power marketer and an active market participant and electricity importer in the California electricity market.

TEMUS strongly supports the exemption in the draft regulation of business entities whose only activity within California consists of wholesale electricity transactions under §96071(b)(5). This section provides much needed clarity as to the status as covered entities of electricity importers into the CAISO.

As pointed out in previous comments, this exemption upholds the intention of the authors of the Climate Disclosure legislation since electricity importers are already covered entities under CARB's Mandatory Reporting of Greenhouse Gas Emissions regulation. Electricity imports are a vital component of the continued reliability of the CAISO for California consumers, and it is important that the regulation does not create a barrier to these energy flows as over the past five years (2024-2020) peak net imports have contributed a minimum of 20% to peak demand in California. 013.1

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Senior Regulatory Advisor
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Email: Denelle_Peacey@TransAlta.com

February 9, 2026

Attention: California Air Resources Board (CARB)

Re: TransAlta's Comments on California Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs

TransAlta Energy Marketing U.S. (TEMUS) appreciates the opportunity to submit comments on the California Air Resources Board's (CARB) Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation as proposed on December 23 2025. TEMUS, a wholly owned subsidiary of TransAlta Corporation, is wholesale power marketer and an active market participant and electricity importer in the California electricity market.

TEMUS strongly supports the exemption in the draft regulation of business entities whose only activity within California consists of wholesale electricity transactions under §96071(b)(5). This section provides much needed clarity as to the status as covered entities of electricity importers into the CAISO.

As pointed out in previous comments, this exemption upholds the intention of the authors of the Climate Disclosure legislation[1] since electricity importers are already covered entities under CARB's Mandatory Reporting of Greenhouse Gas Emissions regulation. Electricity imports are a vital component of the continued reliability of the CAISO for California consumers, and it is important that the regulation does not create a barrier to these energy flows as over the past five years (2024-2020) peak net imports have contributed a minimum of 20% to peak demand in California.[2] 013.2

Yours truly,

TRANSALTA USA INC.

Denelle Peacey, MA (Economics), CFA
Senior Regulatory Advisor

[1] California Legislature 2023-24, Senate Daily Journal 3058, (Jan. 30, 2024)
[2] https://www.caiso.com/library/key-statistics

Watershed

Chair Liane M. Randolph
California Air Resources Board
1001 I Street
Sacramento, CA 95814

5 February 2026

Re: Comments on Initial Proposed Regulation for SB 253 and SB 261
Submitted via CARB public docket

Dear Chair Randolph and Members of the Board,

Watershed appreciates the California Air Resources Board's continued leadership in implementing the Climate Corporate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Act (SB 261). We support both the purpose of these statutes and CARB's decision to move forward with implementation in 2026 through the initial proposed rulemaking. 014.1

Watershed is a global climate platform supporting 700+ organizations to measure, disclose, and manage greenhouse gas emissions and climate-related risks in line with global standards. We work with hundreds of companies already preparing for compliance with California's requirements alongside other mandatory and voluntary regimes. Our comments below reflect what we see working in practice as disclosure shifts from voluntary to mandatory.

Overall, we welcome CARB's staged approach: establishing administrative foundations now, while reserving substantive reporting requirements for future rulemaking. We have provided specific comments on individual points, based on priority. 014.2

1. Reporting deadline for emissions: Watershed supports CARB's proposed August 10, 2026 deadline for first-year Scope 1 and Scope 2 reporting under SB 253.

In our experience, initial disclosure of Scope 1 and 2 emissions is achievable within this timeframe for large companies, particularly where reporting is based on best-available data rather than fully assured, audit-ready outputs. Year one should focus on establishing a credible baseline and normalising emissions disclosure as a standard corporate obligation. Practical challenges in 2026 are better addressed through clear enforcement guidance and flexibility, rather than by delaying the reporting deadline itself, which risks undermining momentum and creating incentives for further deferral. 014.3

Looking ahead, we support CARB considering greater flexibility in future reporting cycles once baseline disclosure is established. As assurance requirements expand and Scope 3 reporting is phased in, moving reporting deadlines towards later in the calendar year may be appropriate. Providing clarity on the intended evolution of reporting timelines beyond 2026 would help companies plan investments in systems, controls, and assurance in a predictable and orderly way.

2. Enforcement discretion and first-year clarity: we support CARB's intent to exercise enforcement discretion in 2026, though the current guidance would benefit from greater clarity. 014.4

As framed today, expectations risk being uneven: companies that began preparing early appear more clearly obligated to submit, while those that delayed may effectively face no expectations in year one. Similarly, it remains unclear whether assurance is optional for all, or expected if received before, creating uneven reporting obligations.

We encourage CARB to provide clear, written guidance on:

- What constitutes a good-faith submission in 2026;
- Whether assurance is optional for all companies; and
- How expectations will be applied consistently across reporting entities.

3. Applicability and exemptions: we encourage CARB to reconsider a blanket exemption for insurance companies under SB 253.

014.5

While insurers are subject to other climate-related disclosure requirements, those frameworks do not consistently deliver comprehensive emissions transparency—particularly for indirect (Scope 3) emissions, which often represent the majority of insurers' climate impact. Exempting insurers from SB 253 risks leaving a material gap relative to the statute's objectives.

Thank you for consideration of these comments. We support the work CARB is doing, appreciate the opportunity to participate in the rulemaking process, and remain available to support CARB's ongoing work.

Rob Chesnut
General Counsel, Watershed

Columbia Law School | COLUMBIA CLIMATE SCHOOL
SABIN CENTER FOR CLIMATE CHANGE LAW

February 5, 2026

Clerk of the Board, California Air Resources Board
1001 I Street
Sacramento, California 95814

Re: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

To Whom it May Concern:

Columbia Law School's Sabin Center for Climate Change Law ("Sabin Center") respectfully submits this comment in response to the December 23, 2025 Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation, from the California Air Resources Board ("CARB").[1]

The Sabin Center develops legal techniques to fight climate change and advance climate justice, trains students and lawyers in their use, and provides the public with resources on key topics in climate law and regulation.

Introduction

We write to commend CARB on its prompt and rigorous implementation of SB 253's and SB 261's statutory mandate, as well as to respectfully recommend one revision to the December 9, 2025 proposed Climate Data and Financial Risk Reporting Fee Regulation. We encourage CARB not to exempt insurers from emissions reporting under Health and Safety Code section 38532. 015.1

In particular, we wish to reinforce the California state legislature's emphasis on mandatory, uniform, and quantitative emissions-reporting frameworks for addressing today's climate risks.[2]

[1] Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation (Dec. 23, 2025).
[2] SB-253 Climate Corporate Data Accountability Act (Oct. 7, 2023) ("The current approach for disclosure of climate emissions from public and private corporate enterprises relies largely on voluntary reporting of GHG inventories, goals, commitments, and agreements, and lacks the full transparency and consistency needed by residents and financial markets to fully understand these climate risks").

Voluntary reporting, for instance through the National Association of Insurance Commissioners' ("NAIC") discretionary policy on Scope 3 data, may provide a stopgap in commercial contexts lacking the regulatory authority or political support for more substantive disclosure requirements. However, CARB, one of the nation's premier emissions regulators, here possesses strong support and arguably an obligation to fulfil the state legislature's mandate that "[t]he people, communities, and other stakeholders in California, facing the existential threat of climate change, have a right to know about the sources of carbon pollution, as measured by the comprehensive GHG emissions data of those companies benefiting from doing business in the state, in order to make informed decisions."[3]

015.2

The academic literature on climate-era disclosure regimes helps explain what makes a public mandate so crucial to reducing insurance-industry emissions. The California legislature's decision to expressly exempt insurers from Section 38533 coverage, but not from Section 38532 coverage, further clarifies this mandate. The fact that more than 80% of a typical insurer's emissions, via Scope 3 activities such as underwriting and investment, need not be disclosed under current industry self-regulation amplifies the need for this mandate. And the legislature has determined that CARB should administer this particular emissions-disclosure mandate, regardless of whether the state's Department of Insurance also measures insurers' climate risks.

1. The Relevant Academic Literature Calls for Mandatory Insurance Industry Emissions Disclosure

Empirical research confirms that insurers' climate-related disclosures prompt statistically significant emissions reductions. Cheng et al. (2024) use states' incremental adoption of the NAIC's Climate Risk Disclosure Survey ("CRDS") to examine the impacts of mandatory climate risk disclosures on insurers' investment portfolios.[4] The authors find that, post-disclosure, CRDS-compliant insurers decreased their fossil fuel investments by an average of 13.1%.[5] This study suggests that, when required to disclose their climate risk, insurers "significantly adjust their investment strategies toward more environmentally responsible investments."[6] The authors note distinct characteristics of the insurance sector that contribute to meaningful emissions outcomes, such as: the industry's total financial assets of roughly $9 trillion dollars[7]; its search for high returns to fund ongoing business operations, including payouts to claimants; and its "investment choices that can exacerbate climate change" (here pointing to the industry's substantial holdings in fossil fuel related assets).[8]

015.3

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[3] *Id*.
[4] Jiang Cheng, Jia Guo, Jeffrey Ng, and Tjomme Rusticus, The Effect of Mandatory Climate Risk Disclosure on Environmentally Responsible Investing: Evidence from the U.S. Insurance Industry, HKU JOCKEY CLUB ENTERPRISE SUSTAINABILITY GLOBAL RESEARCH INSTITUTE PAPER SERIES, 1 (2024), https://ssrn.com/abstract=4771738.
[5] *Id.* at 14.
[6] *Id*. at 3.
[7] Michelle Wong, *U.S. Insurance Industry's Cash and Invested Assets Rise Over 5% to Close in on $9 Trillion as of Year-End 2024*, NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS (May, 2025), https://content.naic.org/sites/default/files/capital-markets-special-reports-asset-mix-ye2024.pdf.
[8] Cheng et al., *supra* note 4, at 2.

More broadly, academic research in the U.S.,[9] the U.K.,[10] and France[11] shows that climate risk disclosures by corporations and investment funds can prompt notable GHG emissions reductions. Mandatory, quantitative, and uniform disclosures (of the type that the NAIC's Climate Risk Disclosure Survey requires for Scopes 1 and 2, but not for Scope 3) tend to yield more meaningful reductions than voluntary, qualitative, or open-ended disclosures.[12] The reductions can be significant, with covered U.K. companies reducing emissions by more than 15% relative to their non-covered peers,[13] and with French institutional investors reducing aggregate portfolio emissions by over 30% upon entering Article 173 compliance (which requires detailed reporting by French institutional investors of their exposure to climate-related risks, and their efforts to mitigate climate change).[14] These reductions may be further enhanced if the data is subject to third-party assurance reports— improving data accuracy, and limiting distortive framing in a firm's self-presentation of its emissions record.[15]

2. Voluntary Emissions Disclosure via Insurance Industry Organizations Does Not Suffice for Addressing Today's Climate Risks

Voluntary emissions reporting shows some promise of reducing emissions. Yet the academic literature suggests that voluntary regimes underperform mandatory regimes. Research also shows significant variation depending on the industry in which a firm operates. Most notably, voluntary regimes appear to work best in sectors perceived as heavy-emitting by the public— typically manufacturing-based sectors, rather than service-based sectors such as insurance, where emissions occur primarily as a consequence of underwriting and investment practices.

015.4

Kim and Lyon (2011) research the emissions impacts of the U.S. Department of Energy's ("DOE") voluntary registry program, which permits companies to file their claimed GHG emissions reductions. To measure the accuracy of these disclosures, Kim and Lyon also compare voluntary DOE-reported data to the required emissions reporting of electric utility companies, since those companies must report to the Federal Energy Regulatory Commission ("FERC").[16] The study finds a large gap between voluntarily reported emissions and actual emissions, with 68% of firms that voluntarily reported emission reductions to DOE reporting actual emission

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[9] Sorabh Tomar, Greenhouse Gas Disclosure and Emissions Benchmarking, 61 JOURNAL OF ACCOUNTING RESEARCH, 451, 467 (2023).
[10] Benedikt Downar, Jürgen Ernstberger, Hannes Rettenbacher, Sebastian Schwenen, and Aleksandar Zaklan, Fighting Climate Change with Disclosure? The Real Effects of Mandatory Greenhouse Gas Emission Disclosure, 1795 DIW BERLIN DISCUSSION PAPER 1, 2 (2019), https://ssrn.com/abstract=3352390.
[11] Jean-Stéphane Mésonnier and Benoît Nguyen, Showing off Cleaner Hands: Mandatory Climate-Related Disclosure by Financial Institutions and the Financing of Fossil Energy, 2 (2022), https://ssrn.com/abstract=3733781.
[12] Cynthia A. Williams, Does Climate Disclosure Work to Reduce Greenhouse Gas Emissions? Emerging Evidence Suggests Cautious Optimism, 48 SEATTLE U. L. REV. 571, 577 (2025).
[13] Downar et al., *supra* note 10, at 4; Valentin Jouvenot and Philipp Krueger, Mandatory Corporate Carbon Disclosure: Evidence from a Natural Experiment 1 (July 13, 2021), https://ssrn.com/abstract=3434490.
[14] Mésonnier and Nguyen, *supra* note 11, at 2.
[15] Lily Hsueh, Do Businesses that Disclose Climate Change Information Emit Less Carbon? Evidence from S&P 500 Firms, 13 CLIMATE CHANGE ECONOMICS, 1 (2022).
[16] Eun-Hee Kim and Thomas Lyon, Strategic Environmental Disclosure: Evidence from the DOE's Voluntary Greenhouse Gas Registry, Journal of Environmental Economics and Management, 311 (2011).

increases to FERC.[17] This suggests that such firms "viewed the [voluntary DOE] program as a form of greenwash."[18]

Hsueh (2022) compares S&P 500 corporations' voluntary Carbon Disclosure Project ("CDP") reporting between 2011 and 2016 to verified emissions data, finding company-wide emissions mostly unchanged (or in some cases increasing) following the adoption of CDP disclosures. [19] Participants who voluntarily reported taking additional steps to implement carbon management practices increased total carbon emissions by approximately 2.4%.[20] Some sectoral heterogeneity also emerged, with non-GHG-intensive sectors and consumer-oriented sectors more likely to claim inaccurate emissions reductions, whereas companies in GHG-intensive sectors showed actual company-wide reductions after opting into the CDP.[21] Hsueh attributes the emissions reductions of "dirtier" industries to enhanced scrutiny by regulators, politicians, and the public.[22] By contrast, industries with cleaner reputations engaged in reporting practices and related rhetoric that stakeholders were less able or inclined to verify.

Overall, the empirical findings on voluntary GHG emissions disclosures suggest that such regimes should be pursued when necessary, but should be replaced by a transparent and uniform regulatory mandate when legally and politically possible. The political will here is clear, and we encourage CARB to follow the California legislature's lead by not exempting insurers from Section 38532 coverage.

3. Mandatory Scope 3 Reporting Will Fill a Critical Gap in Insurance Industry Self-Reporting

We recognize that CARB's implementation timeline for SB 253 has not yet necessitated providing a detailed definition of reporting entities' Scope 3 obligations. However, this forthcoming Scope 3 focus will only further clarify the importance of including insurance-industry data.[23]

015.5

Given the U.S. insurance industry's roughly $9 trillion in assets, insurers' vast Scope 3 emissions have direct bearing on climate risk outcomes for the state's broader economy and its social well-being.[24] Yet voluntary reporting regimes have not provided sufficient disclosure of these emissions.

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[17] *Id.* at 320.
[18] *Id.* at 311.
[19] Hsueh, *supra* note 15, at 5.
[20] *Id.* at 18.
[21] *Id*. at 23.
[22] *Id.* at 5.
[23] *Underwriting the Transition: A Deep-Dive Transition Plan Guide for Insurance and Reinsurance Underwriting Portfolios*, FORUM FOR INSURANCE TRANSITION TO NET ZERO (July, 2025), https://www.unepfi.org/wordpress/wp-content/uploads/2025/07/2nd-FIT-Transition-Plan_Final.pdf provides useful guidance on calculating Scope 3 emissions for this sector.
[24] Wong, *supra* note 7.

The World Resource Institute's GHG Reporting Protocol, which supplies accounting standards for 97% of S&P 500 companies participating in the voluntary Carbon Disclosure Project,[25] notes that "equity investments made by insurance companies using insurance premiums are required to be reported (although companies may establish a threshold for equity investments)." Yet CERES' 2025 publication *The Measurement Gap: A Deep Dive into Climate Risk Reporting in the U.S. Insurance Sector* finds that the insurance industry's reporting performance "remains extremely limited; with near-zero compliance…for financed emissions targets and negligible response rates for most other scope 3 categories." CERES further explains that Scope 3 sources represent "simultaneously the greatest challenge and the most significant opportunity for insurance industry climate risk management leadership," given that emissions from investing and underwriting practices account for 80-90% of a typical insurers' GHG footprint.[26]

With disclosure of such noteworthy Scope 3 emissions lagging under voluntary reporting frameworks, retaining insurers in CARB's Section 38532 coverage is crucial to providing the "people, communities, and other stakeholders in California," the "right to know about the sources of carbon pollution, as measured by the comprehensive GHG emissions data of those companies benefiting from doing business in the state." 015.6

4. The Department of Insurance Is Not Positioned to Fulfill SB 253's Mandate

In its December 9, 2025 Statement of Reasons for these drafted regulations, CARB notes that since SB 261 already excludes from coverage business entities subject to regulation by California's Department of Insurance ("CDI"), CARB now proposes to exclude such entities from Section 38532 coverage as well, "for continuity."[27] Respectfully, we submit that preserving SB 253's broad statutory scope provides a more fitting means of maintaining "continuity" in implementing the state's legislative mandate—rather than imposing SB 261's express exemption for insurers onto SB 253, which declines to offer any such exemption.[28] 015.7

We appreciate CDI's ongoing efforts to proactively address climate risk, including through its pending Long-Term Solvency Regulation, proposed October 28, 2025.[29] Yet we would highlight for CARB's consideration that CDI's proposed regulation does not require emissions-data disclosure, but instead focuses on insurers' long-term business risks and mitigation strategies.

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[25] GHG Protocol, Category 15: Investments, WORLD RESOURCES INSTITUTE.
[26] *The Measurement Gap: A Deep Dive into Climate Risk Reporting in the U.S. Insurance Sector*, CERES (Aug. 12, 2025), https://www.ceres.org/resources/reports/the-measurement-gap-a-deep-dive-into-climate-risk-reporting-in-the-us-insurance-sector.
[27] Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation (Staff Report: Initial Statement of Reasons) (Dec. 9, 2025).
[28] *California Climate Disclosure Laws: Recent Developments,* DEBEVOISE & PLIMPTON (Nov. 15, 2024), https://www.debevoise.com/-/media/files/insights/publications/2024/11/california-climate-disclosure-laws-recent.pdf notes that California's Senate Committee on Environmental Quality exempted insurers from SB 261 coverage in order to avoid "'double-reporting'" scenarios, given NAIC's existing disclosure standards. Regarding SB 253's emissions data, however, it is worth reinforcing that NAIC's Climate Risk Disclosure Survey leaves Scope 3 reporting voluntary, and that roughly 20 states, comprising roughly 15% of the U.S. insurance market, still do not participate in the survey, even for Scopes 1 and 2 reporting.
[29] Long-Term Solvency Planning (Workshop Text of Regulation), (Oct. 28, 2025).

Though important for assessing insurers' capacity to pay claims,[30] the documentation (not necessarily even disclosure) of these particular data points falls far short of SB 253's mandate to proactively inform the "people, communities, and other stakeholders in California…about the sources of carbon pollution, as measured by the comprehensive GHG emissions data of…companies."

We have also previously commended CDI for its Climate Risk Carbon Initiative and related climate disclosure initiatives.[31] However, these disclosures regarding insurers' fossil fuel investments fulfill a different function than SB 253's cross-sector reporting of emissions data by a wide range of businesses. Cross-sector reporting facilitates the public's capacity to track divergent emissions trends across the state's economy, to determine which industries have lagged in meaningful sustainability measures, and to promote appropriately tailored policy responses (or, as SB 253 put it, "to make informed decisions"). Here especially, uniform emissions reporting by numerous economic sectors proves valuable to investors seeking to assess which industries and businesses deserve their targeted support. 015.8

Conclusion

CARB should revise its drafted regulations for Health and Safety Code section 38532, preserving coverage of insurers. Empirical research shows mandatory, uniform, and quantitative emissions disclosures prompt the greatest emissions reductions. By expressly exempting insurers from Section 38533 coverage, but not from Section 38532 coverage, the legislature indicated its intent that Section 38532 cover insurers. Voluntary disclosure initiatives for insurers' especially extensive Scope 3 emissions have proved ineffective at promoting compliance. Finally, the legislature has determined that CARB, rather than CDI, should administer this disclosure mandate. 015.9 015.10 015.11

Thank you for the opportunity to provide comments. Please do not hesitate to contact the Sabin Center with any questions.

Respectfully submitted,

Cynthia Hanawalt, Director of Climate and Business Law
Andy Fitch, Fellow, Climate and Business Law

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[30] *"Expect the Unexpected": Commissioner Lara Moves to Safeguard Californians' Financial Future With New Regulation,* CALIFORNIA DEPARTMENT OF INSURANCE (Oct. 28, 2025), https://www.insurance.ca.gov/0400-news/0100-press-releases/2025/release073-2025.cfm.

[31] Cynthia Hanawalt and Andy Fitch, Comment Letter on PreNotice Public Discussion on Long-Term Solvency Planning from the California Department of Insurance (Nov. 12, 2025), https://climate.law.columbia.edu/sites/climate.law.columbia.edu/files/content/Comment%20On%20California%20Department%20Of%20Insurance%20Prenotice%20Public%20Discussion%20on%20Long-Term%20Solvency%20Planning%20%2811.12.2025%29.pdf.

The Climate Registry (Amy Holm)

Please find attached for The Climate Registry's (TCR) comments in response to the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation. Thank you very much for your consideration.

THE CLIMATE REGISTRY

February 9, 2026

Sydney Vergis, Ph.D., Assistant Division Chief
Industrial Strategies Division
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dr. Vergis and CARB staff,

The Climate Registry (TCR) appreciates the opportunity to provide comments on the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation. The Climate Registry is a leader in credible greenhouse gas (GHG) reporting and disclosure. Founded in 2007 by 63 North American states, provinces, and territories to scale up the work of the California Climate Action Registry (created by California legislation in 2001), TCR brings more than two decades of expertise in preparing states and reporters for GHG regulation. This combination of technical rigor, capacity building support, and public disclosure is unmatched among GHG registries.

016.1 TCR strongly supports the California Air Resources Board's (CARB) ongoing efforts to develop and implement the Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure programs, as mandated by SB 253 and SB 261. 016.2 We view the proposed initial regulation as a foundational milestone in establishing a transparent and robust climate reporting system in California. CARB's proposed fee structure is an appropriate mechanism to recover the reasonable costs of implementing and administering the SB 253 and SB 261 programs. 016.5 Adequate and stable funding is essential to support program integrity, data quality, and consistent administration over time.

016.3 TCR commends CARB's steady progress and underscores the importance of maintaining this momentum. Consistent progress in these early stages will ensure the long-term scalability and efficacy of the programs. We are encouraged by this forward movement and support the continued efforts to efficiently and effectively establish these programs.

016.4 TCR values CARB's ongoing consideration of stakeholder feedback throughout this process. We look forward to staying engaged as additional portions of the regulations are developed and welcome opportunities to share additional insights from TCR's expansive experience in GHG reporting and disclosure.

Sincerely,

Amy Holm
Executive Director
The Climate Registry

600 Wilshire Blvd., Suite 202 · Los Angeles, CA 90071 · phone 866-523-0764 · fax 213-623-6716
www.theclimateregistry.org

Mequela Moreno (Mequela Moreno)

I appreciate the opportunity to provide public comment on CARB's implementation of SB 253, the Climate Corporate Data Accountability Act. I am submitting this comment on behalf of ECOncrete, a company that works in coastal and marine infrastructure where both greenhouse gas emissions and ecological outcomes are material considerations.

SB 253 is a critical step toward transparency in corporate climate reporting, particularly for Scope 3 emissions associated with capital goods and construction activities. For infrastructure-intensive sectors such as ports, transportation, energy, and coastal development, embodied emissions from construction materials represent a significant portion of Scope 3 emissions. However, these same infrastructure assets also interact directly with California's coastal and marine ecosystems for decades. 017.1

As CARB develops Scope 3 reporting guidance, I urge the Board to explicitly recognize habitat creation and ecological performance as relevant contextual information for long-lived infrastructure assets. While habitat creation does not replace greenhouse gas accounting or emissions disclosure, it is a meaningful component of value-chain impact and climate risk assessment. Infrastructure materials deployed in marine environments can either degrade ecosystems or actively support habitat formation, biodiversity, and ecological resilience.

Manufacturers and project developers increasingly generate quantitative data on biological colonization, habitat complexity, and ecological performance associated with infrastructure materials. Allowing companies to reference this information alongside Scope 3 emissions disclosures would improve the quality and completeness of climate-related reporting, particularly for assets located in climate-vulnerable coastal zones. This approach aligns with California's broader climate, biodiversity, and resilience goals and reflects the reality that emissions impacts and ecological outcomes are interconnected for coastal infrastructure. 017.2

I encourage CARB to provide guidance that enables companies to disclose embodied emissions while also transparently describing habitat creation and ecological performance associated with long-lived capital goods. Doing so will strengthen SB 253 implementation by ensuring disclosures reflect not only emissions quantities, but the real-world environmental consequences of infrastructure investment decisions.

Thank you for the opportunity to comment and for CARB's continued leadership in advancing climate accountability and environmental stewardship.

Society for Corporate Governance (Randi Morrison)

Dear Ladies & Gentlemen,

Please see attached letter on behalf of the Society for Corporate Governance.

Kind regards,

Randi Val Morrison
General Counsel & Chief Knowledge Officer

February 6, 2026

Lauren Sanchez
Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Submitted Electronically via CARB Internet Comment Form and climatedisclosure@arb.ca.gov

Re: Comment Letter in Response to CARB's **Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation**

Dear Chair Sanchez:

The Society for Corporate Governance ("Society") submits this letter in response to the California Air Resources Board's ("CARB") request for comments on the proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation ("Proposed Regulation") to implement California's climate disclosure legislation, Senate Bill 253 ("§ 38532") (codified in Health & Safety Code § 38532) and Senate Bill 261 ("§ 38533") (codified in Health and Safety Code § 38533), as amended by Senate Bill 219 ("SB 219").[1]

We appreciate the opportunity to engage with CARB on outstanding areas of concern regarding Health and Safety Code § 38532 and § 38533. In advance of the February 26, 2026, CARB Board hearing to consider the Proposed Regulation, we hope CARB will update its rulemaking based on our recommendations, which not only advance the stated objectives of the legislation, but also offer constructive solutions to address important areas of misalignment between the Proposed Regulation and the practical realities for reporting companies. We believe that it is crucial for CARB to address these areas to avoid jeopardizing the credibility and implementation of Health and Safety Code § 38532 and § 38533.[2]

In that spirit and in view of the upcoming CARB Board hearing, we have focused this comment letter on items we believe must be resolved in the near term to promote the foregoing objectives:

- CARB's approach for establishing the covered year for GHG emissions reporting under § 38532
- Timing of greenhouse gas (GHG) emissions reporting under § 38532
- Proposed fee structure and timing
- Codification of exemptions to applicability for purposes of 2026 and ongoing reporting
- Codification of relief and reconciliation with text of § 38532 for 2026 reporting
- Concerns related to the rulemaking process

The concerns we have previously expressed to CARB regarding the implementation of § 38532 and § 38533 have encompassed a wider range of issues. We have not reiterated many of these concerns in this

[1] References to SB 253 and SB 261 are to their amended versions per SB 219. This letter also references California Health & Safety Code § 38532 and § 38533, in which SB 253 and SB 261 are respectively codified.
[2] § 38532 identifies among its stated objectives GHG emissions data transparency, accuracy, comprehensiveness, and consistency, along with minimizing duplication of effort and supporting interoperability for reporting entities.

comment letter in the interest of time, but encourage CARB to review our prior submissions,[3] as many of these issues remain important to our reporting companies. Notably, except as relevant to the discussion about fees in Section IV, this letter does not include a discussion about the definition of "doing business in California" under Health and Safety Code § 38532 and § 38533. However, we remain concerned that the
018.1 proposed definition fails to provide a clear and sufficient California nexus, and remind CARB of our recommendation that the proposed definition include an additional California-specific revenue threshold beyond those set forth in Revenue and Tax Code § 23101(b) to establish this nexus.[4] We also remain focused on the three central goals underlying our prior communications, namely to: (i) provide companies with predictability, (ii) take a practical approach as to the timing and scope of requirements, and (iii) minimize costs and burdens, particularly in light of the current status of corporate climate reporting and the substantial time, effort, and expense associated with preparing such reporting.

Introduction

Founded in 1946, the Society is a professional membership association of approximately 3,700 corporate and assistant secretaries, in-house counsel, outside counsel, and other governance professionals who serve approximately 1,600 entities, including 1,000 public, private, and nonprofit organizations of almost every size and industry. Our organization has 80 years of experience empowering professionals to shape and advance corporate governance within their organizations, in part through providing the knowledge and tools they need to advise their boards and executive management on corporate governance; regulatory and legal developments; and sustainability issues, including climate-related governance, risk management, and disclosure.

Our members have significant practical experience with governance, risk management, and disclosure, both in general and with respect to climate-related matters. Therefore, we believe that the Society is well-positioned to provide constructive feedback to CARB with respect to the climate-related disclosures required by § 38532 and § 38533. Moreover, the comments we are submitting are informed not only by

[3] The comments and recommendations in this letter supplement those in prior submissions to CARB and/or CARB staff and policymakers, which consist of the following:

- Society: Meeting Summary: January 28, 2026, Meeting with CARB Staff, January 2026
- Society: Comment Letter in Response to Draft Reporting Template for Scope 1 and Scope 2 GHG Emissions and Appendix A | November 2025
- Society: Key Takeaways from October 22, 2025, Meeting with Senator Stern | October 2025
- Society Letter to CARB in Response to Request for Comments Following August 21, 2025 Public Workshop | September 2025
- Society Letter to CARB: Feedback on August 21, 2025 Public Workshop | August 2025
- Society: Recommendations for CARB's Consideration for August 21, 2025, Public Workshop | "Doing Business in California" Decision Trees | Enforcement Relief Table | August 2025
- Society Comment Letter: Information Solicitation to Inform Implementation of California Climate-Disclosure Legislation: Senate Bills 253 and 261, as amended by Senate Bill 219 | March 2025

[4] For entities not domiciled or headquartered in California, or that have operations in many states, this standard in and of itself does not and cannot demonstrate a sufficient nexus with the state of California necessary for required compliance with the extensive and time-consuming GHG emissions and climate-related financial risk reporting under Health and Safety Code § 38532 and § 38533, respectively. Because of the use of unclear terminology (e.g., "commercially domiciled") and relatively low applicability thresholds, this definition was clearly not intended to be used for laws such as Health and Safety Code § 38532 and § 38533 to establish the necessary substantive nexus. Using Revenue and Tax Code Section 23101(b) could result in a company meeting the requisite definition of "doing business" in California by virtue of having a single California transaction, which would not serve CARB's legal obligation to establish clear, predictable, and objective standards that are appropriately calibrated to demonstrate a clear and sufficient nexus between potential in-scope companies and the state of California, particularly in light of the significant time, effort, and expense that companies will need to incur to comply with Health and Safety Code § 38532 and § 38533.

that experience, but also by a member survey[5] regarding their companies' GHG emissions disclosure and assurance practices and related timing considerations.

[5] Society for Corporate Governance Survey: GHG Emissions Reporting Timeline (January/February 2026), hereinafter, Society Survey (on file with author). Respondent demographics consisted of [90%] publicly traded companies, [7%] private companies, and [3%] mutual companies across sizes and industries, with the greatest representation among companies in the following industries: Technology (16%), Financial Services (13%), Insurance (10%), and Oil & Gas (10%).

I. Summary of Recommendations

Recommendation	Rationale	Section
Covered Year for GHG Emissions Reporting (Health and Safety Code § 38532)		
018.2 CARB should permit all companies, regardless of the date of their fiscal year-end, to report their GHG emissions for their fiscal year ending in the previous calendar year, subject to their election to report more currently available data.	Currently proposed § 96076(b) bifurcates companies into two groups based on the date of their fiscal year-end. This particularly disadvantages companies with January 1 – February 1 fiscal year-ends (primarily retailers). It is also inconsistent with companies' typical reporting timelines (and thus the statutory text). As further discussed below, many companies, including mature GHG emissions reporters, do not and are unable to report their GHG emissions data six months after their fiscal year-end, and these challenges are exacerbated for new GHG emissions reporters. The recommended approach not only better reflects the practical realities of corporate climate reporting, but also allows CARB to align with the approach taken by voluntary reporting organizations, such as CDP, to accommodate the practical challenges faced by companies with non-calendar fiscal years. 018.3 Further, many companies, particularly retail companies, do not have a fixed fiscal year-end date but rather have a formula-driven fiscal year-end (e.g., Saturday or Sunday closest to January 31). Under the Proposed Regulation, these companies would fall into different reporting categories in different years under § 96076(b). This creates unpredictability for both companies and CARB, and will result in arbitrary gaps in the data made available to the public.	Further discussed in Section II
Timing of GHG Emissions Reporting (Health and Safety Code § 38532)		
018.4 Permit companies to submit their initial Scope 1 and Scope 2 GHG emissions reports from August 10, 2026, through December 31 in 2026 and for subsequent reporting periods.	Flexibility for companies to report on a rolling basis through the end of 2026 will alleviate practical challenges (and for some companies, infeasibility of compliance). Additionally, a later submission deadline is consistent with industry practice and CARB's legislative mandate, including the mandate to take into account availability of assurance providers and interoperability.[6] Conversely, there are mature GHG reporting companies	Further discussed in Section III

[6] Health and Safety Code § 38532(c)(2)(A)(vi) requires that reporting timelines established by CARB's implementing regulations "shall consider industry stakeholder input and shall take into account the timelines by which reporting entities typically receive scope 1 emissions, scope 2 emissions, and scope 3 emissions data, as well as the capacity for an independent assurance engagement to be performed by a third-party assurance provider." Notwithstanding the fact that CARB's informal guidance specifically waived assurance for 2026 § 38532 reporting, as further discussed in Section III, particularly for mature reporting companies, assurance is an established and non-negotiable component of emissions reporting; as a result, assurance is a critical component of these companies' reporting timelines.

	Recommendation	Rationale	Section
018.5		with a post-February 1 fiscal year-end that would not want to report more than one-year-old data and that may elect to report their most current data in a post-August 10 submission window if they are in a position to do so.	
018.6	If CARB needs to receive data on the number of reporting companies by August 10 for fee assessment purposes, permit companies that do not report by August 10 to submit a statement that they intend to report on or before December 31. This should also be an option available for subsequent reporting periods if August 10 remains CARB's selected date for fee assessment purposes.	If it is important to CARB to have, by August 10, 2026, final data on the number of § 38532 reports it will receive in 2026 for purposes of calculating and invoicing the fees in a timely manner, we believe that goal would be served while permitting companies to submit § 38532 reports through year-end if CARB gave companies three options, including the two it has already proposed. By August 10, companies in scope of § 38532 submit: (1) a cover note with a § 38532 GHG emissions report, (2) a cover note with a statement on company letterhead stating that "it did not submit a report" and "indicating that in accordance with the Enforcement Notice, [it] was not collecting data or planning to collect data at the time the Notice was issued," or (3) a cover note with a statement on company letterhead stating that it intends to submit a § 38532 GHG report on or before December 31, 2026.	Further discussed in Section III
	Fee Structure and Timing		
018.7	Assess filing fees on a per-report basis, with tiered costs based on the FTB-reported California-specific revenue of the entity submitting the report.	Assessing filing fees on a per-report basis addresses some of the challenges associated with identifying in-scope entities given the evolving nature of CARB's guidance on this topic. Additionally, it represents a more proportionate approach to the allocation of filing fees (and aligns with the reality that companies take different approaches on consolidated tax filings to California) than the fairly complicated per-entity approach set forth in the Proposed Regulation. This approach would also facilitate CARB's fee collection efforts, since CARB would already need to verify in-scope entities based on California tax filings. To further facilitate CARB's fee assessment efforts, CARB could include on the cover page boxes for the reporting entity to indicate its fee tier (similar to the cover page to SEC reports).	Further discussed in Section IV

II. Covered Year for GHG Emissions Reporting (§ 38532)

Recommendation 1: Amend § 96076 of the Proposed Regulation to permit all companies, regardless of the date of their fiscal year-end, to report their GHG emissions for their fiscal year ending in the previous calendar year, subject to their election to report more currently available data.

Rationale: § 96076 of the Proposed Regulation Does Not Align with Corporate Reality or CARB's Statutory Mandate to Take Into Account Corporate Timelines and Maximize Data Access

018.8 The statute mandates that CARB follow two principles in adopting regulations under § 38532, including with respect to deadlines for reporting. The first principle is set out in § 38532(c)(2)(A)(vi), which requires that reporting timelines established by CARB's implementing regulations "shall consider industry stakeholder input and shall take into account the timelines by which reporting entities typically receive Scope 1 emissions, Scope 2 emissions, and Scope 3 emissions data, as well as the capacity for an independent assurance engagement to be performed by a third-party assurance provider." Governor Newsom reinforced that requirement in his signing statement for § 38532, directing CARB to "clarify and streamline" implementation and to ensure that the program does not impose "inconsistent or infeasible compliance obligations."

The second principle is established by § 38532(c)(2)(B), which states that CARB shall ensure that the regulations adopted pursuant to the statute require that "a reporting entity's public disclosure maximizes access for consumers, investors and other stakeholders to comprehensive and detailed greenhouse gas emissions data across Scope 1 emissions, Scope 2 emissions, and Scope 3 emissions […] and is made in a manner that is easily understandable and accessible."

A. Reporting GHG emissions for a fiscal year six-to-seven months after that fiscal year-end constitutes an "infeasible compliance obligation" for many companies.

Most companies, including approximately 70% of the Russell 3000, have a fiscal year-end that ends on December 31.[7] For such companies, the August 10 deadline would provide only about seven months to prepare and submit Scope 1 and 2 GHG emissions in 2026. For the companies whose fiscal years end between January 1 and February 1, 2026, the proposed reporting timeframe is an even more compressed 018.9 six months.

Feedback from our members in the Society Survey (consistent with the member survey we conducted in 2025 and that we used for purposes of informing our March 2025 comment letter[8] on this precise topic) indicates that six-to-seven months does not provide many companies with sufficient time to publish GHG emissions disclosures with accurate data. Preparing and reporting GHG emissions requires substantial time, effort, and expense on an annual basis.

- According to the Society Survey, among companies that currently report Scope 1 and Scope 2 emissions data, nearly half of respondents will require between six and 11 months to publish their GHG emissions data in a regulatory compliance filing such as that required by the Proposed Regulation.

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7 Data as of February 2026 and derived from Intelligize's compilation of public company filings made through the U.S. Securities and Exchange Commission's Electronic Data Gathering, Analysis, and Retrieval filing ("EDGAR") system.

8 *See* Society Comment Letter: Information Solicitation to Inform Implementation of California Climate-Disclosure Legislation: Senate Bills 253 and 261, as amended by Senate Bill 219 (March 2025), available at https://higherlogicdownload.s3.amazonaws.com/GOVERNANCEPROFESSIONALS/5d47927b-105a-4bc7-9aef-821536f3505b/UploadedImages/Society_for_Corporate_Governance_Letter_in_Response_to_CARB_Information_Solicitation_March_21__2025.pdf.

- *Data Collection.* Many companies take up to six months (with 61% of companies requiring between three and six months, and a minority needing up to approximately ten months) just to gather the Scope 1 and Scope 2 GHG emissions data to begin analysis and development of disclosures.
- *Data Verification.* Following data gathering, companies undertake an internal verification and approval process to ensure accuracy (as large companies typically do with all public disclosures), which takes additional time. Third-party assurance further extends this timeline.

The Society Survey reinforces the examples we shared during our engagements with CARB staff on December 19, 2025,[9] and January 28, 2026[10]—reaffirming the fact that even large, sophisticated, and mature emissions reporting companies with plentiful resources would find a six-to-seven month reporting timeframe infeasible or challenging and inconsistent with their current practices.[11]

In considering this data, CARB should note that mature GHG emissions reporting companies are much more likely to publish assured GHG emissions data than reporting companies that are newer to emissions disclosure, which, as noted above, extends the reporting timeline. This is the case notwithstanding CARB's enforcement relief in the first year, as was discussed in detail by members of mature reporting companies during the aforementioned engagements with CARB staff.

CARB should also note that the timing challenges would be even greater for companies without well-established data gathering and disclosure processes. In our experience, smaller and non-public companies that may not be captured in the Society Survey are much more likely to have immature climate reporting capabilities. Concerns about providing sufficient time to produce accurate and reliable data are even more salient for those companies. While we acknowledge the enforcement discretion that CARB has stated it will exercise with respect to the first year of reporting, gathering and preparing the relevant data (and, in future years, obtaining assurance) is an exercise that will need to be performed annually, and the challenges in doing so will not disappear after initial reports under § 38532 are published.

Conclusion: Permitting all companies to report their GHG emissions for their fiscal year ending in the previous calendar year would be more consistent with CARB's mandate to take into account existing practices and timelines because it allows companies to leverage their current processes and practices. Under the recommended approach, companies could also choose to provide more recent data, if available and ready for submission.

B. The bifurcated reporting year framework will create inconsistent reporting obligations and disparately impact retailers.

018.10 Not all companies set a particular date for their fiscal year-end. Instead, many companies establish their fiscal year-end based on a formula, such as the Saturday or Sunday closest to a particular date in December or January. This is a common practice for retailers, which commonly use fiscal year ends that allow them to capture sales from the busy holiday season at the end of each calendar year.

9 On December 19, 2025, Society leadership and members of certain mature reporting companies met with CARB Chair Chief of Staff Emily Wimberger to discuss their practices and processes and associated timing of GHG emissions reporting with reference to the timeline attached to this letter as Exhibit A.

10 On January 28, 2026, Society leadership and members of certain mature reporting companies met with CARB Assistant Division Chief, Industrial Strategies Division Syd Vergis, and Branch Chief, Climate Data & Risk Reporting Branch Jordan Ramalingam, to discuss their practices and processes and associated timing of GHG emissions reporting with reference to the timeline attached to this letter as Exhibit A.

11 *See* Exhibit A.

Based on publicly available research, a meaningful number of companies establish fiscal year-ends using formula-based conventions rather than a fixed calendar date. An empirical analysis published in *The CPA Journal* found that approximately 8.5% of publicly traded companies used a 52/53-week (weekday-based) fiscal year in 2017, a structure under which the fiscal year ends on a specified weekday nearest to a particular month-end rather than on a fixed date.[12] Applied to the current population of Form 10-K filers, this suggests that several hundred public companies use formula-based fiscal year-ends. In addition, private companies are also permitted to elect such fiscal year-end conventions under applicable tax rules; however, no comprehensive public data exist to estimate the prevalence of these practices among private firms. Accordingly, the total number of affected entities is likely materially higher than the public-company estimate alone.

If the bifurcated reporting year approach in the Proposed Regulation is adopted for years beyond 2026, this group of companies would have a fiscal year-end that periodically falls in and out of the January 1 to February 1 time period. This shifting will create practical challenges for CARB and reporting companies, as illustrated in the following table for a company whose fiscal year ends on the Saturday closest to January 31.

§ 38532 Reporting Year	*Company's Fiscal Year End Date*	*Company's Required Reporting Period*
2026	1/31	FY ending in 2026
2027	1/30	FY ending in 2027
2028	1/29	FY ending in 2028
2029	2/3	FY ending in 2028
2030	2/2	FY ending in 2029

In 2028 and 2029, this company would be required to duplicate reporting for the same fiscal year, which is inconsistent with CARB's statutory mandate under § 38532. In addition, this company would have only six months after fiscal year-end to prepare reporting in each of 2026 to 2028, their first three years of reporting to CARB, but would have 18 months to do so in the next two years.

A company whose fiscal year ends the Monday closest to January 31 would be required to report for the fiscal year ending in 2025 this year, but would need to report for the fiscal year ending in 2027 in 2027. This company would have 18 months after fiscal year-end to prepare reporting 2026, but would only have six months in 2027. In addition, CARB would not receive data for this company for the fiscal year ending in 2026.

As these examples show, the practical reality under the proposed § 96076 framework is one with arbitrary outcomes from company to company, and from year to year. Not only would adopting § 96076 as currently proposed reduce predictability for CARB and the companies, it would also create periods in which companies either would submit duplicative data or would not submit data at all because the data was previously submitted.

In contrast, our recommended approach would promote both the timing and accessibility statutory principles described above. Allowing companies to report their GHG emissions for their fiscal year ending in the previous calendar year would facilitate companies' regular reporting cadence, which is consistent with CARB's statutory mandate to "take into account the timelines by which reporting entities typically receive Scope 1 emissions, Scope 2 emissions, and Scope 3 emissions data, as well as the capacity for an independent assurance engagement to be performed by a third-party assurance provider."

[12] The CPA Journal, How Long is a Year?, March 2022, available at https://www.cpajournal.com/2022/03/16/how-long-is-a-year/.

By allowing companies to report on a timeline that is both feasible for the company and more consistent with current market practice (including voluntary submissions to organizations such as CDP as further discussed below), our recommended approach would also help CARB meet the second statutory principle of ensuring reporting that "maximizes access for consumers, investors and other stakeholders to comprehensive and detailed greenhouse gas emissions data across Scope 1 emissions, Scope 2 emissions, and Scope 3 emissions" in a comparable and accessible manner.

Conclusion: The bifurcated framework currently proposed under Proposed Regulation § 96076 is inconsistent with statutory mandates, disparately impacts certain companies based solely on the date of their fiscal year-end and will create arbitrary outcomes for companies, CARB, and the public. Permitting companies to report their GHG emissions for their fiscal year ending in the previous calendar year would promote CARB's statutory mandates.

III. Timing of GHG Emissions Reporting (§ 38532)

Recommendation 1: Permit companies to submit their initial Scope 1 and Scope 2 GHG emissions reports from August 10, 2026, through December 31 in 2026, and for subsequent reporting periods.

Rationale: A Rolling Timeline Supports CARB's Statutory Mandate to Take Into Account Corporate Timelines and Maximize Data Access

This recommendation is intended to promote the same statutory principles described in Section II above. Under the currently proposed August 10, 2026, § 38532 reporting deadline, many companies will not have sufficient time to collect, verify, and submit quality data as discussed above in Section II.A. As evidenced by the feedback from Society members, which reflects industry stakeholder feedback on the realities of the timelines by which companies typically receive and vet GHG emissions data for public reporting, as required under § 38532(c)(2)(A)(vi), the Proposed Regulation creates a reporting obligation that is at odds with the in-scope reporting company practices. As a result, the August 10 deadline would be challenging or, in some cases, impracticable, for initial reports due in 2026, even without an assurance requirement for the initial year of reporting (for those companies that elect to report unassured data), and would contravene the first statutory principle.

018.11

Because the August 10 deadline would create inconsistent or infeasible compliance obligations for many reporting companies, another foreseeable outcome is that some companies may be pressured to publish reduced quality data or data that is subject to significant gaps, caveats, and assumptions, with an increased risk of subsequent restatements or revisions, as further discussed in Section III.A below. This outcome would contravene the second statutory principle of maximizing access for consumers, investors and other stakeholders to comprehensive and detailed GHG emissions data in a manner that is easily understandable and accessible, in addition to posing legal, reputational, and other risks for reporting companies.

For these reasons, we believe that the rolling submission window we recommend is more consistent with both statutory principles.

A. The Proposed Regulation will result in reduced quality or incomplete data.

Gathering actual, reliable, and assurable data is a complex undertaking that, for larger enterprises, requires obtaining information from a large number of sites and stakeholders and, with respect to Scope 2 information, from utilities that may not provide the necessary data for months after the end of the relevant period. Requiring most companies to report within six-to-seven months of their fiscal year-end, as contemplated by the Proposed Regulation, would have the practical effects of increasing reliance on assumptions rather than actual data (which increases the risk of measurement errors and inaccuracy), increasing costs and imposing a substantial strain on resources that cannot be readily expanded.

018.12

Companies go to great lengths to ensure the accuracy and reliability of public disclosure, especially disclosure made in response to regulatory mandates. Prior to making such disclosures, various layers of

approval are often required, including assessment of the controls and processes around the data and systems for collecting it, review by owners of the relevant data and metrics, subject matter experts, disclosure committees that include senior members of management and, in many cases, the boards of directors (or committees thereof).

Truncating a company's review and internal and external controls processes to accommodate an arbitrary fixed filing deadline that is in many cases accelerated relative to current reporting practices is inconsistent with established corporate governance best practices. Among other adverse implications, it puts the accuracy and reliability of corporate disclosures at substantial risk. Companies may also face legal and reputational exposure under US securities laws and the laws of other regimes if they fail to maintain adequate controls over these public disclosures.

Conclusion: Providing reporting companies the flexibility to submit data between August 10 and December 31 would enable them to produce disclosure that comports with their internal controls and other practices based on accurate and comprehensive data as statutorily required, giving investors and other stakeholders access to more reliable information while limiting potential legal and reputational risks for companies. Combined with the recommendation in Section II, a rolling submission window would also promote the submission of more currently available data for those companies that are in a position to report GHG emissions for their fiscal year ending in the current calendar year but cannot do so within six-to-seven months after their fiscal year-end.

B. The Proposed Regulation is inconsistent with other mandatory and voluntary emission reporting regimes.

Our recommendations take into account that the Proposed Regulation is establishing reporting periods and a fixed deadline for 2026 submissions, and that CARB has indicated it will follow with a separate rulemaking process for "reporting contents and format, data assurance and more" beyond 2026.[13]
018.13 However, CARB is not exempted from the statutory principles described above in 2026, which don't support adoption of a unique reporting timeline that is inconsistent with the underlying statute.

As a result, we urge CARB to consider our recommendations and adopt regulations that establish a reporting timeframe for 2026 that allows companies to rely on existing processes and controls while CARB establishes and finalizes the long-term § 38532 reporting requirements, which should be similarly adaptable as CARB recognized in its Staff Report[14] and consistent with current reporting practices as we have proposed in our recommendations.

Many companies have already structured their GHG emissions reporting processes to align with CDP reporting and other voluntary reporting regimes, as well as existing mandatory requirements.

- In 2025, CDP did not require responses to its questionnaire, including GHG emissions data, until November 19, 2025, when the submission portal closed.[15] Companies are permitted to begin submissions earlier, and typically submit between August and November each year.
- The United Kingdom's Streamlined Energy and Carbon Reporting greenhouse gas emissions and TCFD-aligned reporting obligations require disclosures to be submitted within nine months of fiscal year end.
- In California, the Energy Commission's Power Source Disclosure Program requires retail electricity suppliers to file annual reports on the energy sources and GHG emissions associated with their electricity sales by August 10, *and these reports are not verified for accuracy and completeness until October 1* [emphasis added].

[13] Staff Report at 15.
[14] Staff Report at 15 ("For any future reporting deadlines, staff recognizes the need to manage different fiscal years that may apply across all regulated entities.").
[15] The approach taken by CDP accommodated the practical challenges faced by companies with non-calendar fiscal years, as shared in our first submission to and subsequent conversations with CARB.

CARB's proposed reporting deadline for GHG emissions reports under § 38532 is more stringent than these regimes. This not only disrupts ongoing processes, but also creates risks for those companies that are already required via their internal controls or other regulatory mandates to obtain assurance over their emissions information. According to the Society Survey, approximately 75% of respondents plan to obtain assurance for their Scope 1 and Scope 2 emissions disclosures to be reported in 2026. A substantial number of respondents to the survey indicated that they obtain assurance as a control to affirm accuracy and reliability and/or to satisfy existing reporting obligations in other jurisdictions. For those companies, producing *unassured* data on an expedited timeline for the sole purposes of complying with § 38532 creates a likely risk that data may later need to be revised or restated, posing significant legal and reputational risks.

While some companies are subject to both California's Mandatory Reporting Regulation (MRR) and § 38532, CARB's decision to align the § 38532 deadline to the existing verification deadline for submissions under the MRR, instead of the existing alternatives above, is neither consistent with its statutory mandate nor otherwise appropriate. MRR verification deadlines were adopted and designed to comply with a wholly different regulatory purpose (under the California Global Warming Solutions Act of 2006, to support California's Cap-and-Invest Program, among other goals) and apply to a different, specific group of reporting entities from those covered by § 38532.

The emissions data reported under MRR represents only a limited subset of an MRR reporting company's overall greenhouse gas emissions inventory. It generally captures only specified categories of Scope 1 emissions from covered facilities within California. It does not require enterprise-wide consolidation, nor does it include comprehensive Scope 1 emissions outside the regulated source categories, Scope 2 emissions, or Scope 3 emissions.

By contrast, SB 253 requires companies to prepare and obtain third-party assurance[16] over a comprehensive, enterprise-wide greenhouse gas inventory covering all Scope 1, Scope 2, and Scope 3 emissions across global operations and value chains. This requires aggregation of data from multiple internal systems, international operations, and third-party counterparties, as well as the application and assurance of methodologies that are materially broader and less mature than those used under MRR. Accordingly, the August 10 MRR reporting deadline—reflecting the feasibility of submitting a narrow, facility-level regulatory dataset—does not provide an appropriate or workable proxy for the timing required to prepare and assure the significantly broader disclosures required under SB 253.

Conclusion: Consistent with its statutory mandate to consider corporate timelines, CARB should take into account reporting deadlines under standards and frameworks that are more similar to § 38532 (including in terms of goals and types of reporting entities) than MRR. The recommended rolling submission window promotes CARB's alignment with comparable frameworks.

C. The proposed August 10 § 38532 reporting deadline imposes a reporting deadline that is particularly challenging for many companies given other regulatory obligations.

018.14 GHG emissions reporting is just one element of many companies' public disclosure obligations and functions. At the beginning of the year in particular, companies are tasked with a broad range of disclosure obligations, each associated with discrete controls and procedures. For example, within the first six months of their fiscal year end, US public companies typically prepare fourth quarter results, annual reports on Form 10-K (including audited financial statements), and proxy statements, each of which requires extensive resources that in many cases (particularly in smaller companies) overlap with the personnel (including senior level management and members of the board of directors) needed to gather data, develop disclosure, and undertake assurance for GHG emissions reporting. Companies are also navigating various other constituencies and obligations during the months following their fiscal year-

16 As noted elsewhere in this letter, many companies, particularly mature companies will not or are unable to forego third-party assurance on their reported GHG emissions notwithstanding CARB's waiver of the assurance requirement for 2026.

end. For example, historically, approximately 90% of annual shareholder meetings are held in the first half of the calendar year, with the majority being between April and June of each year.

Conclusion: The same governance structures required to gather and analyze data and prepare disclosures for, review, assure, and approve § 38532 reports are typically also involved in preparing, reviewing, and approving the disclosures and other materials required to support these other processes. This is especially true and particularly burdensome for smaller and mid-size companies that often have the same staff internally responsible for their SEC reporting/disclosures as their sustainability reporting/disclosures. CARB should account for these practical challenges and the timelines by which companies typically gather, report, and verify GHG emissions data under existing regimes, such as CDP, in 2026 and beyond.

D. CARB is not the only stakeholder that reporting entities will need to consider when disclosing to CARB.

As detailed by representatives of mature GHG emissions reporting companies in the meetings with CARB staff on December 19, 2025, and January 28, 2026, adopting a reporting timeline for GHG emissions that is accelerated relative to, and thus at odds with, many companies' existing reporting practices is problematic for many US companies. These concerns are exacerbated in the current environment which is characterized by increased scrutiny on corporate disclosures related to carbon emissions and other
018.15 environmental topics due to the diverging requirements and expectations of diverse stakeholders, including shareholders, customers, and regulators in other jurisdictions in which companies operate. As a result, adhering to internal practices, processes, and other controls in the course of reviewing, approving, and publishing these disclosures is paramount and not negotiable notwithstanding regulatory-imposed timing pressures.

By providing companies with a sufficient reporting period to align their disclosures across their reporting obligations (an especially important consideration for public reporting companies, whose disclosures can impact their pricing, insider trading windows, ability to engage with investors, and other sensitive items), CARB would support companies', boards' and management's ability to exercise applicable fiduciary duties.

Conclusion: Not only would companies benefit from a reporting timeline that accommodates their typically robust internal control processes, stakeholders would also benefit because they would have access to reliable data that those processes are designed to support.

The recommended approach of an open submission window between August 10 through December 31 would be workable not only in 2026, but also for future years when the reporting requirements under § 38532 will necessarily expand, including with respect to assurance[17] (including reasonable assurance for Scope 1 and Scope 2 emissions data beginning in 2030) and Scope 3 emissions reporting obligations.

018.16 **Recommendation 2**: If CARB needs to receive data on the number of reporting companies by August 10 for fee assessment purposes, consider permitting companies that do not report by August 10 to submit a statement that they intend to report on or before December 31.

[17] Third-party assurance providers are expected to see an overwhelming increase in emissions assurance engagements, and there are a limited number of assurance providers with the experience and sophistication to provide high-quality assurance over reporting by complex enterprises. Even if reporting companies experience delays or challenges obtaining an assurance provider, the proposed window should help companies timely meet their reporting deadline.

Companies that currently obtain limited assurance but want or need to switch providers in advance of mandatory reporting obligations may require more time than in the past, as new firms will need to familiarize themselves with the reporting company and its data-gathering and control environment, and may employ different procedures. Fluctuations in the process from year-to-year could be accommodated by the proposed window more readily than a fixed deadline.

Rationale: Allow CARB to Adopt More Realistic Reporting Timelines While Having and Providing Certainty on Fees

If it is important for CARB to have final data on the number of § 38532 reports it will receive in 2026 for purposes of calculating and invoicing the fees in a timely manner by a deadline similar to the MRR deadline of August 10, we believe that goal would be served while permitting companies to submit § 38532 reports through calendar year-end if the final regulations provide companies three options, including the two CARB has already proposed.

As currently contemplated by the Proposed Regulation, by August 10, companies in scope of § 38532 would be required to submit (1) a cover note with a § 38532 report, or (2) a cover note with a statement on company letterhead stating that "it did not submit a report" and "indicating that in accordance with the Enforcement Notice, [it] was not collecting data or planning to collect data at the time the Notice was issued." We suggest CARB provide a third option: submission of a cover note with a statement on company letterhead stating that the company intends to submit a § 38532 report on or before December 31, 2026.

Conclusion: This recommendation should not meaningfully change CARB's currently contemplated processes, and would enable CARB to adopt the more realistic submission window described under Recommendation 1 above while receiving data on the number of reporting companies by August 10 for fee assessment purposes. This option should also be available for subsequent reporting periods if August 10 remains CARB's selected date for fee assessment purposes.

IV. Fee Structure and Timing

Recommendation 1: Assess filing fees on a per-report basis, with tiered costs based on the Franchise Tax Board-reported California-specific revenue (which CARB would already use to access "doing business") of the entity submitting the report.

018.17

Rationale: Ensuring Clear and Predictable Fee Process for Both CARB and Companies, Making Fees More Proportionate

The Proposed Regulation establishes a Total Required Revenue (TRR) framework and annual invoicing process that depend on CARB identifying the covered populations (N38532, or Number of reporting entities, and N38533, Number of covered entities, respectively) and other fee calculation inputs. The core formulas set Required Revenue (RR) and TRR annually, then allocate TRR into separate fee rates for § 38532 and § 38533 based on staffing allocation percentages (i.e., authorized staff positions assigned to each, referred to in the Proposed Regulation as P38532 and P38533, respectively). [18]

At the same time, the Proposed Regulation and Staff Report leave unresolved practical questions that are necessary to ensure fees remain tied to "actual and reasonable costs" and are administered in a predictable and dispute-resilient manner.[19]

A. A per-report fee structure best serves CARB's stated administrative and predictability goals

CARB's Staff Report explains that a flat fee is intended to reduce administrative burden and improve predictability, and that a variable fee based on emissions or revenue was considered but rejected.[20]

018.18

That rationale is best served by assessing a single fee per consolidated disclosure report filed, rather than per legal entity within a corporate group. The statutes expressly permit consolidated reporting at the parent-company level. [21]

[18] Proposed Regulation § 96073(a)-(d), pp. 5-6.
[19] HSC § 38532(c)(2)(G)(ii)-(iv); HSC § 38533(c)(2)(B)(i)-(ii); Staff Report at 11-12.
[20] Staff Report at 12.
[21] HSC § 38532(c)(2)(A)(iii); HSC § 38533(b)(2).

A structure-driven per-entity approach risks arbitrary outcomes (different fee burdens based solely on how a single enterprise's organizational structure may have evolved for historical, legal, or tax reasons) and invites disputes over how to count covered entities for N38532/N38533.[22] As discussed in one of our prior comment letters,[23] the per-entity fee structure also fails to acknowledge the challenges that both CARB and in-scope companies may experience with identifying in-scope entities, particularly considering some of the remaining ambiguities that we and other commenters have raised. These challenges will be exacerbated for CARB because many companies measure and report GHG emissions on a consolidated level at the parent level, and will likely do so under § 38532 regardless of whether that parent is itself in-scope. As a result, it would be complicated for both companies and CARB to calculate their fees each year under the per-entity approach, since the California-based revenues being examined for purposes of "doing business in California" may fluctuate from year to year as set forth in the Proposed Regulation.

In contrast, both companies and CARB can take advantage of a more streamlined process for budgeting and calculating fees if the final regulation provides for payment of a fee for each unique § 38532 report, whether prepared on a consolidated or non-consolidated basis, rather than a fluctuating and potentially uncertain amount of fees based on the number of entities ultimately determined to be in scope each year.

To further increase certainty and predictability, we recommend that the fee be tiered based on the size of a single line item (the "FTB Line Item") in the Franchise Tax Board tax filing for the reporting parent entity (or if that entity is not itself in scope of § 38532, the largest in-scope subsidiary)—with the FTB Line Item
018.19 being the same line as the one companies and CARB will need to verify for purposes of the "doing business in California" definition. A clear advantage of this approach is that, to the extent that CARB will be using the FTB Line Item to verify whether an entity is "doing business in California", CARB would also be able to use the FTB Line Item to verify whether the entity has paid the correct amount of fees.

Further, as CARB stated during its August workshop (when it proposed a similar fee structure as set forth in the Proposed Regulation), a goal for the fee structure is to ensure that enterprises with more California contact shoulder a greater proportion of the state's overall administration costs for the climate reporting programs under § 38532 and § 38533. We believe that a more well-tailored and practical method for promoting proportionality between the degree of an enterprise's California contacts and the amount of filing fees paid by such enterprise is to require enterprises to pay tiered filing fees based on the FTB Line Item (which CARB itself has identified in the "doing business" definition as an indicator of California contacts), rather than the number of affiliated entities that may be in-scope. For example, if an entity reports California franchise taxes on a consolidated basis and its FTB Line Item was barely above the threshold for "doing business in California," that company should logically be assessed a lower filing fee as compared to another company that reports California franchise taxes on a consolidated basis and has a much higher FTB Line Item.[24]

018.20 In addition, since CARB is permitting consolidated reporting, which is expected to be the approach used by many reporting companies, a per-report fee structure is also more proportionate with respect to CARB's burdens and costs under § 38532.

[22] Proposed Reg. Text § 96073(c)-(d), pp. 5-6.
[23] *See* Society Comment Letter in Response to Request for Comments Following August 21, 2025 Public Workshop (September 2025), available at https://higherlogicdownload.s3.amazonaws.com/GOVERNANCEPROFESSIONALS/5d47927b-105a-4bc7-9aef-821536f3505b/UploadedImages/Society_for_Corporate_Governance_Comment_Letter_Post-August_21__2025_Workshop__9-11-25_.pdf.
[24] A tiered fee approach based on tax filing line item is consistent with current practices under California law. For example, California currently requires limited liability companies ("LLCs") to pay an annual fee based on their total income "from all sources derived from or attributable to California" under Revenue and Tax Code § 17942. When then file their Form 568 each year, LLCs would pay $900 (if total income is between $250,000-$499,999), $2,500 (if total income is between $500,000-$999,000), $6,000 (if total income is between $1,000,000,000-$4,999,999,000), and $11,790 (if total income is over $5 million). See FTB Pub. 3556: Limited Liability Company Filing Information | Forms and Publications | FTB.ca.gov.

Conclusion: A per-report filing fee for each unique § 38532 report based the same FTB Line Item used to verify whether a company is "doing business in California" would increase clarity and predictability for companies (particularly the many that are likely to submit a consolidated report as contemplated by § 38532), while also facilitating CARB's fee assessment and collection efforts.

B. A per-entity fee structure will not provide companies with clarity and predictability and will likely increase CARB's exposure to fee disputes.

The proposed per-entity fee model presupposes that CARB can determine (1) the population of "reporting entities" and "covered entities" (the denominators N38532 and N38533) and (2) which entities are "affected" and thus will receive fee determination notices.[25]

Yet the Proposed Regulation does not specify the data sources, decision rules, or administrative process CARB will use to identify 'affected entities' in time for the proposed September 10 notice date, particularly where corporate groups contain multiple potentially in-scope legal entities.[26]

Because the statutes require fees to be adequate to cover costs but not exceed "actual and reasonable" costs, the population denominator is not a minor implementation detail: it directly drives fee levels for all entities (F38532 and F38533).[27] Lack of a clearly defined process for identifying in-scope entities also undercuts the predictability rationale CARB cites for the September 10 timeline and the flat fee approach.[28]

018.21

CARB states that the September 10 assessment date "ensures predictability" and aligns with the state's fiscal cycle.[29] But predictability depends on entities receiving advance clarity on whether they will be treated as "affected entities" for the incoming fee year.[30] Without having proposed and adopted any timeline or procedure for producing a list of "affected entities" in advance of the September 10 proposed fee assessment date, companies will not have predictability on their fees. There is currently no clarity on how CARB is generating its list of "affected entities" for purposes of the fee calculation, and which companies will be ultimately included on that list.

If there are ultimately valid differences between CARB's list and a company's own scoping assessment as to itself and its subsidiaries, CARB is likely to be exposed to fee disputes, particularly since § 96075(c) would, as currently proposed, impose a daily payment violation for each day or portion thereof that a fee remains unpaid after the due date.[31] In addition, § 96074(c) also authorizes a late fee to cover administrative costs caused by late payment,[32] but does not describe any administrative process for resolving disputes, including those that result from a valid disagreement with CARB on whether an entity is in-scope.[33] The possibility of such a disagreement is likely to be higher with respect to smaller entities, which may have greater fluctuation on the FTB Line Item from year to year. Therefore, by looking at the FTB Line Item of the reporting parent entity (or if that entity is not in scope, then its largest in-scope subsidiary), CARB can reduce the likelihood of a fee dispute and decrease the costs and complexity of its administration of § 38532 and § 38533.

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Conclusion: We appreciate CARB's efforts to establish a fee structure that supports effective administration and enforcement. We believe adopting a per-report fee structure—rather than per-entity

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[25] Proposed Reg. Text § 96073(c)-(d) and § 96074(a), pp. 5-7.

[26] Proposed Reg. Text § 96074(a), pp. 6-7.

[27] HSC § 38532(c)(2)(G)(ii); HSC § 38533(c)(2)(B)(i).
[28] Staff Report at 12.
[29] Staff Report at 12.
[30] Proposed Regulation § 96074(a), pp. 6-7.
[31] Proposed Regulation § 96075(c), p. 7.
[32] Proposed Regulation § 96074(c), p. 7.
[33] Proposed Regulation § 96075(d), p. 7.

fees—would best align with CARB's stated goals of reducing administrative burden and improving predictability.

Recommendation 2: Ensure separate program allocations and transparent explanations for § 38532 and § 38533.

Rationale: Ensuring Clear and Predictable Fee Process for Both CARB and Companies, Making Fees More Proportionate

018.23 § 96073 already separates the fee calculations for Health and Safety Code § 38532 and § 38533 using distinct allocation percentages (P38532 and P38533) and denominators (N38532 and N38533).[34]

The Staff Report similarly states costs for the two statutes must be calculated individually (even if invoiced together) and that allocation is based on the share of program resources dedicated to each statute.[35]

Conclusion: To avoid opacity or perceived cross-subsidies, CARB should further explain how P38532 and P38533 are determined and how they may change year-to-year and should explain how CARB will use companies' annual fees to fund its administration of § 38533 in non-reporting years.[36]

V. Exemptions

018.24 **Recommendation 1**: In the final regulatory text, explicitly state the exemptions from § 38532 obligations provided under prior CARB guidance for (a) companies that were not collecting data or planning to collect data at the time the December 2024 Enforcement Notice was issued, (b) insurance companies, and (c) assurance requirements in 2026.

Rationale: Provide Greater Certainty for Companies Intending to Rely on CARB's Guidance

A. Without explicit reference in the regulatory text, some companies may not be willing or able to rely on CARB's intended exemption for companies that were not collecting data (or planning to collect data) in December 2024.

The stated exemptions from applicability in the Proposed Regulation at § 96071 do not include the exemption proposed during the November 18, 2025, workshop[37] for companies that were not collecting data or planning to collect data at the time the December 2024 Enforcement Notice[38] was issued, and as set forth in the "Staff Report: Initial Statement of Reasons" (hereinafter, "Staff Report") accompanying the Proposed Regulation.[39] We recommend including the following or similar language in the Proposed Regulation:

018.25 > "Reporting entities that were not collecting GHG emissions data or were not planning to collect GHG emissions data at the time that The Climate Corporate Data Accountability Act Enforcement Notice (Enforcement Notice) was issued (i.e., December 5, 2024) are not expected or required to submit Scope 1 and Scope 2 reporting data in 2026. Any such reporting entity that does not submit Scope 1 and Scope 2 reporting data on or before the first year reporting deadline (as set forth in § 96076) must submit a statement on entity letterhead to CARB, stating that the entity did

[34] Proposed Regulation § 96073(c)-(d), pp. 5-6.
[35] Staff Report at 11.
[36] Staff Report at 11-12; HSC § 38533(c)(2)(A)-(B).

[37] https://content.govdelivery.com/accounts/CARB/bulletins/3fa6191
[38] CARB, The Climate Corporate Data Accountability Act Enforcement Notice, December 5, 2024. at https://ww2.arb.ca.gov/sites/default/files/2024-12/The%20Climate%20Corporate%20Data%20Accountability%20Act%20Enforcement%20Notice%20Dec%202024.pdf.
[39] CARB, Staff Report: Initial Statement of Reasons, December 9, 2025, at 14-15, https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/isor.pdf.

> not and will not submit a report in 2026 disclosing the entity's Scope 1 and Scope 2 emissions, and stating that, in accordance with the Enforcement Notice, the entity was not collecting Scope 1 and Scope 2 greenhouse gas emissions data or planning to collect such data at the time the Notice was issued."

The foregoing is consistent with the Staff Report, which provides:

> "To support initial implementation and reduce uncertainty, CARB issued an Enforcement Notice in December 2024. In this Enforcement Notice, CARB recognized that some reporting entities may require lead time to develop or refine their data collection processes to ensure complete and accurate reporting of Scope 1 and Scope 2 emissions. Accordingly, CARB has indicated that it will exercise enforcement discretion for the first report due in 2026, allowing reporting entities to submit Scope 1 and Scope 2 emissions for their prior fiscal year based on information they already have or were collecting when that Notice was issued. Entities that were not collecting data or were not planning to collect data, at the time the Enforcement Notice was issued, are not expected to submit Scope 1 and Scope 2 reporting data for this first reporting cycle (see below). This approach is intended to support companies as they transition into complying with these new reporting requirements." (footnotes omitted)

B. Adding an explicit reference in the regulatory text to the exemption CARB intended to provide for entities in the business of insurance under § 38532, together with a definition of such term, would enhance clarity for companies intending to rely on CARB such exemption.

The stated exemptions from applicability in the Proposed Regulation include "[a] business entity that is subject to regulation by the Department of Insurance in this state, or that is in the business of insurance in any other state" (§ 96071(b)(2)). The exemption is reflected in the statutory text of § 38533 in the exclusion from the definition of "Covered Entity" set forth in the Proposed Regulation at § 96072(a)(5), and the exclusion from the definition of "Covered Entity" set forth in Health and Safety Code § 38533(a)(4).[40] As respects § 38532 and § 38533, apart from this definitional difference specific to insurance entities and the different dollar thresholds for reporting, the definitions of "Covered Entity" under § 38533 and "Reporting Entity" under § 38532 are substantively identical.

018.26 Based on the above, we recommend including in the Proposed Regulation a definition of "in the business of insurance" to provide certainty regarding the applicability of the exemption to business entities that are not subject to regulation by the Department of Insurance in California. This definition could track the definition of "business of insurance" as set forth in the California Code of Regulations Title 10, § 2175.2(e) (and 18 U.S.C. § 1033(f)(1)), as follows:

> "The "business of insurance" means (1) the writing of insurance, or (2) the reinsuring of risks, by an insurer, including all acts necessary or incidental to such writing or reinsurance and the activities of persons who act as, or are, officers, directors, agents, or employees of insurers or who are other persons authorized to act on behalf of such persons."

018.27 We also recommend explicitly stating that entities "in the business of insurance" are exempted from the definition of "Reporting Entity" in § 96072(a)(11). We recommend this change to make it clear that the insurance-related exemption applies to emissions reports that would otherwise be required under § 38532. This should ensure that Proposed Regulation § 96071(b) is not (inadvertently) narrowly interpreted to only apply to entities that are exempt pursuant to Health and Safety Code § 38533. As so amended, the definition of "Reporting Entity" would read as follows:

> "Reporting entity" means a partnership, corporation, limited liability company, or other business entity formed under the laws of this state, the laws of any other state of the United States or the District of Columbia, or under an act of the Congress of the United States with total annual revenues in excess of one billion United States dollars ($1,000,000,000) and that does business

[40] Health and Safety Code § 38533(a)(4); Proposed Regulation § 96072(a)(5). "'Covered entity' does not include a business entity that is subject to regulation by the Department of Insurance in this state, or that is in the business of insurance in any other state."

in California. The entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue. "Reporting entity" does not include a business entity that is subject to regulation by the Department of Insurance in this state, or that is in the business of insurance in any other state.

C. Without explicit reference in the regulatory text, some companies may not be willing or able to rely on CARB's intended waiver of the assurance requirement in 2026.

The Proposed Regulation does not currently address assurance, which is expressly required under the text of Health and Safety Code § 38532, but was specifically waived for 2026 reporting pursuant to November 18, 2025, public workshop slides[41] and associated discussion.

The slides at page 12 provide:

- Is data assurance required for 2026 reporting?

  • For 2026 reporting, limited assurance is not required for data submission.

Consistent with this notion, the Staff Report accompanying the Proposed Regulation provides that assurance requirements are forthcoming in a future regulation.[42]

The Proposed Regulation should explicitly provide that assurance is not required for § 38532 reports in 2026. Because the statute appears clear that assurance is required, companies may be unable or reluctant to rely solely on the public workshop slides or the mere omission of a discussion of assurance requirements in the Staff Report, and will face the timing and resource constraints further described above in Sections II and III.

018.28 In addition, there is uncertainty regarding CARB's authority to selectively determine which aspects of § 38532 it can temporarily waive in the face of an explicit mandate to attain an assurance engagement at a limited assurance level beginning in 2026. The regulatory text should therefore also note CARB's authority to permit reporting in a manner contrary to the text of Health and Safety Code § 38532.

Conclusion: In the case of each of the exemptions described above, without including in the final regulations text that explicitly waives assurance, companies that may elect to rely on the exemption (based on their inability to obtain adequate data or limited assurance for their 2026 reporting or otherwise) would need to assume meaningful legal and reputational risks.

A statement of enforcement discretion alone is an inadequate policy-making tool, as it leaves the regulated community technically out of compliance (and thus unable to, for example, support affirmation with "compliance with laws" provisions in contracts and other arrangements) and subject to additional guidance updates as and when they might be issued.

Certain companies also may have compliance policies that prohibit them from relying on informal agency guidance when that guidance is not codified in, and may be interpreted as being contrary to, later-adopted formal agency guidance (and clear statutory text in the case of assurance).

[41] SB 253/261/219 Public Workshop: Update on California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs, November 18, 2025, https://ww2.arb.ca.gov/sites/default/files/classic/SB%20253%20261%20Nov%20Workshop%20slides%20%28Updated%29.pdf

[42] Staff Report at 5 ("Establishing this reporting deadline provides clarity for first-year reporting. Other program requirements, including but not limited to reporting and assurance requirements and enforcement provisions, will be developed and adopted through a subsequent rulemaking") and 15 ("CARB will undertake a second rulemaking to establish future reporting dates beyond 2026 and to provide additional details for reporting contents and format, data assurance, and more"). https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/isor.pdf

Without adopting final regulations that explicitly waive assurance requirements in 2026 and clearly explain CARB's regulatory authority for doing so, many companies may be unwilling or unable to take advantage of the relief CARB is seeking to provide.

VI. Recordkeeping Compliance Considerations

Recommendation: Remove currently proposed record-keeping requirements in favor of one of the more narrowly tailored options suggested below.

Rationale: § 96074(d) Would Impose Onerous Requirements Unmoored From Any Commensurate Benefit

018.29

The Proposed Regulation at § 96074(d) requires every entity "subject to this article" to (1) maintain records demonstrating that it meets the revenue and "doing business in California" thresholds, (2) retain those records for five years, and (3) provide them to CARB upon request. We respectfully submit this provision:

- Imposes an administrative burden on regulated entities that is disproportionate to the regulatory benefit;
- Duplicates information already available to CARB through existing state agency data-sharing mechanisms;
- Creates an asymmetry between CARB's role in determining applicability and fee amounts versus the entity's burden to prove or disprove its own coverage; and
- Provides limited incremental value for entities that are already complying with reporting and fee payment obligations.

A. **The recordkeeping requirement in § 96074(d) is duplicative and burdensome for limited value.**

§ 96075(d) of the Proposed Regulation expressly authorizes the Executive Officer to "contract with or consult with outside entities, including, but not limited to, the Board of Equalization or the California Franchise Tax Board, to obtain data or services needed to audit the fee remittances provided by fee payers."

Further, the Staff Report acknowledges that the key applicability criteria—"doing business in California" and "revenue"—are defined by reference to California Revenue and Taxation Code provisions and are "verifiable via tax documents available from the FTB." Specifically:

(a) The Staff Report states that "the applicability of entities subject to the fee regulation as defined by the California Revenue and Taxation Code § 23101 is verifiable via tax documents available from the FTB."[43]

(b) The Staff Report also notes that "this definition of annual revenue is verifiable for all public and private businesses through FTB tax filings."[44]

In light of these stated premises, § 96074(d) appears inconsistent. CARB simultaneously asserts that state tax records provide verifiability and reduced burden, yet requires entities to maintain and produce their own records as though that infrastructure did not exist. The more coherent approach is for CARB to rely primarily on the same FTB-based sources it cites as the backbone for enforceable applicability determinations and only request incremental documentation in exceptional cases.

018.30

In practice, because CARB has already made an applicability determination (at least preliminarily) before any recordkeeping request arises, a universal five-year record retention mandate on every invoiced entity is duplicative: it requires companies to build and maintain a parallel "applicability file" for CARB's

[43] Staff Report at 9-10.
[44] Staff Report at 10.

determination—often assembling records that already exist in government systems. Requiring entities to maintain duplicative records imposes unnecessary administrative costs. This is particularly true for entities that are already filing reports and paying fees—because CARB already has an active compliance channel with those entities and can validate coverage using the same objective state records that CARB cites as verifiable through FTB filings, the incremental value of a universal five-year applicability file is limited while the administrative burden is substantial.

B. **The recordkeeping requirement creates an inappropriate asymmetry in regulatory responsibility.**

Under the proposed regulatory framework, CARB—not the regulated entity—makes the initial determination of which entities are covered and calculates the fee amounts due. Specifically:

(a) § 96074(a) provides that "on or by September 10, the Executive Officer shall provide a written fee determination notice to each affected entity of the amount due."
(b) The fee calculation formulas in proposed§ 96073 require CARB to determine the number of reporting entities (N38532) and covered entities (N38533) as inputs to the fee calculation.

This framework places CARB in the position of determining which entities are in scope and what fees are owed, yet the recordkeeping provision shifts the burden of maintaining applicability documentation to the entities themselves. If CARB is making these determinations—presumably based on data it already possesses or can obtain through FTB coordination—it is more appropriate for CARB to maintain the underlying applicability records rather than requiring each entity to do so independently.

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The Staff Report rationale for this provision is minimal, stating only that "retention of records related to the eligibility thresholds of the Proposed Regulation allows Staff to follow up with entities to verify information when there are questions about coverage."[45] This rationale does not explain why entities should bear the cost of maintaining records that CARB can obtain through existing interagency mechanisms, particularly when CARB is the party making applicability determinations in the first instance.

The burden imposed by § 96074(d) is not theoretical. In practice, it will require companies to create and maintain duplicative documentation packages for CARB, even where state records already exist and where CARB can independently verify coverage:

- **Data mismatch / mistaken invoicing scenario:** A company receives a fee determination notice due to an upstream data error or corporate name/structure mismatch. To prepare for a potential CARB request, the company must assemble and retain multi-year "doing business" analyses, revenue workpapers, and internal sourcing data—often requiring significant legal and finance resources—despite CARB being able to validate the underlying criteria through tax documents and its audit authority.
- **M&A / reorganization scenario:** Following an acquisition, entities may need sensitive, transaction-related analyses to determine revenue and California nexus across consolidated structures. A blanket retention rule incentivizes over-collection and retention of confidential deal materials and internal workpapers far beyond what is needed to confirm basic coverage thresholds.
- **Threshold "cycling" scenario:** Entities near the threshold may shift in and out of coverage year-to-year. If § 96074(d) remains broad and undefined, companies will be compelled to preserve evolving internal analyses for five years even when the determination is ultimately based on objective, standardized tax concepts.

These examples illustrate why a universal recordkeeping mandate is likely to produce over-retention, overproduction, and compliance friction without meaningfully improving CARB's ability to administer the program.

1. The Recordkeeping Requirement is vague and invites inconsistent, costly compliance behavior

018.32

[45] Staff Report at 13.

§ 96074(d) does not specify:

- what constitutes "records demonstrating" the thresholds (e.g., full returns, worksheets, apportionment schedules, board minutes, intercompany transaction data, corporate structure charts);
- whether summaries or certifications are sufficient;
- how to treat complex structures (parents/subsidiaries, reorganizations);
- how confidentiality will be handled when records include sensitive tax and commercial information.

This vagueness will predictably lead companies—especially those with limited in-house compliance teams—to over-retain, over-collect, and over-escalate to counsel to avoid enforcement risk. That is a real burden even for large entities, and it is particularly acute for private companies and organizations with complex corporate structures.

A blanket five-year retention requirement encourages creating a comprehensive, litigation-ready set of documents for every transaction—documents that are far broader than what is needed to validate fee applicability.

2. The enforcement structure in § 96075 amplifies the burden of the recordkeeping requirement

The recordkeeping burden under § 96074(d) must be read in conjunction with the enforcement provisions in § 96075. Under § 96075(c), "[t]he failure to pay the full amount of any fee required by this subarticle shall constitute a single, separate violation of this subarticle for each day or portion thereof that the fee has not been paid after the date the fee is due."

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This creates a problematic dynamic: an entity that in good faith believes it is not covered by the regulation has no safe harbor in the proposed text and faces per-day penalties while it disputes CARB's applicability determination. In this context, the recordkeeping burden becomes more consequential as entities must maintain comprehensive "applicability files" as defensive protection against enforcement action, even if they are confident they fall outside the regulation's scope.

Conclusion: We appreciate CARB's efforts to develop a workable regulatory framework for implementing §§ 38532 and 38533. However, the recordkeeping provision in § 96074(d) imposes administrative burdens that are not justified by the regulatory benefits, particularly given CARB's existing access to the relevant data through state tax authorities. In light of these considerations, we urge CARB to consider and adopt one of the following options instead:

Option 1 (preferred): Remove § 96074(d) and rely on CARB-maintained applicability records

Delete § 96074(d) in its entirety. CARB should maintain (internally) the data sources and decision logic used to identify "affected" entities for invoicing—consistent with CARB's stated reliance on verifiable FTB tax documents and state infrastructure.

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Option 2: Replace with a targeted, dispute-based record submission process

Replace § 96074(d) with language that:

- requires an entity to provide documentation only if it affirmatively claims it is not covered, disputes a fee notice, or seeks an exemption; and
- allows submission of a short certification plus specifically enumerated supporting items (e.g., a relevant excerpt of an FTB filing or a standardized apportionment/sales factor summary).

This approach aligns record submission with actual need, rather than imposing a universal retention regime.

Option 3: Narrow and clarify § 96074(d) to reduce burden and protect sensitive information

If CARB retains a recordkeeping requirement, CARB should (i) define a clear minimum safe harbor set of records (e.g., a short certification plus an excerpt or summary derived from relevant California tax filings), (ii) confirm that where CARB can verify annual revenue and California nexus from FTB filings or other state records, CARB will not require duplicative production absent a specific discrepancy, (iii) limit record requests to disputes or anomalies, and (iv) clarify confidentiality handling for tax-return and proprietary commercial information.

VII. Rulemaking Process and Consultation for Proposed Regulation

We appreciate CARB's stakeholder engagement efforts over the past year and share its goal that § 38532 produce accurate, comparable, and decision-useful disclosures that interoperate with global regimes. The Proposed Regulation has the potential to set a leading standard for climate-related disclosures, but the abbreviated and disjointed rulemaking procedure threatens its quality, clarity, and effectiveness. The rulemaking process, including the agency's various notices, FAQs, webinars, and accompanying materials provided prior to the issuance of the Proposed Regulation and the Staff Report, has proceeded on an accelerated and fragmented basis, with limited consultation of key stakeholders, creating a challenging and uncertain compliance planning environment for potentially regulated entities.

1. Abbreviated timeline for finalization of regulation

The current consultation timeline is positioned to meet only the minimum requirements under the California Administrative Procedure Act ("APA") (Government Code §§ 11340, *et seq.*). This approach is detrimental to the clarity, quality, and effectiveness of the Proposed Regulation. The rulemaking timeline does not permit meaningful amendments to the Proposed Regulation, as is expected to be warranted from the responsive comments provided. As such, we recommend CARB build in additional time for public consultation.

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We appreciate that CARB published the Proposed Regulation on December 9, 2025, to provide additional review time in advance of opening the public comment period December 26. Nonetheless, the formal publication established a 45-day comment period running through the holiday period, resulting in a 30-business-day comment period. This timeline is tight and, given its overlap with the holiday period, inopportune for soliciting full participation and consultation from all stakeholders. Further, with only 13 business days between the close of the comment period and the board consultation, there is very little time for CARB staff to meaningfully review, analyze, vet, and prepare well-considered recommendations for the Board based on the public feedback.

Among other things, CARB should bear in mind that to accommodate substantial changes, the agency would be required to provide a second 15-day comment period in compliance with the APA. Additionally, to the extent that CARB decides not to incorporate changes based upon the comment period, staff must address the comments and provide justifications for declining recommended changes.

In light of the significant interest in the Proposed Regulation, which we understand has thus far exceeded CARB's records for stakeholder attendance and participation, we strongly recommend that CARB delay the planned Board hearing by at least 30 days to provide time for CARB staff to carefully digest and address input from stakeholders, and to accommodate the APA's additional 15-day period for stakeholder review of needed subsequent changes to the regulation.

2. Insufficient stakeholder consultation

We appreciate that CARB staff have held several lengthy public meetings,[46] received many written comments, and endeavoured to have an open door. However, the rulemaking record and proposal do not

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[46] Note that while the three public workshops in 2025 were lengthy, based on the number of commenters seeking to speak, comments were limited to two minutes, which for many participants, was not sufficient to meaningfully provide feedback or express concerns.

clearly reflect the nature and substance of statutorily required consultation. The statute requires CARB to consult with all of the following: "(A) the Attorney General; (B) other government stakeholders, including, but not limited to, experts in climate science and corporate carbon emissions accounting and reporting; (C) investors; (D) stakeholders representing consumer and environmental justice interests; and (E) reporting entities that have demonstrated leadership in full-scope greenhouse gas emissions accounting and public disclosure and greenhouse gas emissions reductions."[47] Beyond broad references to stakeholder consultations, the record of consultation does not discuss how CARB has met its requirement to meaningfully engage with these stakeholders. Had stakeholder consultations been given due weight, we would expect the Staff Report to reflect such input; however, no specific stakeholder input is discussed in the Staff Report with any substantive specificity. Indeed, the only place where the Staff Report addresses stakeholder input in any practical way is in connection with reporting deadline commentary and even there, the discussion is cursory and generalized and does not reflect the Society's repeated feedback—provided through multiple written submissions and direct engagements with CARB staff— as to the timing of reporting.

By way of example, the Society has repeatedly expressed concerns about the § 38532 reporting deadline in the context of data that show that companies typically publish their sustainability reports, including GHG emissions disclosures, between six to nine months (on average, within a much broader range) after the end of their fiscal year and we have encouraged CARB to solicit additional feedback on this topic. Yet the Staff Report references only six months and implies that six months will accommodate all reporting companies without regard to data and written and oral feedback that is inconsistent with that conclusion.[48] As noted above in Section III.B., the Staff Report further inappropriately references CARB's existing and unrelated MRR program verification deadline[49] as a basis for the Health and Safety Code § 38532 reporting deadline without regard to the typical timelines by which companies typically disclose their GHG emissions and the fact that the MRR program verification deadline is not an appropriate benchmark for § 38532 reporting. As noted previously, § 38532 (c)(2)(A)(vi) provides: "The reporting timelines shall consider industry stakeholder input and shall take into account the timelines by which reporting entities typically receive scope 1, scope 2, and scope 3 emissions data, as well as the capacity for an independent assurance engagement to be performed by a third-party assurance provider." CARB should be responsive to data on current timing practices and the Staff Report should use that data to support the § 38532 reporting deadline included in the Proposed Regulation.

Both the stakeholder community and CARB stand to benefit from meaningful engagement and consideration by CARB. If the stakeholder community agrees that CARB succeeded in the drafting of the Proposed Regulation, the regulation as adopted is likely to serve as a top standard for climate-related disclosure regulation. This will encourage stakeholders to advocate for other jurisdictions to follow the model established by CARB, solidifying CARB's leadership as a standard-setter in climate-related disclosures. On the other hand, if the stakeholder community perceives that it has not meaningfully engaged in the process, that its perspectives were not sufficiently considered, or that the adopted regulation is substantively problematic, this risks other jurisdictions steering away from the CARB's approach and leading to a fragmented regulatory framework nationally and globally that poorly serves the public interest.

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[47] Health and Safety Code §38532(c)(4).

[48] Staff Report at 15 ("Staff received feedback from stakeholders regarding a future first year reporting deadline. Two of the main themes communicated in this feedback were, 1) reporting entities requested six months after the end of their fiscal year to gather data, verify the accuracy of the data, and report to CARB, and ...This approach guarantees at least six months of time between fiscal year end and the proposed reporting deadline, to provide additional flexibility and accommodate the wide range of fiscal year timelines.")

[49] Staff Report at 15 ("The proposed first reporting deadline of August 10, 2026, matches the verification deadline under CARB's existing MRR program, with the goal of streamlining GHG reporting responsibilities and timing for entities reporting under Health and Safety Code section 38532 and MRR.")

As noted in the preamble of and throughout this comment letter, at present, many concerns and considerations remain unaddressed in the Proposed Regulation and Staff Report, warranting greater stakeholder input before the adoption of the Proposed Regulation.

Further, stakeholder companies expect that their disclosure reports prepared in compliance with the Proposed Regulation will be read and relied upon by a much broader audience than just CARB. For example, § 38532(c)(2)(B) contemplates that consumers, investors, and other stakeholders will use these reports. The consultation process should account for the reality of the broad use cases and audiences for disclosure reports made in compliance with the Proposed Regulation to promote the disclosure of meaningful and practical information for that broader audience consistent with the statutory purpose. This consultation will be an important foundation for CARB's further substantive § 38532 rulemaking to ensure that the data and any format established for reporting is a net benefit to users of the information and maximally interoperable with other global reporting standards and schemes.

3. Fragmented and informal regulatory approach

We find the fragmented rulemaking approach adopted by CARB to be quite challenging from a stakeholder input and compliance planning standpoint. By establishing essential definitions and
018.37 applicability for the fee scheme before the substantive reporting requirements have been developed, stakeholders lack clarity regarding how important concepts, such as parent-subsidiary relationships, will ultimately influence their responsibilities under the law. Likewise, from a compliance standpoint, it puts regulated entities in the position of having legal obligations imposed on them through the applicability provisions that are not yet substantively fleshed out.

We appreciate that CARB is exercising enforcement discretion for first year reports to relieve assurance obligations and accept reports based on available data. However, as discussed in Section V above, aside from the fact that many mature reporting companies in particular are unable to benefit from this relief due
018.38 to internal controls, regulatory, or other requirements to report only complete and assured data (as discussed in Sections II and III), for those companies are able and elect to take advantage of the relief, we believe that this approach should be spelled out clearly in the Proposed Regulation to provide clarity on the obligations triggered by the proposed definitions and to ensure that regulated entities can reasonably understand and rely on the scope of their obligations during initial implementation.

Further to and expanding on the concerns described in Section V above regarding various ad-hoc exemptions not included in the Proposed Regulation, we recommend that CARB amend the Proposed Regulation to expressly include the transition relief announced during its November workshop and in related FAQ updates. In particular, we believe the Proposed Regulation should expressly (1) as noted
018.39 above, waive the assurance requirement for year one, (2) incorporate CARB's FAQ advice regarding waiver procedure for entities that were not yet collecting data as of the date of the December 2024 Enforcement Notice (December 5, 2024), and (3) incorporate CARB's FAQ advice confirming that entities may submit data in any format, including existing reporting, provided it includes the statutorily required Scope 1 and Scope 2 data reported under the Greenhouse Gas (GHG) Protocol.

As this is a critical compliance framework that is not self-executing under the statute, we believe these requirements should be codified subject to notice and comment rulemaking that allows stakeholders to weigh in and enjoy the reliance benefit of a clear rule. Taken together, we encourage CARB to consider delaying finalization of a fee-only rule and instead incorporate these definitions into a complete rule that would provide stakeholders with clarity and opportunity to weigh in on the full picture of the reporting proposal.

Adherence to APA – Health and Safety Code § 38533

Health and Safety Code § 38533 requires a covered entity to make its climate-related financial risk report publicly available "on its own internet website."[50] The statute does not require submission of the report, or a link to the report, to a CARB-hosted docket as a condition of compliance.

Recent CARB guidance materials, website content, and related compliance documents repeatedly state that covered entities "must" submit a public link to their climate-related financial risk reports to a CARB-hosted docket. Although CARB has characterized current docket participation as voluntary, this posture
018.40 reflects the existence of a court-ordered injunction[51] rather than a determination that docket posting is optional under § 38533. CARB has otherwise indicated, through published guidance and enforcement materials,[52] that submission of a report link to the CARB docket[53] is expected for compliance once enforcement resumes, creating significant uncertainty for covered entities, particularly because CARB's guidance consistently presents docket submission as a mandatory compliance step despite the absence of statutory or regulatory authority for that obligation.

Any requirement that covered entities submit report links to a CARB docket would impose an obligation beyond the express terms of § 38533 and is not included in CARB's proposed regulatory text. Under the California Administrative Procedure Act, compliance obligations must be established through statute or duly adopted regulations.[54]

We therefore urge CARB to clarify in its final regulations implementing § 38533 that a covered entity satisfies the reporting requirement by making its climate-related financial risk report publicly available on its own internet website by the applicable deadline, and that no additional posting or submission to a CARB-hosted docket is required.

Regulatory Assumptions Affecting Both Fee Calibration and Disclosure Quality

To achieve CARB's goals, including generating data that is decision-useful and interoperable with other global regimes, we respectfully highlight key assumptions underlying the Proposed Regulation and Staff Report that could be more fully supported or recalibrated to reflect more realistic implementation dynamics and data. Doing so will enhance the usefulness of reported information for investors and other users, reduce avoidable friction for reporting entities, and support California's aspiration to set a practicable model other jurisdictions can follow.

1. Minimal Compliance Costs for the Proposed Fee Regulation

In its Staff Report, CARB asserts the estimated compliance costs for its proposed fee regulation "are minimal and not anticipated to influence employment levels [in California]" (page 18). It also asserts "[t]he

[50] Health & Safety Code § 38533(c)(1). Likewise, Health & Safety Code § 38533(f)(2) directs CARB to adopt regulations that authorize the imposition of penalties if a covered entity fails to make the disclosure report "***publicly available on its internet website*** or publishes an inadequate or insufficient report (emphasis added).

[51] *See, e.g.*, CARB's November 18, 2025 presentation slides "SB 253/261/219 Public Workshop: Update on California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs," p. 34, available at https://ww2.arb.ca.gov/sites/default/files/classic/SB%20253%20261%20Nov%20Workshop%20slides%20%28Updated%29.pdf.

[52] *See Enforcement Advisory: Climate-Related Financial Risk Reporting (SB 261)*, December 1, 2025, available at https://ww2.arb.ca.gov/sites/default/files/2025-12/Dec%201%20SB%20261%20Enforcement%20Advisory.pdf.

[53] CARB's public docket is available at https://ww2.arb.ca.gov/public-comments/climate-related-financial-risk-reports-sb-261-docket.

[54] *See* Cal. Gov. Code § 11340.5 (a); Cal. Gov. Code § 11342.600; 1 CCR § 250(1)(a). Rules not written into regulations or otherwise legislatively authorized are invalid "underground" regulations and cannot be enforced. *See, e.g.*, *Donaldson v Dep't of Real Estate* (2005) 134 Cal.App. 4th 948, 966; *Tidewater Marine W., Inc. v Bradshaw* (1996) 14 Cal. 4th 557, 563. This includes requirements characterized as policies as well. *See, e.g., Morillion v Royal Packing Co. (*2000) 22 Cal.4th 575, 570.

estimated compliance costs for each regulated entity are minimal and therefore are not anticipated to affect the expansion of businesses currently doing business within the State of California."[55]

Beyond the proposed fee structure, CARB proposes in the Staff Report definitions for "business entity," "covered entity," "reporting entity," "doing business," "doing business in California," "revenue," "parent company" and "subsidiary." Each of these definitions bear on the potential fee amount covered entities would pay under the proposed regulation.

018.41 Contrary to CARB's assertion of "minimal" compliance costs, covered entities, or potentially covered entities, will incur significant costs to evaluate the scope and terms of the above definitions (the challenges of which are covered above) for the purpose, as relevant here, of calculating what fee amount, if any, they may be required to pay to CARB. Particularly for non-California entities that generate some revenues in the State and have complex organizational structures, joint or similar ventures, and/or global or multi-state operations, the internal and external accounting, legal, and tax resources, and related costs, required to determine threshold applicability of the fee regulation, develop or refine data systems and workflows, organize reporting on a consolidated or company-by-company basis, and ensure ongoing compliance—including establishing appropriate internal controls and record retention procedures—will be a substantial undertaking.

In a 2025 survey used to inform our March 2025 comment letter to CARB, Society members estimated compliance costs with § 38532 would range in the hundreds of thousands of dollars and up to $1 million.[56] While the respondents at that time were uncertain of the scope of the proposed regulation outside of the express statutory text and thus were asked to provide expected costs based on their initial assessment, the estimated amounts well exceed a "minimal" cost.

2. No Job Creation or Elimination Expected Due to Minimal Costs

018.42 Further to the above, in the Staff Report Economic Impacts Assessment,[57] CARB concludes that the proposed regulation "is not expected to directly affect the creation or elimination of jobs within the state," because "the estimated compliance costs for this regulation are minimal." As noted, this will be far more than a minimal undertaking for many companies. As such, we respectfully recommend CARB to re-evaluate this assumption and conduct a more detailed economic impact analysis. Given the scale of preparatory work described by stakeholders, we suggest that CARB further evaluate whether assurance readiness, data collection and controls, increased disclosure, and multi-jurisdiction alignment have already led to or will in the future lead to increased hiring or outsourcing and update the record accordingly to avoid understating impacts in compliance with the APA.

3. Assumption that Higher Sales Imply Larger GHG Footprint

018.43 The Proposed Regulation defines revenue using the same meaning as "gross receipts" under California Revenue and Taxation Code § 25120(f)(2). This definition emphasizes sales and "does not deduct operating costs" because, according to the Staff Report, "sales is a more appropriate metric for identifying companies that may potentially have large operations and associated carbon footprints."[58] We urge CARB

[55] Staff Report at 19.
[56] Society for Corporate Governance Survey: Emissions Disclosure, Assurance & Climate Risk Reporting (February/March 2025) (on file with author), referenced in Society Comment Letter: Information Solicitation to Inform Implementation of California Climate-Disclosure Legislation: Senate Bills 253 and 261, as amended by Senate Bill 219 (March 2025) at 8 note 6 ('Question: Based on your company's initial assessment of SB 253, what do you expect your company's initial and ongoing annual total costs will be to comply with the law, inclusive of development, expansion, and/or refinement of processes and procedures; technology; internal and outsourced staffing; consultants; and other resources? Please exclude attestation providers or specifically note that your costs include attestation.").

[57] Staff Report at 18.
[58] Staff Report at 10.

not to equate larger revenue with higher emissions, as this assumption is not uniformly valid across diverse sectors and business models. For example, retailers with high pass-through sales, firms with limited direct emissions, and holding companies with multiple legal entities, can be large in revenue but
018.44 modest in emissions. As discussed elsewhere in this letter, we recommend CARB reassess the fee structure for different reasons. In addition, we believe CARB should acknowledge that the Staff Report assumption or inference is unfounded and revise its justifications for using this metric to more accurately
018.45 represent corporate realities.

4. Assumption of No Costs for Small Businesses

The Staff Report states that due to the relatively high revenue thresholds of the Proposed Regulation, it is not expected to have direct costs on "small businesses," as defined by California Government Code § 11346.3.[59] We recommend CARB conduct further analysis to assess the effects on small businesses, considering factors like supply chain dependencies, contractual obligations with larger entities, and potential shifts in market dynamics. This would allow for a fuller picture of how the regulation might be more equitable and not inadvertently disadvantage smaller entities.
018.46

5. Anticipated Benefit of Increased Reporting

The Staff Report outlines anticipated benefits from its regulation, including that it will "support a program that involves further quantification and reporting of regulated entities' GHG emissions."[60] CARB expects this additional reporting to "ultimately result in beneficial reductions in GHG emissions following improved
018.47 accounting," although "the extent of any such GHG reductions is not quantifiable at this time."[61] It is understandable that the emissions reduction piece is not quantifiable at this time; however, the statement that the program will lead to more reporting is also unquantified and unsupported.

We recommend that if this purported benefit is to be included in the record, CARB provide support and details on how much net new decision-useful information will be reported under § 38532 and § 38533, particularly as many of the public companies and mature reporters that the regulation captures already report in accordance with global frameworks and there is a statutory obligation for CARB to consider interoperability and reduced duplication, particularly with the GHG Protocol. As stated in the Society's prior submission on November 21, 2025,[62] deviating from this framework or mandating granular
018.48 California-specific templates would substantially increase complexity and cost, especially for entities already reporting under international frameworks, contrary to § 38532(c)(2)(D)(i).

6. Actual and Reasonable Costs

As discussed above in Section IV, the Staff Report explains that fees must be set "in an amount sufficient to cover the actual and reasonable costs to administer and implement these programs." It then defines the Total Required Revenue (TRR) as an inflation-adjusted Required Revenue ("RR") figure, "which reflects (1) personnel salaries and benefits of staffing needs required to implement, administer, and

[59] Staff Report at 20.
[60] Staff Report at 16.
[61] Id.
[62] Society Comment Letter in Response to Draft Reporting Template for Scope 1 and Scope 2 Greenhouse Gas Emissions Pursuant to Health and Safety Code § 38532 and Accompanying Memo (November 2025), available at https://higherlogicdownload.s3.amazonaws.com/GOVERNANCEPROFESSIONALS/5d47927b-105a-4bc7-9aef-821536f3505b/UploadedImages/Society_for_Corporate_Governance_Comment_CARB_Comment_Letter_Scope_1_and_2_Template_Memo_November_21_2025.pdf and https://higherlogicdownload.s3.amazonaws.com/GOVERNANCEPROFESSIONALS/5d47927b-105a-4bc7-9aef-821536f3505b/UploadedImages/Society_for_Corporate_Governance_Appendix_A_Annotated_SB253_Draft_Scope1_2_GHG_Template_November_21_2025.xlsx.

enforce the regulation, (2) legal defense costs to support the State's ability to defend the regulation in court, and (3) contracting expenses to account for specialized technical, administrative, or outreach services that may be necessary to support implementation, consistent with fiscal responsibility and state budgeting practices."

In addition to the issues and recommendations set forth in Section IV, we respectfully raise two concerns regarding this revenue – and therefore, the fee – calculation:

A) *TRR Calculation Cannot Be Finalized Without Clarity on Covered Entities*: As noted earlier, the scope of coverage – specifically, how many companies will be subject to these fees – remains unclear. Without knowing the total number of regulated entities, it is not possible to accurately calculate the per-entity fee or even the aggregate TRR. Any attempt to finalize fees now risks either overestimating or underestimating costs, leading to inequitable outcomes. We urge CARB to first establish clear parameters on coverage before setting fees.

018.49

B) *Inclusion of Legal Defense Costs Is Neither Appropriate Nor Consistent with Statutory Intent*: The TRR definition includes "legal defense costs to support the State's ability to defend the regulation in court." We do not believe it is appropriate to require regulated entities to fund litigation expenses – particularly when such litigation may challenge processes or concerns with the proposed regulation that go beyond the administrative and implementation costs foreseen by the legislature when regulation was adopted. The statute states that "The total amount of fees collected shall not exceed the state board's actual and reasonable costs to administer and implement this section." Litigation costs, by their nature, are unpredictable and not directly tied to program administration or implementation. Including them in fee calculations stretches the meaning of "actual and reasonable costs" beyond what the statute allows. We respectfully request that CARB exclude legal defense costs from the TRR to ensure compliance with legislative intent and fairness to regulated parties.

018.50

Conclusion

As noted above, we appreciate our constructive engagement with CARB thus far, and welcome the opportunity to discuss these comments with CARB staff and to provide any additional information that would be helpful.

Appendix

Exhibit A: Exemplar CA SB 253 Reporting Timeline for Mature Reporting Companies

Respectfully submitted,

Randi Val Morrison
General Counsel & Chief Knowledge Officer
Society for Corporate Governance

Paul F. Washington
President & Chief Executive Officer
Society for Corporate Governance

Exhibit A

Exemplar CA SB 253 Reporting Timeline for Mature Reporting Companies

- Even assuming certain steps above occur contemporaneously, CARB's proposed deadline of August 10 (or approximately six months following FYE) is not aligned or consistent with most companies' GHG emissions reporting practices and poses significant compliance challenges even to mature reporting companies. These challenges are exacerbated in the context of other reporting and filing undertakings, including SEC filings, CDP submissions, voluntary sustainability report publications, and CSRD/CSDDD reporting, among others.

INTERNAL USE

Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

February 6, 2026

Filed Via Web Portal: *https://carb.commentinput.com/?id=ekNF7gTx2h*

To: California Air Resources Board

Re: Comments in response to the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

The Bonneville Power Administration (Bonneville) provides these comments in response to the California Air Resource Board's (CARB) solicitation for comments on its Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation. Bonneville is a federal Power Marketing Administration within the Department of Energy and located in the Pacific Northwest. Bonneville markets power from the Federal Columbia River Power System across the West, including to California entities, and is a participant in the California Independent System Operator's Western Energy Imbalance Market. In addition, Bonneville owns and operates transmission infrastructure in California.

019.1 Bonneville appreciates that § 96071 (b) provides that the proposed regulation does not apply to: (1) federal entities and (2) business entities whose only activity within California consists of wholesale electricity transactions. The proposed regulations satisfactorily respond to Bonneville's March 20, 2025 comments on implementation of SB 253 and SB 261. Those comments explain why Bonneville believes these types of entities should not be covered entities under SB 253 and SB 261. For these reasons, Bonneville urges CARB to include the proposed exemptions listed in § 96071 (b) if it adopts the proposed regulation.

If you have questions, please contact Alisa Kaseweter at (503)312-6816 or Doug Marker at (971)533-0852.

Sincerely,

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Schneider Electric (Amy Mmagu)

Please see attached comments

February 6, 2026

Members, California Air Resources Board
1001 “I” Street
Sacramento, CA 95814

RESPONSE: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Schneider Electric, the global specialist in energy management and automation in more than 100 countries, with over 25,000 U.S. employees and thousands of U.S.-based clients and partners, is pleased to submit the following response to the California Air Resources Board (CARB) on California Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs. Schneider Electric has been **recognized as the world’s most sustainable company for two consecutive years by Time Magazine for 2023 and 2024**[1] as well as by Corporate Knights[2]. We understand that climate change is one of the most significant issues of our time, which is why, as a company, we are committed to achieving net zero emissions throughout our value chain, without the use of carbon offsets, by 2050.

Through **SE Advisory Services**, we help organizations turn bold sustainability, energy, and digitalization ambitions into measurable impact. We combine deep expertise, global implementation, and AI-powered software to drive transformation across energy and risk management, decarbonization, nature-based solutions, operational efficiency, and digital transformation.

020.1 We are strongly supportive of CARB’s proposal to mandate climate-related disclosures and applaud CARB’s proactive position on advancing transparency for the investor community on climate risks. We also acknowledge that the proposed rule will impact both our clients and our organization, and our response reflects this awareness. In response to CARB’s initial regulation language, we offer the following comments to seek clarification.

Revenue

020.2 The revenue definition remains unclear for some companies. CARB recently clarified via a memo the impact of Water's Edge accounting on CARB's total revenue thresholds: CARB has previously stated that the “total annual revenue” (used to meet the $500M/$1B thresholds) is defined as gross receipts on Form 100 Schedule F Lina 1a in the company's Franchise Tax Board (FTB) filings. While this may represent total global revenue for *some companies*, entities that elect to use the Water's Edge accounting methodology will actually use Form 100W. This accounting approach allows them to not include certain subsidiaries (following specific accounting criteria) and may cause some companies to fall out of scope for SB 261/253. We would appreciate guidance or clarification for companies that use an alternative methodology to be included either in the regulatory text, FAQs, or otherwise accessible public supplementary material.

Deadlines – SB 261

020.3 As CARB is aware, SB 261 has a statutory reporting deadline of January 1, 2026. We understand that the enforceability of this reporting deadline is dependent upon the Ninth Court of Appeals. However, we would

[1] World's Most Sustainable Companies 2024 | TIME
[2] https://www.corporateknights.com/issues/2025-01-global-100-issue/California%20Corporate%20Greenhouse%20Gas%20(GHG)%20Reporting%20and%20Climate%20Related%20Financial%20Risk%20Disclosure%20Programsschneider-electric-is-the-most-sustainable-company-in-the-world/

appreciate guidance indicating how CARB plans to adjust enforcement of the regulatory deadline if the court upholds the regulation and lifts the injunction.

Technical Guidance – SB 253

For SB 253 reporting due August 10, 2026, we would appreciate further guidance as to how reported metrics should be submitted (i.e. through a public docket, on a company website, through a CARB-specified portal, etc.) Additionally, while the Draft Template has been released and is considered optional to use for the first year of reporting, we encourage CARB to release guidance on what fields are mandatory if the Draft Template is not utilized. Examples of required guidance include but are not limited to specific emissions breakdowns by Scope, source, use type; acceptable Global Warming Potential (GWP) Assessment Report (AR) versions; and attachments of verification or assurance statements.

020.4

020.6

Fee Structure/Payment

Companies often maintain internal vendor payment processes that are complex and may require more time than is contemplated by the proposed regulatory text. Limiting the payment remittance period to 60 days, coupled with the imposition of fees for failure to meet that deadline, may establish a framework that is not aligned with the operational realities of large corporations subject to the law. We urge CARB to reevaluate these timelines.

020.5

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Thank you for the opportunity for Schneider Electric to provide responses to this solicitation and we look forward to continued engagement with the California Air Resources Board on the development of the Corporate Greenhouse Gas Reporting and Climate Related Financial Risk Disclosure Programs. Please do not hesitate to reach out to me directly with any questions at Amy.Mmagu@se.com.

Sincerely,

Amy Mmagu
California Government Relations Manager
Schneider Electric

CALIFORNIA BANKERS ASSOCIATION

February 6, 2026

California Air Resources Board
Submitted via portal: https://carb.commentinput.com/?id=ekNF7gTx2h

RE: Comments regarding Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation Proposed Regulation Text A-1

Dear Chair Sanchez:

The California Bankers Association (CBA) appreciates the opportunity to submit comments in response to the California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation Proposed Regulation Text A-1 released December 9, 2025, and scheduled for consideration February 26, 2026.

Bankers appreciate the engagement by CARB staff and the opportunity to suggest improvements to CARB's proposed regulations informed by lessons learned with other corporate climate disclosure programs.

Section 96071 Applicability

Credit unions should be included -- In contrast to organizations with charitable intent or other community benefit that qualify as a tax-exempt under section 501(c)(3) of the Internal Revenue Code (IRC), credit unions are nonprofits organized under either Section 501(c)(1) or 501(c)(14) that compete in the marketplace with banks. Bankers believe limiting the Section 96201(b)(1) exemption to those organizations that qualify as tax-exempt under section 501(c)(3) of the IRC would be in accordance with the legislative intent. 021.1

Section 96072 Definitions

Commend two-year revenue threshold window -- Bankers commend the inclusion of "the lesser of the entity's previous two fiscal years of revenue" in Section 96202(a)(11) as this avoids the circumstance where short-term revenue volatility, or one-time gains, may cause an entity to temporarily exceed the threshold. 021.2

Section 96072 Definitions and Sections 96073-96075 Calculation of Fees, Payment and Collection, Fee Enforcement

Improve clarity about parent/subsidiary identification and disputes -- It would be helpful for CARB to clarify how the fee framework is intended to operate in practice, including that CARB determines applicability and issues fee determination notices, while entities maintain records demonstrating whether they meet the applicable thresholds and provide those records upon request. Specifically, CARB should clarify a process for disputes over 021.3

assessments or entity classification before payments are due, how late identification of covered entities or corrections will be handled, and whether CARB will stay enforcement while disputes are pending. Adding these elements would reduce confusion and support more efficient fee administration. 021.11

Section 96076 Deadline for Reporting Under HSC Section 38532

First year August 10 reporting deadline becomes more challenging once assurance and Scope 3 added, December 31 promotes more durable and consistent reporting – Section 96076(a) establishes a deadline for the 2026 reporting. CARB is encouraged to take into account future Scope 3 reporting and assurance requirements, not only the Scope 1 and Scope 2 reporting included in this regulation package, to establish a durable emissions disclosure framework that can scale effectively over time. 021.4

While some entities with mature data systems and established emissions reporting processes can meet an August 10 reporting deadline today for Scope 1 and Scope 2 disclosures, this timing is not sustainable as a permanent regulatory requirement. As reporting and assurance expectations expand, an early August deadline becomes increasingly misaligned with how emissions data are finalized, reviewed, and assured in practice. Over the longer term, reporting deadlines should be moved later in the year and aligned across scopes. Aligning Scope 1 and Scope 2 reporting with Scope 3 on a December 31 deadline would provide a more durable and consistent reporting framework.

For financial institutions, Scope 1 and Scope 2 emissions data are sourced from numerous offices, subsidiaries, and operational systems across multiple jurisdictions. While some firms can finalize this information by early August, doing so may require accelerated timelines and tightly sequenced internal processes, leaving limited flexibility to accommodate late-arriving data or additional review. These challenges are more acute for entities with decentralized operations, less mature emissions data systems, or limited experience coordinating emissions reporting alongside assurance processes within compressed timelines after the fiscal year closes. 021.5

Establishing the proper long-term reporting deadline also requires considering Scope 3 timing. As CARB develops a permanent reporting framework, Scope 3 considerations are directly relevant to deadline design and should be incorporated from the outset, rather than retrofitted later. Scope 3 emissions reporting presents distinct and materially greater timing challenges, which underscore why a single August reporting deadline is not appropriate across all scopes. Scope 3 data depend on third-party information that is outside an entity's control and often subject to significant lags. For financial institutions, financed emissions calculations rely on emissions data from thousands of counterparties across sectors and jurisdictions, many of whom do not publish relevant information until well after mid-year. Data vendors supporting Scope 3 reporting similarly face delays in 021.6

obtaining, validating, and updating datasets. As a result, Scope 3 disclosures inherently trail Scope 1 and Scope 2 and cannot reasonably be finalized by an August 10 deadline.

Assurance processes create additional timing constraints across all scopes. Under SB 253, independent assurance for Scope 1 and Scope 2 emissions begins with limited assurance and escalates to reasonable assurance over time. Even limited assurance requires evidence-based testing, documentation of internal controls, and validation of underlying data. Reasonable assurance substantially increases the scope and rigor of review, requiring more extensive sampling, deeper controls evaluation, and additional review cycles. An August deadline limits flexibility for these processes and becomes increasingly misaligned as assurance expectations mature. 021.7

These timing pressures are further compounded by assurance provider capacity constraints. Assurance firms must allocate resources across multiple clients, scopes, and regulatory regimes and require sufficient time to conduct testing, resolve issues, and complete quality reviews. A fixed August deadline increases the risk of bottlenecks and inconsistent outcomes, particularly as Scope 3 and reasonable assurance requirements are phased in.

A December 31 reporting deadline better accommodates the realities of third-party data flows and provides a stable foundation as assurance requirements mature. Aligning all scopes to a single year-end deadline would support higher-quality data, improve comparability across reporting entities, reduce operational risk, and enable CARB to establish a durable emissions disclosure framework that can scale effectively over time. 021.8

Retain flexibility – CARB should afford reporting entities maximum flexibility with respect to the reporting period covered by reports. Relevant factors that may affect a reporting entity's timeline for collecting, reconciling and obtaining assurance include, but are not limited to, the annual reporting deadline established by CARB, a reporting entity's fiscal year (which may not match the calendar year), and a reporting entity's reporting cycle for greenhouse gas emissions data (which may not match its fiscal year). Further, CARB should formally allow the use of estimates, proxies or modeled data when third party records are not yet finalized, and without triggering penalties or re-filing obligations. 021.9 021.12

Section 96207 Severability
No comments.

Preserve flexibility, avoid prescriptive requirements or reporting formats
The statute provides that emissions reporting should be "structured in a way that minimizes duplication of effort and allows a reporting entity to submit…reports prepared to meet other national and international reporting requirements, as long as those reports 021.10

satisfy all of the requirements of [Health and Safety Code Section 38532].” Bankers encourage CARB to avoid prescriptive requirements or mandatory reporting templates that are at odds with the statute’s clear expectation that reporting entities may satisfy their obligations by submitting reports prepared for other jurisdictions.

Sincerely,

Chris Shultz
Vice President, Government Relations
California Bankers Association

CS:ec

CALIFORNIA BANKERS ASSOCIATION

February 6, 2026

California Air Resources Board
Submitted via portal: https://carb.commentinput.com/?id=ekNF7gTx2h

RE: Comments regarding Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation Proposed Regulation Text A-1

Dear Chair Sanchez:

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Section 96207 Severability
No comments.

Preserve flexibility, avoid prescriptive requirements or reporting formats
The statute provides that emissions reporting should be "structured in a way that minimizes duplication of effort and allows a reporting entity to submit…reports prepared to meet other national and international reporting requirements, as long as those reports 022.7

satisfy all of the requirements of [Health and Safety Code Section 38532].” Bankers encourage CARB to avoid prescriptive requirements or mandatory reporting templates that are at odds with the statute’s clear expectation that reporting entities may satisfy their obligations by submitting reports prepared for other jurisdictions.

Sincerely,

Chris Shultz
Vice President, Government Relations
California Bankers Association

CS:ec

Evergreen Renewables Inc (Michael Leggett)

We appreciate CARB's engagement with stakeholders as it implements SB 253 and respectfully offer a few high-level recommendations as GHG reporting rules are finalized.

1. Maintain stable Scope 2 accounting through the initial implementation period.

We encourage CARB to provide certainty by allowing companies to continue using the GHG Protocol's current Scope 2 Guidance (2015) through at least 2033. This guidance was in effect when SB 253 was enacted and remains the foundation of corporate clean electricity procurement today. Companies have made long-term investments and contractual commitments based on these rules that enable clean energy projects. Introducing uncertainty about Scope 2 accounting during the early years of SB 253 risks disrupting procurement and slowing progress at a time when accelerating clean electricity deployment is critical. 023.1

Policy stability is particularly important because the most impactful procurement strategies rely on long-term contracts. Multi-year power purchase agreements, long-term REC contracts, and similar instruments provide the predictable revenue that enables new renewable energy projects to secure financing. Sudden changes to accounting rules can undermine confidence in these contracts and reduce the willingness of companies to enter into new long-term agreements.

2. Avoid automatic adoption of future GHG Protocol revisions and ensure a deliberate transition.

CARB should not automatically incorporate future changes to the GHG Protocol. If CARB considers alternative approaches after 2033, we encourage a transparent process that evaluates how any new accounting framework would affect clean electricity procurement and real-world emissions reductions. 023.2

In particular, CARB should ensure that companies are not penalized for long-term clean electricity contracts executed prior to any rule changes. Transition provisions, including legacy treatment for existing agreements, will be essential to preserve market confidence and avoid stranding investments that were made in good faith under existing guidance. 023.4

3. Consider the market impacts of more granular matching requirements.

Emerging proposals that emphasize increasingly granular temporal or geographic matching should be evaluated carefully in the context of SB 253. While improved data and transparency can be valuable, overly restrictive matching requirements risk increasing cost and complexity in ways that reduce participation and weaken demand for new clean energy. 023.3

The clean electricity market has scaled largely because annual, certificate-based accounting enabled broad participation and supported long-term contracting that enabled new projects. Policies that make procurement significantly more complex or restrictive could unintentionally slow the pace of new project development by reducing the pool of participating buyers and undermining long-term revenue certainty.

For SB 253 to succeed, the reporting framework should reinforce the conditions that have enabled

rapid renewable energy deployment: stable rules, scalable participation, and strong incentives for long-term contracting.

We appreciate CARB's leadership and the opportunity to provide input.

February 6, 2026

California Air Resources Board
1001 I Street
Sacramento, CA 95814

Subject: Insurance Industry Comments on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Regulatory Text

Dear California Air Resources Board Members,

On behalf of the American Council of Life Insurers (ACLI), the American Property and Casualty Insurance Association (APCIA), the Association of California Life and Health Insurance Companies (ACLHIC), the Insured Retirement Institute (IRI), the National Association of Mutual Insurance Companies (NAMIC), and the Personal Insurance Federation of California (PIFC), we appreciate the opportunity to comment on the December 23, 2025 Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure regulatory text.

024.1 We write in support of CARB staff's proposed approach to exempt insurers from applicability under Health and Safety Code (HSC) section 38532, consistent with the explicit statutory exemption in HSC section 38533 and as reflected in proposed sections 96071(b)(2) and 96072(a)(5).

Support for Exemption and Statutory Consistency

HSC section 38533, as enacted by the Legislature, expressly excludes business entities that are subject to regulation by the California Department of Insurance (CDI), or that are in the business of insurance in any other state. This statutory language is clear, unambiguous, and reflects legislative recognition that insurers are subject to a distinct, comprehensive regulatory framework administered by insurance regulators with subject-matter expertise in insurer solvency, risk management, and financial reporting.

024.2

CARB staff's Initial Statement of Reasons correctly notes that while HSC section 38533 contains this explicit exemption, HSC section 38532 does not. Staff's proposal to extend the same exemption to section 38532 is both reasonable and necessary to ensure continuity, coherence, and faithful implementation of legislative intent across the climate disclosure statutes. Absent such alignment, insurers could face overlapping or potentially inconsistent climate-related disclosure obligations across regulatory regimes, notwithstanding the Legislature's express decision to place insurers under the primary oversight of insurance regulators.

Existing Insurance-Specific Climate Disclosure Framework
For more than 15 years, insurers operating in California have been subject to an insurance-specific climate disclosure regime developed by the National Association of Insurance Commissioners (NAIC): the Climate Risk Disclosure Survey (CRDS). This survey was the first climate-risk reporting framework of its kind in the United States and has long provided insurance regulators, including CDI, with a detailed view of how insurers identify, assess, and manage climate-related risks.

Beginning in 2022, the NAIC substantially enhanced the CRDS to align with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). The survey is now expressly structured around TCFD's four core pillars—Governance, Strategy, Risk Management, and Metrics and Targets—and is designed to elicit decision-useful, principles-based information regarding insurers' exposure to and management of climate-related risks, including evaluation of Scope 1, Scope 2, and Scope 3 emissions.

024.3

By way of illustration:

- **Governance**: The CRDS assesses board and senior management oversight of climate-related risks and opportunities, including governance structures, frequency of review, and committee responsibilities.
- **Strategy**: The CRDS examines how insurers identify and integrate climate-related risks and opportunities into business strategy, including the use of scenario analysis and long-term resilience planning.
- **Risk Management**: The CRDS evaluates insurer processes for identifying, assessing, monitoring, and managing climate-related risks within enterprise risk management frameworks.
- **Metrics and Targets**: The CRDS requests information regarding metrics and targets used by insurers to assess and manage climate-related risks, including discussion of greenhouse gas emissions, as well as information on targets, timelines, and internal methodologies used for tracking progress.

This established framework already provides regulators with robust, standardized, and insurance-relevant climate disclosures tailored to the unique risk profile and business model of insurers.

Appropriate Regulatory Jurisdiction
The proposed exemption appropriately recognizes CDI's primary jurisdiction over insurer financial and risk disclosures. Insurance regulation is fundamentally different from regulation of other corporate sectors, particularly with respect to capital adequacy, solvency, group supervision, and systemic risk. CDI, in coordination with the NAIC, is uniquely positioned to evaluate climate-related risks in a manner that is integrated with these prudential considerations.

024.4

Exempting insurers from CARB-administered reporting under HSC sections 96071(b)(2) and 96072(a)(5) avoids duplicative regulation while preserving robust climate risk oversight through the existing insurance regulatory framework.

Application of the Exemption at the Insurance Group Level
Consistent with our prior comments, we respectfully reiterate that HSC sections 38532(c)(2)(A)(iii) and 38533(b)(2) support applying the insurance exemption at the insurance

group level where an insurer's CRDS filing incorporates or will incorporate disclosures for subsidiaries (including non-insurance subsidiaries) or affiliates, including any affiliates that provide specific functions in support of the insurance companies' operations. In practice, CRDS submissions frequently include information that extends beyond the regulated insurer entity to encompass non-insurance affiliates within the same corporate group.

024.5

Codifying this approach in the final regulations would reflect existing regulatory practice, remain faithful to statutory intent, and avoid the imposition of duplicative or inconsistent reporting obligations on affiliated entities whose climate disclosures are already captured through the insurer's CRDS filing.

Conclusion

We appreciate CARB's thoughtful and pragmatic approach to implementing SB 253 and SB 261 and its continued engagement with stakeholders. We support the proposed regulatory text exempting insurers from applicability under both HSC sections 96071(b)(2) and 96072(a)(5) and respectfully request that CARB finalize the exemption as proposed, including clarifications confirming its application at the insurance group level.

024.6

024.7

We remain committed to transparent, reliable, and decision-useful climate risk reporting and look forward to continued collaboration as these regulations are finalized.

Respectfully submitted,

American Council of Life Insurers (ACLI) - John Mangan
American Property Casualty Insurance Association (APCIA) - Denneile Ritter
Association of California Life and Health Insurance Companies (ACLHIC) - Matthew Powers
Insured Retirement Institute (IRI) - Sarah Wood
National Association of Mutual Insurance Companies (NAMIC) - Christian Rataj
Personal Insurance Federation of California (PIFC) - Seren Taylor

Kymm Wilson (Kymm Wilson)

> Everybodys Cool International (Entity #6350466) hereby submits this comment in support of the initial regulatory framework for SB 253. While we fall below the mandatory reporting threshold, we have officially adopted the "ATB Framework" which mandates a 70/30 capital allocation model and rigorous data transparency. 025.1

> We are voluntarily aligning our organizational reporting with the proposed Scope 1 and Scope 2 disclosure standards to ensure restorative accountability and mission integrity. We support the Board's efforts to establish consistent reporting deadlines (such as the proposed August 10, 2026 date) and fee structures that prioritize transparency. Our organization remains committed to providing verified, high-integrity data to the public docket in good faith. 025.2

OPERATIONAL METHODOLOGY: THE ATB FRAMEWORK

Everybodys Cool International (Entity #6350466)

I. GOVERNANCE MANDATE

This document constitutes the official Operational Methodology of Everybodys Cool International, as adopted by the Board of Directors on November 2, 2024. This framework is a binding governing instrument that dictates how the corporation manages assets, verifies its mission, and ensures restorative accountability.

II. THE 70/30 CAPITAL ALLOCATION MODEL

To ensure maximum charitable impact and organizational sustainability, the corporation strictly adheres to a mandated revenue split:

• 70% Restricted Mission Fund: Seventy percent (70%) of all gross programmatic revenue is restricted to direct charitable activities, community restoration, and the fulfillment of the organization's core purpose.

• 30% Operational Sustainability Fund: Thirty percent (30%) of gross revenue is allocated to operational overhead, administrative compliance, and the long-term sustainability of the methodology.

III. ADVERSARIAL AUDIT & VERIFICATION (THE "BREAKER TEAM")

Integrity is maintained through a proprietary verification process known as the "Breaker Team" protocol:

1. Independent Verification: A designated internal or external audit function must "stress-test" all programmatic claims.

2. Mission Alignment Check: Every major expenditure must be cross-referenced against the organization's restorative goals.

3. Transparency Reporting: Verified results of these audits are to be summarized and maintained for public disclosure and state regulatory review.

IV. RESTORATIVE ACCOUNTABILITY PROTOCOLS

In the event of an operational variance or a failure to meet the 70/30 mandate:

• Automatic Correction: The organization must immediately trigger a "Restorative Correction," redirecting a compensatory amount of operational funds back into the Restricted Mission Fund.

• Root Cause Analysis: A formal report must be generated to identify the systemic failure, which is then shared with the Board to prevent recurrence.

V. DATA ACCOUNTABILITY (SB 253 ALIGNMENT)

The organization voluntarily adopts the data reporting rigor of the California Climate Corporate Data Accountability Act (SB 253). This ensures that all organizational outputs—environmental or social—are tracked with the same level of precision required of major corporate entities, ensuring a "Good Faith" standard of transparency.

VI. BOARD CERTIFICATION

We, the Board of Directors, certify that this methodology is the foundational operational standard for Everybodys Cool International.

Date: February 7, 2026

Authorized Signature: _____

Name/Title: Kymm Wilson, Incorporator

Everybodys Cool International (Entity #6350466) is a California nonprofit public benefit corporation. The foundational documents provided for this registration include:

1. Articles of Incorporation: The endorsed document filed with the California Secretary of State.

ARTICLES OF INCORPORATION

OF

EVERYBODYS COOL INTERNATIONAL

Article I: Name

The name of this corporation is Everybodys Cool International.

Article II: Purpose

This corporation is a nonprofit public benefit corporation and is not organized for the private gain of any person. It is organized under the Nonprofit Public Benefit Corporation Law for charitable and educational purposes.

The specific purpose of this corporation is to develop and implement the ATB Framework, a methodology for systemic integrity and restorative accountability. The corporation is dedicated to:

1. Providing research and public access to foundational governance tools and ethical frameworks.

2. Implementing a mandated 70/30 Capital Allocation Model where 70% of gross programmatic revenue is restricted to direct charitable impact and 30% is allocated to operational sustainability.

3. Conducting independent mission verification through adversarial audit protocols.

4. Aligning organizational transparency with high-level data accountability standards, including the principles set forth in California SB 253.

Article III: Service of Process

The name of the initial agent for service of process in the State of California is Kymm Wilson. The address of the initial agent is 10209 Dante Avenue, Oakland, CA 94603.

Article IV: Governance

This corporation is organized exclusively for charitable purposes within the meaning of Section 501(c)(3) of the Internal Revenue Code. No substantial part of the activities of this corporation shall consist of carrying on propaganda, or otherwise attempting to influence legislation, and the corporation shall not participate or intervene in any political campaign on behalf of any candidate for public office.

Article V: Dissolution

The property of this corporation is irrevocably dedicated to charitable purposes and no part of the net income or assets of this corporation shall ever inure to the benefit of any director, officer, or member thereof or to the benefit of any private person. Upon the dissolution of this corporation, its assets remaining after payment of all debts and liabilities shall be distributed to a nonprofit fund, foundation, or corporation which is organized and operated exclusively for charitable purposes and which has established its tax-exempt status under Section 501(c)(3) of the Internal Revenue Code.

CERTIFICATE OF INCORPORATOR

I hereby declare that I am the person who executed the foregoing Articles of Incorporation, which execution is my act and deed.

Kymm Wilson, Incorporator

2. Corporate Bylaws: The internal governing rules adopted on November 2, 2024, outlining board structure and officer duties.

BYLAWS

OF

EVERYBODYS COOL INTERNATIONAL

(A California Nonprofit Public Benefit Corporation)

ARTICLE 1: NAME AND OFFICES

The name of this corporation is Everybodys Cool International. The principal office for the transaction of the business of the corporation is located at 10209 Dante Avenue, Oakland, CA 94603.

ARTICLE 2: PURPOSES

The specific purpose of this corporation is to develop and implement the ATB Framework, a methodology for organizational integrity and restorative accountability. The corporation is organized exclusively for charitable and educational purposes within the meaning of Section 501(c)(3) of the Internal Revenue Code.

ARTICLE 3: DIRECTORS

• Section 3.1 Number: The corporation shall have no less than three (3) and no more than seven (7) directors.

• Section 3.2 Terms: Directors shall serve for a term of six (6) years. There are no limits on the number of terms a director may serve.

• Section 3.3 Powers: All corporate powers shall be exercised by or under the direction of the Board of Directors.

• Section 3.4 Quorum: A majority of the directors then in office shall constitute a quorum for the transaction of business.

ARTICLE 4: OFFICERS

The officers of the corporation shall be a President, a Secretary, and a Treasurer (or Chief Financial Officer).

• President: The President is the general manager and chief executive officer of the corporation and has general supervision over its affairs.

• Secretary: The Secretary shall keep the minutes of all meetings and maintain corporate records.

• Treasurer: The Treasurer shall keep and maintain adequate and correct accounts of the properties and business transactions of the corporation.

ARTICLE 5: OPERATIONAL MANDATES (ATB FRAMEWORK)

The Board of Directors officially adopts the ATB Framework as the mandatory operational standard. This includes:

1. 70/30 Capital Model: 70% of gross programmatic revenue is restricted to direct mission impact; 30% is reserved for organizational sustainability.

2. Verification: The authorization of an independent audit function to verify financial and mission alignment.

ARTICLE 6: RECORDS AND REPORTS

The corporation shall maintain (a) adequate and correct books and records of account; (b) written minutes of the proceedings of its Board and committees; and (c) a record of each director's name and address.

ARTICLE 7: AMENDMENTS

These bylaws may be adopted, amended, or repealed by a majority vote of the Board of Directors.

CERTIFICATE OF SECRETARY

I, the undersigned, certify that I am the currently acting Secretary of Everybodys Cool International, a California nonprofit public benefit corporation, and that the above Bylaws are the bylaws of this corporation as adopted by the Board of Directors on February 6, 2026.

Ralph Bessard, Secretary

3. Operational Methodology Addendum: The formal board-adopted framework governing the organization’s specialized programmatic mandates and 70/30 capital model.

METHODOLOGY: THE ATB FRAMEWORK FOR SYSTEMIC INTEGRITY

Section 1: Foundational Principles & Core Mechanics
The ATB Framework is built on the principle that systemic integrity is a dynamic, verifiable state achieved through transparent protocols and recursive feedback. The methodology operates through four interdependent mechanical systems:

1. The Vow (The Immutable Standard): A publicly documented covenant that defines the non-negotiable standards for ethical, social, environmental, and financial integrity for all participating entities. This serves as the central datum for all measurement.
2. The Invitation Protocol (The Signal Intake): An open-source, sovereign gateway that accepts and catalogs petitions regarding potential harm, omission, or violation from any source—human community, algorithmic guardian, or internal system.
3. The Breaker Team (The Adaptive Immune Response): A permanently funded, operationally independent adversarial audit function. This team conducts unscheduled, hostile audits of any entity or instrument certified under The Vow. Its findings and raw data trails are published in real-time to a public ledger. Its purpose is not to punish flaws but to treat them as critical system data.

4. The Market of Reconciliation (The Capital Translation Layer): A suite of financial instruments (e.g., Integrity Swaps, Vow-Backed Securities) designed to translate verification events from the Breaker Team into calibrated capital responses, providing continuous price discovery for integrity and risk.

Section 2: The Operational Sequence (The Recursive Loop)
The Framework executes through a defined, recurring cycle:

1. Signal Introduction: A petition is submitted via the Invitation Protocol.
2. Resonance Check: The Breaker Team assesses if the signal vibrates against the standards of The Vow.
3. Verification & Publication: An audit is conducted. All findings are published to the immutable public ledger.
4. Market Translation: Financial instruments within the Market of Reconciliation automatically adjust, pricing the new, verified truth into the capital ecosystem.
5. Restorative Mandate Execution: Algorithmic protocols are triggered, mandating specific actions (e.g., creating a community trust fund, archiving a memory monument) to repair the identified harm.
6. System Update: The Framework's own protocols are updated based on the learning, hardening the system against future identical failures.

Section 3: Implementation & Protocol Integration
This section details the integration of the Framework's mechanics into the operational fabric of the founding entity and its subsidiaries.

· 3.1 Subsidiary Governance (The "ATB LLC" Model): For any subsidiary or protected entity (e.g., Attempt to Balance LLC), governance is expressly subservient to this Methodology. The subsidiary's operating agreement must codify the authority of the Breaker Team for audit, adherence to Restorative Mandates, and a profit-distribution model that flows a majority of capital to the nonprofit's mission.
· 3.2 The 70/30 Capital Allocation Protocol: A minimum of 70% of all gross program revenue generated through Framework activities is legally restricted for direct mission impact via the Restorative Mandate. The remaining 30% is allocated to organizational sustainability, including the perpetual funding of the Breaker Team.
· 3.3 Data Conduit & SB 253 Alignment: The organization voluntarily structures its internal data architecture to align with the disclosure requirements of California SB 253. This creates a verifiable, public data conduit that feeds the Invitation Protocol and provides the material for Breaker Team verification, turning a compliance mandate into a foundational

input for systemic integrity.

Section 4: Governance & The Observer's Seat
Governance of the Framework itself is maintained through a council featuring a neutral, non-voting Observer seat. This Observer's sole function is to witness and formally attest that each operational cycle—from Signal Introduction to System Update—was conducted without procedural breach, ensuring the mechanism's purity remains its primary product.

Section 5: Integration with Founding Entity (Everybody's Cool International)
As the originating and governing entity, Everybody's Cool International instantiates and enforces this methodology. The organization's Articles, Bylaws, and internal protocols legally mandate the 70/30 revenue allocation, establish the Breaker Team's authority, and require that all programmatic activities utilize the Framework's recursive loop for verification and impact.

Sam Riley (Samantha Riley)

Please see attached our letter on the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation.

February 6, 2026

Via Electronic Submission

Clerks' Office
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Ladies and Gentlemen:

The Bank Policy Institute[1] appreciates the opportunity to comment on California Air Resources Board's ("CARB") Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation, published on December 23, 2025 (the "Proposed Initial Regulation"), which implements California Senate Bill ("SB") 253 (2023) and SB 261 (2023), each as amended by SB 219 (2024) (such bills, as amended, "SB 253" and "SB 261," respectively, and collectively, the "Climate Laws" or "Laws").[2]

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[1] The Bank Policy Institute (BPI) is a nonpartisan public policy, research and advocacy group, representing the nation's leading banks and their customers. Our members include universal banks, regional banks and the major foreign banks doing business in the United States. Collectively, they employ nearly 2 million Americans, make nearly half of the nation's small business loans and are an engine for financial innovation and economic growth.

[2] BPI previously submitted a comment letter, dated March 21, 2025, in response to CARB's information solicitation seeking feedback to inform its implementation of the Climate Laws. *See* BPI, *Information Solicitation to Inform Implementation of California Climate Disclosure Legislation: Senate Bills 253 and 261, as amended by SB 219* (Mar. 21, 2025), available at https://bpi.com/wp-content/uploads/2025/03/BPI-CARB-Comment-Letter-March-2025.pdf. BPI also submitted a comment letter, dated September 11, 2025, following CARB's August 2025 public workshop regarding its implementation of the Climate Laws. *See* BPI, *SB 253/261/219 Public Workshop: Regulation Development and Additional Guidance (August 21, 2025)*, available at https://bpi.com/wp-content/uploads/2025/09/BPI-CARB-Comment-Letter-September-2025.pdf. BPI recognizes that there is ongoing litigation regarding the Climate Laws. BPI is submitting this letter to provide

I. Executive Summary

Our members actively evaluate climate-related financial risks and their potential impacts and are developing resources to develop risk management capabilities to identify, measure and mitigate these risks. In the context of general corporate disclosures, many of our members already publish extensive climate-related information, including with respect to certain greenhouse gas ("GHG") emissions and climate risk management.

We appreciate the CARB staff's continued efforts to solicit feedback to help inform, and to provide guidance regarding, CARB's implementation of the Climate Laws, including through the Proposed Initial Regulation, as well as an anticipated subsequent rulemaking to address SB 253 reporting requirements applicable in 2027 and beyond (the "Subsequent Regulation").[3] Although we recognize that the Proposed Initial Regulation only proposes August 10, 2026 as the first-year reporting deadline under SB 253, with future reporting deadline under SB 253 to be established in the Subsequent Regulation, we continue to be deeply concerned about the annual reporting deadline under SB 253, because of the complexity and challenges associated with GHG emissions reporting, particularly scope 3 emissions, as well as related assurance requirements. 026.1

To address this significant concern, certain ambiguities in the Proposed Initial Regulation, as well as the uncertainty related to the first-year reporting timeline under SB 261, and to ensure that meaningful climate-related information is provided to California consumers, investors and members of the public without undue burdens on reporting entities[4], we urge CARB to consider the following recommendations in connection with its implementation of the Climate Laws:

- CARB should establish December 31 as the annual deadline for GHG emissions reporting under SB 253, starting with the first-year report due in 2026. 026.2
- CARB should provide reporting entities with maximum flexibility with respect to the reporting period covered by reports under SB 253. 026.3
- CARB should clarify that the proposed definition of "revenue" incorporates the relevant 026.4

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comments on the Proposed Initial Regulation in connection with CARB formal rulemaking process and is not expressing any view on the litigation. In addition, this letter does not take a position on or otherwise waive potential arguments relating to the authority of a state regulator to require reporting of information and payment of a fee in connection with such reporting from a national bank under applicable law, including 12 U.S.C. § 484.

[3] CARB, *Staff Report: Initial Statement of Reasons* (Dec. 9, 2025), available at https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/isor.pdf (the "Staff Report"); CARB, *California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs: Frequently Asked Questions Related to Regulatory Development and Initial Reports* (Nov. 17, 2025), at 2-3 (item 3) available at https://ww2.arb.ca.gov/sites/default/files/classic/FAQs%20Regarding%20California%20Climate%20Disclosure%20Requirements_Nov.pdf (the "FAQs").

[4] We use the term "reporting entities" to generally refer to both "reporting entities" as defined in SB 253 and "covered entities" as defined in SB 261 for purposes of this letter, unless otherwise specified with respect to a particular Climate Law.

regulations and interpretations regarding the definition of "gross receipts" under the California Revenue and Taxation Code ("RTC") and that an entity's gross receipts amount as reported in its tax filings with the California Franchise Tax Board ("FTB") is determinative of the entity's revenue for purposes of determining its "revenue" under the Climate Laws.

- CARB should clarify that the proposed definitions of "doing business" and "doing business in California" incorporate the relevant regulations and interpretations regarding the definitions of "doing business " and the relevant prongs of "doing business in this state" under the RTC and an entity's in-state sales amount as reported in its tax filings with the FTB is determinative of the entity's in-state sales for purposes of determining whether the entity is "doing business in California" due to its in-state sales under the Climate Laws. 026.5

- CARB should clarify certain aspects of the fee proposal to reduce uncertainty and increase efficiency in the implementation of the fee determination, invoice and payment processes. 026.6

- We continue to urge CARB to permit maximum flexibility under the evolving GHG Protocol standards and guidance and avoid prescriptive reporting format in connection with its implementation of the Climate Laws. 026.7

- To reduce the uncertainty arising from the pending litigation regarding the Climate Laws and related burdens on reporting entities, we urge CARB to clarify now that it will provide a grace period of 90 days for submitting the initial SB 261 reports should reporting obligations resume under SB 261. 026.8

II. CARB should establish December 31 as the annual deadline for GHG emissions reporting under SB 253, starting with the first-year report due in 2026.

In the Proposed Initial Regulation, CARB proposes a reporting deadline of August 10, 2026 for the first-year report under SB 253. The CARB staff noted that this proposed first-year reporting deadline matches the verification deadline under CARB's Mandatory Reporting Regulation ("MRR") program, with "the goal of streamlining GHG reporting responsibilities and timing for entities reporting under [SB 253] and MRR."[5] For the reasons discussed below, CARB should not use the verification deadline under MRR program as the basis for establishing a reporting deadline under SB 253. Instead, we urge CARB to establish December 31 as the annual deadline for GHG emissions reporting under SB 253, starting with the first-year report due in 2026. 026.9

A. CARB should not use the verification deadline under the MRR program as the basis for establishing a reporting deadline under SB 253.

The reporting deadline under SB 253 should not be tied to the reporting timeline under the MRR program, because the reporting entities, the reporting content, and the users of the information reported under SB 253 differ from those under the MRR program.

First, MRR requires data reporting and third-party data verification from the largest GHG emitters (*e.g.*, certain facilities and suppliers that have covered emissions greater than a certain 026.10

[5] Staff Report, at 15.

threshold and electric power entities importing power into California).[6] In contrast, subject to limited exceptions, *all* U.S. entities "doing business in California" with "total annual revenues" in excess of $1 billion, regardless of their industry sector and level of emissions, are subject to reporting under SB 253.

Second, as to the reporting content, unlike SB 253, the MRR program does not require scope 3 emissions reporting. As outlined below, one of the pertinent reasons that a deadline earlier than December 31 is impractical for SB 253 reporting is because of the complexities associated with collecting and reporting scope 3 emissions data, particularly for financial institutions.

Finally, MRR data supports California's Cap-and-Trade Program,[7] whereas the stated goal for the reporting programs under the Climate Laws is to "help ensure that accurate, comparable, and decision-useful climate information is made available to inform investors, lenders, insurers, consumers, and other stakeholders in the state".[8]

Because many reporting entities under SB 253 are not subject to the MRR, the reporting content is different even for entities that are subject to both the MRR and SB 253, and the users of the information reported under SB 253 and the MRR are also different, aligning the SB 253 reporting deadline with the MRR verification deadline would not lead to increased efficiency.

B. CARB should establish December 31 as the single annual reporting deadline for all required GHG emissions data under SB 253, because the complexity and challenges associated with GHG emissions reporting, particularly scope 3 emissions, and related assurance requirements make an earlier deadline impractical.

We urge CARB to establish December 31 as the single annual reporting deadline for all required GHG emissions data, starting with the first-year report due in 2026, in light of the complexity and challenges associated with GHG emissions reporting and related assurance requirements. 026.11

Although we recognize that the Proposed Initial Regulation only proposes a first-year reporting deadline under SB 253, with future reporting deadline under SB 253 to be established in the Subsequent Regulation, it is important to look at the complete picture of how GHG emissions reporting, including scope 3 reporting, should be addressed in connection with the finalization of the Proposed Initial Regulation.

A single annual reporting timeline for all required GHG emissions data is consistent with the statutory requirements of SB 253,[9] and is more efficient for both the reporting entities and CARB. This is how GHG emissions data is generally reported today, either voluntarily or pursuant to reporting

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6 CARB, *Mandatory Greenhouse Gas Reporting: 2022 Emissions Year Frequently Asked Questions* (Nov. 6, 2023), available at, https://ww2.arb.ca.gov/sites/default/files/classic/cc/reporting/ghg-rep/reported-data/2022mrrfaqs.pdf; CARB, *Reporting Guidance for Determining Rule Applicability for California's Mandatory GHG Reporting Program* (Feb. 1, 2019) available at, https://ww2.arb.ca.gov/sites/default/files/classic/cc/reporting/ghg-rep/guidance/applicability-general.pdf

7 CARB, *Mandatory Greenhouse Gas Reporting: 2022 Emissions Year Frequently Asked Questions* (Nov. 6, 2023)

8 Staff Report, at 3.

9 Cal. Health & Safety Code § 38532(c)(1; (G)(i).

requirements in other jurisdictions. Further, a single annual report under SB 253 with all required GHG emissions data is more useful for users of the information and supports CARB's goal of providing accurate, comparable, and decision-useful climate information to investors, lenders, insurers, and the public in California. On the contrary, staggered deadlines would create inefficiencies and confusion for investors by forcing companies to prepare multiple reporting and assurance cycles in the same year. Even though scope 1 and 2 data are separate from scope 3 data, many of the same systems and controls apply, and assurance providers would need to repeat walkthroughs, control testing and methodological explanations if there are different reporting timelines for scope 1 and 2 reporting versus scope 3 reporting. This adds cost and burden without improving disclosure quality. More importantly, publishing scope 1 and 2 data months ahead of scope 3 data from the same reporting period creates an incomplete and potentially misleading picture of a reporting entity's emissions profile. For financial institutions, scope 3 represents the vast majority of their emissions. Aligning all scopes on the same annual deadline ensures efficiency, lowers costs, and provides stakeholders with a clear, integrated view.

As discussed in BPI's prior comment letters to CARB, we believe the single annual reporting deadline should be December 31 for all required GHG emissions data. This is because collecting, reconciling, and obtaining assurance for global emissions data are complex, challenging, and time-consuming, particularly with respect to scope 3 emissions data.

For large financial institutions, scope 1 and 2 emissions data is sourced from hundreds of offices and subsidiaries across multiple jurisdictions. Each local office relies on utility providers, landlords, or facility managers to supply energy use and fuel consumption data, and bills and records may not be finalized until months after year-end. Finalizing this information requires multi-step internal controls, including reconciliation with utility invoices, cross-checks against internal systems, and validation by sustainability and finance teams.

Furthermore, Financial institutions face unique challenges in reporting scope 3 emissions, which make a deadline earlier than December 31 impractical.

- *Data collection challenges*. Financial institutions calculate scope 3 emissions—driven primarily by financed emissions—by aggregating data from a wide range of counterparties, including borrowers, investees, and other third parties. This data is often sourced through external data vendors that collect information from publicly available disclosures, private reporting, and estimates. This process typically results in a 12-month to 18-month time lag in emissions data, which presents significant challenges, as the emissions data used for reporting may not reflect the most current operational activities of counterparties.

- *Availability and quality of data*. The availability and quality of data required for scope 3 emissions vary widely. Many counterparties operate in jurisdictions without robust sustainability reporting requirements, leading to data gaps. Even when emissions data is available, the quality and consistency of that data can vary significantly across industries. Established sectors such as utilities tend to provide relatively reliable and standardized data, while other sectors are still in the process of developing comprehensive reporting frameworks and robust processes to measure and disclose their emissions. As a result, financial institutions often must rely on estimates or proxy data, which complicates assurance and comparability and may lead to volatility in year-over-year reporting as estimates and proxy methodologies are refined over time.

- *Lack of universally accepted methodologies*. Although the GHG Protocol provides a foundation for emissions accounting, there are no universally accepted methodologies for calculating scope 3 emissions across all asset classes. Asset classes such as loans to small businesses, private equity investments, asset management, or sovereign debt often lack specific guidance for calculating emissions.

Because of these unique challenges, we believe that a 12 month-period after the end of the reporting period covered by the report (e.g., a December 31 deadline for a company reporting on its fiscal year ended on December 31 of the prior year) is the minimum period feasible for financial institutions to report meaningful scope 3 emissions data required by SB 253, albeit there may still be a significant time lag (e.g., one year or more) for the scope 3 emissions data reported.

If a reporting entity cannot assemble complete and verified data by the reporting deadline, it may have to rely on estimates, proxies, or incomplete information. This could limit the ability to complete internal controls and assurance reviews and may result in disclosures that need to be revised after more accurate data becomes available. Such outcomes would reduce comparability across entities and risk undermining confidence in the reporting process.

Additionally, given that assurance by an independent third-party assurance provider is required under SB 253, beginning with "limited assurance" in 2027[10] and escalating to "reasonable assurance" in 2030, reporting entities will need additional time to work with their assurance providers to complete the assurance process. Assurance providers often work across multiple clients and need sufficient time to conduct testing, sampling and quality checks. Limited assurance itself is not a "light touch," as it requires evidence-based testing, sampling of invoices, and a demonstration of internal controls. This assurance process will take even longer as more stringent assurance requirements come into effect (*e.g.*, transitioning from "limited assurance" to "reasonable assurance"). Reasonable assurance requires significantly more evidence, a broader audit scope, and more extensive testing. Rushing the assurance process may undermine the credibility of California's climate reporting program.

C. CARB should establish December 31, 2026 as the reporting deadline for the first-year report under SB 253 to align with our recommended subsequent annual reporting deadline under SB 253 and to avoid any unnecessary burdens on reporting entities to establish separate reporting procedures only for the first-year report under SB 253.

026.12

For all the reasons discussed above, CARB should establish December 31 as the single annual reporting deadline for all required GHG emissions data under SB 253. Although we recognize that CARB will exercise enforcement discretion for the first-year report due in 2026 such that reporting entities will be allowed to submit scope 1 and 2 emissions for their prior fiscal year based on information they already have or were collecting as of December 2024, whether or not the data received limited

[10] Although the text of SB 253 states that assurance is required beginning in 2026, CARB has provided additional guidance stating that assurance is *not* required for first-year reports in 2026. *See* FAQs, at 10 (Item 20) ("For 2026 reporting under [SB 253], CARB will exercise enforcement discretion for the first report due in 2026, allowing reporting entities to submit Scope 1 and Scope 2 emissions for their prior fiscal year based on information they already have or were collecting when this Notice was issued, whether or not the data received limited assurance.")

assurance,[11] we nevertheless urge CARB to establish December 31, 2026 as the reporting deadline for the first-year report under SB 253 to align with our recommended subsequent annual reporting deadline under SB 253 and to avoid any unnecessary burdens on reporting entities to establish separate reporting procedures only for the first-year reports under SB 253.

However, if CARB nevertheless determines to establish August 10, 2026 as the first-year reporting deadline under SB 253, CARB should establish December 31 as the single annual reporting deadline for all required GHG emissions data under SB 253 starting in 2027 in the Subsequent Regulation.

Finally, if CARB determines that it must collect information from reporting entities earlier than December 31 in order to calculate and collect the annual fees to support the administration of the reporting programs under the Climate Laws, CARB should bifurcate the annual deadline for collecting information on reporting entities, which may be earlier than December 31, and the annual deadline for GHG emissions reporting, which should be December 31.

III. CARB should provide reporting entities with maximum flexibility with respect to the reporting period covered by reports under SB 253.

026.13

In proposing the definition of "applicable preceding fiscal year", CARB proposes to use February 1 as the date for determining which fiscal year's data should be covered in a reporting entity's first-year report under SB 253 due by August 10, 2026, including flexibility to allow for more recent fiscal year data if available.[12] In proposing this definition, CARB appropriately recognizes that many reporting entities have fiscal years that differ from the calendar year. However, CARB should also recognize that some reporting entities may collect and report GHG emissions data for a 12-month period that does not match their fiscal years.

In determining the definition for "applicable preceding fiscal year" in connection with the

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[11] CARB, *The Climate Corporate Data Accountability Act, Enforcement Notice* (Dec. 5, 2024), available at https://ww2.arb.ca.gov/sites/default/files/2024-12/The%20Climate%20Corporate%20Data%20Accountability%20Act%20Enforcement%20Notice%20Dec%2024.pdf; FAQs, at 10 (Item 20); CARB, *SB 253/261/219 Public Workshop: Update on California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs* (Nov. 18, 2025), at 12, available at https://ww2.arb.ca.gov/sites/default/files/classic/SB%20253%20261%20Nov%20Workshop%20slides%20%28Updated%29.pdf (the "November Presentation") ("For 2026 reporting, limited assurance is not required for data submission").

[12] Proposed Initial Regulation § 96076, available at https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/reg%20text.pdf ("For purposes of this section, the "applicable preceding fiscal year" shall be determined as follows: (1) If the reporting entity's fiscal year ends on or before February 1 in a calendar year, the applicable preceding fiscal year shall be the fiscal year ending in the current calendar year. (2) if the reporting entity's fiscal year ends after February 1 in a calendar year, the applicable preceding fiscal year shall be the fiscal year ending in the previous calendar year. However, reporting entity may choose to report their Scope 1 and Scope 2 emissions from their most recent preceding fiscal year notwithstanding their fiscal year ending after February 1, where that data is available.").

finalization of the Proposed Initial Regulation and in the Subsequent Regulation, CARB should afford reporting entities maximum flexibility with respect to the reporting period covered by reports under SB 253, considering all relevant factors that may affect a reporting entity's timeline for collecting, reconciling and obtaining assurance for the GHG emissions data required under SB 253. These factors include, but are not limited to, the annual reporting deadline under SB 253 established by CARB, a reporting entity's fiscal year (which may not match the calendar year), and a reporting entity's reporting cycle for GHG emissions data (which may not match its fiscal year).

This flexibility is even more necessary with respect to scope 3 emissions reporting because of the unique challenges financial institutions face in reporting scope 3 emissions data. As discussed in detail above, the process for collecting scope 3 emissions data typically results in a 12-month to 18-month time lag. In addition, it is widely accepted across the financial services industry that financed emissions calculations inherently involve a timing mismatch between exposure data and client emissions data. For example, a financial institution's scope 3 financed emissions calculation for fiscal year 2024 would typically rely on 2024 exposure data combined with client emissions data from fiscal year 2022 or 2023, based on the most recent emissions data available from external data providers. As a result, even where reporting entities are afforded up to 12 months to report, this mismatch will persist. Providing flexibility to use best available data is therefore critical to producing high-quality financed emissions disclosures under SB 253.

We believe providing reporting entities maximum flexibility with respect to the reporting period covered by reports under SB 253 will support reporting entities' efforts to apply reporting methodologies in a manner that is best suited for their businesses and circumstances and avoid potentially restricting reporting entities' ability to apply industry standards that supplement the GHG Protocol to address industry-specific issues.

IV. CARB should clarify that the proposed definition of "revenue" incorporates the relevant regulations and interpretations regarding the definition of "gross receipts" under the RTC and that an entity's gross receipts amount as reported in its tax filings with the FTB is determinative of the entity's revenue for purposes of determining its "revenue" under the Climate Laws.

026.14

The Proposed Initial Regulation states that "revenue" has the same meaning as "gross receipts" under Section 25120(f)(2) of the RTC.[13] We recommend CARB to clarify that the definition of "revenue" incorporates the relevant regulations and interpretations regarding the definition of "gross receipts" under the RTC to further align these definitions and avoid any discrepancies in how these definitions are interpreted and applied in practice.

For example, although the definition of "gross receipts" under Section 25120(f)(2) of the RTC

[13] Gross Receipts is defined under Section 25120(f)(2) of the RTC as "[t]he gross amounts realized (the sum of money and the fair market value of other property or services received) on the sale or exchange of property, the performance of services, or the use of property or capital (including rents, royalties, interest, and dividends) in a transaction that produces business income, in which the income, gain, or loss is recognized (or would be recognized if the transaction were in the United States) under the Internal Revenue Code, as applicable for purposes of this part. Amounts realized on the sale or exchange of property shall not be reduced by the cost of goods sold or the basis of property sold."

does not include an explicit carve out for intercompany transactions, intercompany receipts from unitary group members would generally be excluded from taxable income for California income tax purposes under § 25106.5-1 of Title 18 of the California Code of Regulations. Without our recommended clarification, there would be ambiguity as to whether intercompany receipts from unitary group members would be required to be included as "revenue" for purposes of the Climate Laws, when they are generally excluded for corporate income tax purposes.

In addition, to provide further certainty to entities determining whether they exceed the revenue thresholds under the Climate Laws, CARB should clarify that an entity's gross receipts amount as reported in its tax filings with the FTB is determinative of the entity's revenue for purposes of determining its "revenue" under the Climate Laws. During CARB's Third Public Workshop held on November 18, 2025, CARB staff noted that gross receipts are verifiable in FTB filings, referencing specific line items of entities' California tax filings (*i.e.*, Schedule F, Line 1a of corporations' and S-corporations' tax filings on Form 100 and Form 100S, respectively, Line 1a of partnerships' tax filings on Form 565, and Schedule B, Line 1a of LLCs' tax filings on Form 568) as showing the amount of "total revenue."[14] Our recommended clarification is consistent with the approach announced at the workshop and provides entities further clarity and certainty in determining whether they exceed the revenue thresholds under the Climate Laws. 026.22

V. CARB should clarify that the proposed definitions of "doing business" and "doing business in California" incorporate the relevant regulations and interpretations regarding the definitions of "doing business " and the relevant prongs of "doing business in this state" under the RTC and an entity's in-state sales amount as reported in its tax filings with the FTB is determinative of the entity's in-state sales for purposes of determining whether the entity is "doing business in California" due to its in-state sales under the Climate Laws.

Under the Proposed Initial Regulation, "doing business" "shall have the same definition as set forth in section 23101(a) of the [RTC]", whereas "doing business in California" means "doing business and meeting either of the criteria set forth in subsections 23101(b)(1) or 23101(b)(2) of the [RTC]", subject to certain exceptions.[15] Section 23101(a) of the RTC defines "doing business" as "actively engaging in any transaction for the purpose of financial or pecuniary gain or profit".[16] Subsection 23101(b)(1) of the RTC provides that a taxpayer is doing business in California for a taxable year if the taxpayer is organized or commercially domiciled in California.[17] Subsection 23101(b)(2) of the RTC provides that a taxpayer is doing business in California for a taxable year if sales, as defined in Section 25120(e) or (f) of the RTC as applicable for the taxable year, of the taxpayer in California "exceed the lesser of five hundred thousand dollars ($500,000) or 25 percent of the taxpayer's total sales."[18] 026.15

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[14] November Presentation, at 21.

[15] Proposed Initial Regulation § 96072(a)(8).

[16] Cal. Rev. & Tax. Code § 23101(a).

[17] Cal. Rev. & Tax. Code § 23101(b)(1).

[18] Cal. Rev. & Tax. Code § 23101(b)(2) ("For purposes of this paragraph, sales of the taxpayer include sales by an agent or independent contractor of the taxpayer. For purposes of this paragraph, sales in this state shall be

We recommend CARB to clarify that the definitions of "doing business" and "doing business in California" incorporate the relevant regulations and interpretations regarding the definitions of "doing business " and the relevant prongs of "doing business in this state" under the RTC to further align these definitions and avoid any discrepancies in how these definitions are interpreted and applied in practice.

For example, subsection 23101(c)(1) requires the FTB to annually revise the $500,000 threshold for in-state sales to adjust for inflation.[19] The in-state sales dollar threshold for 2025 is $757,070.[20] Without our recommended clarification, there will be discrepancies between how the same term or phases will be interpreted and applied under the Climate Laws and the RTC.

In addition, to provide further certainty to entities determining whether they are deemed to be "doing business in California" under the Climate Laws, CARB should clarify that an entity's in-state sales amount as reported in its tax filings with the FTB is determinative of the entity's in-state sales for purposes of determining whether the entity is "doing business in California" due to its in-state sales under the Climate Laws. During CARB's Third Public Workshop held on November 18, 2025, CARB staff noted that whether a company has sufficient in-state sales to be deemed to be "doing business in California" can be verified in California FTB filings, referencing Schedule R-1, column (b) of entities' California tax filings (i.e., Form 100, Form 100S, Form 565 and Form 568 for corporations, S-corporations, partnerships and LLCs, respectively) for the amount of in-state sales.[21] Our recommended clarification is consistent with the approach announced at the workshop and provide entities further clarity and certainty in determining whether they are deemed to be doing business in California due to its in-state sales under the Climate Laws.

VI. CARB should clarify certain aspects of the fee proposal to reduce uncertainty and increase efficiency in the implementation of the fee determination, invoice and payment processes.

The Proposed Initial Regulation imposes a flat fee structure on reporting entities under the Climate Laws. CARB proposes providing a written fee determination notice to each reporting entity of the amount due on or by September 10, beginning in fiscal year 2026 and for each year thereafter. We recommend CARB to consider the following clarifications to help reduce uncertainties in the implementation of the fee determination, invoice and payment processes.

A. CARB should clarify that it is responsible for determining the reporting entities under the Climate Laws.

026.16

Under the Proposed Initial Regulation, CARB is responsible for issuing fee determination notices to reporting entities, while entities are required to maintain records demonstrating whether they meet the applicable revenue and "doing business in California" thresholds and to provide such records upon

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determined using the rules for assigning sales under Sections 25135 and 25136 and the regulations thereunder, as modified by regulations under Section 25137.").

[19] Cal. Rev. & Tax. Code § 23101(c)(1).

[20] State of California Franchise Tax Board, *Doing Business in California*, available at https://www.ftb.ca.gov/file/business/doing-business-in-california.html.

[21] November Presentation, at 21.

request.[22] Accordingly, we believe it is implied that CARB is also responsible for determining which entities are reporting entities and the number of reporting entities under each Climate Law; however, the proposed regulatory text is ambiguous in this regard. Clarifying that CARB is responsible for determining which entities are in scope of the Climate Laws would help avoid confusion and would support more efficient and consistent compliance with the fee provisions, especially for parent companies reporting on behalf of many reporting entity subsidiaries under one consolidated, parent-level report.

If, on the other hand, CARB intends to rely on information submitted by entities to determine the total number of reporting entities for purposes of determining the per-entity fee under each Climate Law, CARB should propose the information required to be submitted by reporting entities and the timeline for submitting such information. Because the fees are assessed on an individual reporting entity basis[23] and because companies may rely on consolidated reporting as permitted under the Climate Laws, solely relying on the number of entities submitting reports under each Climate Law would not provide CARB with an accurate total number of reporting entities for purposes of the fee calculation.

Furthermore, as discussed in Section II.C above, if CARB determines that it must collect information from reporting entities earlier than December 31 in order to calculate and collect the annual fees to support the administration of the reporting programs under the Climate Laws, CARB should bifurcate the annual deadline for collecting information on reporting entities, which may be earlier than December 31, and the annual deadline for GHG emissions reporting, which should be December 31.

B. CARB should clarify the definition of "Debt" to avoid including the same debt in the fee calculation multiple times.

In the Proposed Initial Regulation, "Debt," which is a component of the Total Required Revenue definition, is defined as "those loans obtained by CARB, and required by the Legislature to be repaid, to carry out sections 38532 and 38533 of the Health and Safety Code."[24] In the Staff Report, CARB staff explains that Debt is included to "ensure that CARB fully reimburses any loans obtained to fund the program as required by the Legislature."[25] We recommend CARB to clarify that the same Debt should only be included in the Total Required Revenue once. 026.17

C. CARB should allow a consolidated fee invoice and payment process to increase efficiency.

Although the Proposed Initial Regulation establishes fee liability at the reporting entity level, it does not address how CARB intends to invoice and collect fees where a parent company submits consolidated reporting on behalf of multiple subsidiaries. 026.18

To reduce administrative burden and improve payment efficiency, CARB should clarify that it will

[22] Proposed Initial Regulation § 96074(d).

[23] FAQs, at 9 (Item 18).

[24] Proposed Initial Regulation § 96072(a)(6).

[25] Staff Report, at 12.

permit a consolidated invoice and payment option under which CARB will issue a single fee determination notice to a parent entity that itemizes the fees attributable to each reporting entity within the corporate group, and allow the parent entity to remit a single payment on behalf of all reporting entities within the corporate group.

We believe the recommended approach is consistent with CARB's prior guidance. In the FAQs, CARB noted that "[f]ees may be paid by the parent company level".[26] To provide certainty and further increase efficiency, we recommend CARB to explicitly provide for a consolidated fee invoice and payment process in the implementing regulations.

D. CARB should provide a process for resolving disputes regarding reporting entity status and reconciling any change to per entity flat fee.

The Proposed Initial Regulations are silent on how to resolve any disputes between CARB and an entity. For example, if there are disputes between CARB and entities regarding whether such entities are reporting entities and therefore should pay fees, it is unclear how such disputes would be resolved between CARB and the entities or how any resolution of such disputes would affect the other reporting entities in light of the per entity flat fee structure.

026.19

Accordingly, CARB should propose a process for resolving fee-related disputes for public comment, which should, at a minimum, address (1) the process and timeline for resolving a dispute between CARB and an entity as to whether the entity is a reporting entity under the relevant Climate Law, and (2) the process for reconciling any change to per entity flat fee under the relevant Climate Law after resolving disputes relevant to the determination of the number of total reporting entities under the relevant Climate Law.

VII. We continue to urge CARB to permit maximum flexibility under the evolving GHG Protocol standards and guidance and avoid prescriptive reporting format in connection with its implementation of the Climate Laws.

026.20

Although we recognize that the scope of the Proposed Initial Regulation is limited, considering the other guidance CARB has issued, and the Subsequent Regulation CARB plans to promulgate, in connection with its implementation of the Climate Laws, we wish to reiterate a critical overarching principle discussed in BPI's prior comment letters to CARB. We continue to believe that permitting maximum flexibility under the evolving GHG Protocol standards and guidance and avoiding prescriptive reporting formats should be key considerations in CARB's implementation of the Climate Laws. To achieve the goal of better informing the decision-making of California consumers, investors and members of the public, it is critical for reporting entities to be able to provide the context in relation to the climate-related data and information required under the Climate Laws, including the relevant metrics and calculation methodologies used. A prescriptive approach to reporting format is also inconsistent with the general disclosure approach under the external climate reporting standards or protocols mandated by the Climate Laws, which focus on the substance, rather than the form, of climate-related disclosures.

Requiring reporting entities to provide climate-related data and information pursuant to

[26] *See* FAQs, at 9 (Item 18).

prescriptive reporting format (such as the Draft Scope 1 and 2 GHG Reporting Template CARB issued on October 10, 2025[27]) without the ability or with limited ability to provide the necessary context would be counterproductive to the goal of providing meaningful information, could potentially result in incomplete or misleading data and information, and would significantly hinder reporting entities' ability to rely on substituted compliance.

VIII. To reduce the uncertainty arising from the pending litigation regarding the Climate Laws and related burdens on reporting entities, we urge CARB to clarify now that it will provide a grace period of 90 days for submitting the initial SB 261 reports should reporting obligations resume under SB 261.

026.21

On November 18, 2025, the Ninth Circuit Court of Appeals issued an order temporarily enjoining enforcement of SB 261 until an appeal challenging SB 261 is resolved.[28] In both the Staff Report and the Notice of Public Hearing issued accompanying the Proposed Initial Regulation, CARB acknowledges the injunction and notes that "[i]n light of this order, CARB will not enforce SB 261 until the injunction is lifted" and that "CARB will continue this rulemaking to consider the Proposed Initial Regulation for adoption".[29] On December 1, 2025, CARB also issued an Enforcement Advisory, noting that "CARB will provide further information – including an alternate date for reporting, as appropriate – after the appeal is resolved."[30]

We appreciate CARB's efforts to acknowledge and provide guidance on this issue. However, providing further information, including an alternate date for reporting, as appropriate, after the appeal is resolved does not provide reporting entities with the clarity they need to prepare for a potential resumption of reporting obligations under SB 261. Without clear guidance on the alternative date for initial reporting under SB 261 now, reporting entities may need to continue to prepare and obtain internal approval for their initial SB 261 reports despite the injunction in order to prepare for a potential immediate resumption of reporting obligations under SB 261 if the injunction is lifted.

To reduce the uncertainty arising from the pending litigation and related burdens on reporting entities, we urge CARB to clarify now that it will provide a grace period of 90 days for submitting the

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[27] CARB, *SB 253 Scope 1 and Scope 2 Greenhouse Gas (GHG) Emissions Draft Reporting Template* (Oct. 10, 2025), available at https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fww2.arb.ca.gov%2Fsites%2Fdefault%2Ffiles%2F2025-10%2FSB253_Draft_Scope1_2_GHG_Template.xlsx&wdOrigin=BROWSELINK; CARB, *California Corporate Greenhouse Gas Reporting Program: Scope 1 and Scope 2 Emissions Draft Reporting Template Memo* (Oct. 10, 2025), available at https://ww2.arb.ca.gov/sites/default/files/2025-10/Draft%20Memo_Scope1%262TemplatePublicRelease.pdf ("Reporting entities are not currently required to use the template; its use is voluntary for the 2026 reporting cycle.").

[28] *See Chamber of Commerce of the United States of America et al. v. California Air Resources Board et al.*, Case No. 25-5327 (9th Cir.).

[29] Staff Report, at 5; Notice of Public Hearing, at 3.

[30] CARB, *Enforcement Advisory: Climate-Related Financial Risk Reporting (SB 261)* (Dec. 1, 2025), available at https://ww2.arb.ca.gov/sites/default/files/2025-12/Dec%201%20SB%20261%20Enforcement%20Advisory.pdf

initial SB 261 reports, should reporting obligations resume under SB 261.

* * *

BPI appreciates the opportunity to provide feedback to CARB regarding the Proposed Initial Regulations and the implementation of the Climate Laws. We thank CARB for its continued efforts seeking public feedback to inform its implementation of the reporting programs under the Climate Laws, and look forward to an ongoing dialogue. If you have any questions, please contact the undersigned by phone at (202) 589-2406 or by email at sam.riley@BPI.com.

Respectfully Submitted,

/s/ Sam Riley

Sam Riley
Senior Vice President & Head of International Regulatory Policy
Bank Policy Institute

RSM US LLP (Scott Wilgenbusch)

RSM US LLP (RSM, we) values the opportunity to offer our comments on the California Air Resources Board's (CARB) Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation (the Proposed Regulation). RSM is the leading provider of assurance, tax and consulting services focused on the middle market, with nearly 18,000 professionals in 77 U.S. cities, six locations in Canada, one in El Salvador and four in India.

Overall Comments on the Proposal

27.1 Overall, we support the intent and function of the Proposed Regulation to clarify the applicability; we also support establishing the fee program under the Climate Corporate Data Accountability Act (codified in Health and Safety Code section 38532) and the Climate-Related Financial Risk Reporting Act (codified in Health and Safety Code section 38533). 027.2

Our responses are based on our understanding of the Proposed Regulation as provided in the publicly disseminated materials ahead of the CARB hearing on February 26, 2026. We have included specific comments on the proposal below and also have the following overall thoughts on the proposal:

• Reporting entity composition: We believe the regulations are unclear on how to determine what data and entities are included in an entity's report (i.e., the reporting entity). Specifically, how the definitions of parent and subsidiary relate to the definition of reporting entity and which subsidiaries should be included with the parent's report, not be included or be reported separately. We suggest that CARB create a flow chart to assist reporting entities in determining the scope of the subsidiary entities to be included in the parent's report. 027.3

• Determining applicability: Entities may face uncertainty in determining applicability, even after management review or legal support. It would be beneficial for CARB to provide consultation resources for entities to contact. 027.4

• Cost of implementation: The "Non-Major Regulation: Statement of the Results of the Economic Impact Assessment (EIA): The creation or elimination of jobs within the State of California" section of the Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation states: "The Proposed Regulation is not expected to directly affect the creation or elimination of jobs within the state, as the estimated compliance costs for this regulation are minimal and not anticipated to influence employment levels. Any potential costs associated with the addition of the first year (2026) corporate GHG reporting deadline through the Proposed Regulation would be negligible, and potentially zero for some companies, and is not expected to create or eliminate jobs." 027.5

Some entities that meet the applicability requirements may not be accustomed to reporting such data, and accordingly will likely incur additional costs for implementation of policies, processes and controls over determining the applicability of sections 38532 and 38533 of the Health and Safety Code as well as the determination of the fees under these sections of the Health and Safety Code. As complexity of the reporting entity's structure increases, so do the associated costs of implementing the Proposed Regulation.

Specific Comments on the Proposal

As requested, we have feedback on the following elements of the CARB Staff Report: Initial Statement of Reasons dated December 9, 2025, as well as other feedback on the proposal, explained below:
Section III. The Specific Purpose and Rationale of Each Adoption, Amendment, or Repeal
A. Section 96201. Applicability
B. Section 96202. Definitions
C. Section 96203. Calculation of Fees
D. Section 96204. Fee Payment and Collection
E. Section 96205. Enforcement
F. Section 96206. Deadline for Reporting under Health and Safety Code section 38532
G. Section 96207. Severability

A. Section 96201. Applicability

It is our understanding that each individual business entity should determine whether it is in scope of sections 38532 and 38533 of the Health and Safety Code. In determining whether a business entity meets the definition of reporting entity or covered entity, and therefore meets the applicability requirement in section 96201(a), we believe it would be necessary to determine which other individual business entities within its corporate family tree should be included (or consolidated) to determine if the business entity meets the definitions of reporting entity under section 96202(a)(11) or covered entity under section 96202(a)(5) for purposes of complying with sections 38532 and 38533 of the Health and Safety Code, respectively. Two of the criteria to meet the definition of a reporting entity or covered entity are: 027.6
1. The business entity does business in California, which requires either:
a. Being commercially domiciled in California or
b. Meeting a certain threshold of sales in California as defined in section 23101(b)(2) of the Revenue and Taxation Code, and
2. Have revenue, which is equivalent to "gross receipts" under section 25120(f)(2) of the Revenue and Taxation, that meets a defined threshold.

The composition of business entities included will affect the sales in determining whether the business entity does business in California under section 23101(b)(2) of the Revenue and Taxation Code and in determining the revenue (or "gross receipts") under section 25120(f)(2) of the Revenue and Taxation Code.

We believe it is unclear which individual business entities within a corporate family tree should be included when determining whether a given business entity meets the definition of a reporting entity or a covered entity and, therefore, sections 38532 and 38533 of the Health and Safety Code would apply to that business entity.

We recommend CARB design a flow chart to aid entities in evaluating whether they are within the scope of sections 38532 and 38533 of the Health and Safety Code by depicting each decision point in determining which other individual business entities within the corporate family should be included in a given business entity's determination of whether it meets the definition of a reporting entity or covered entity. See our comments in subsection B regarding the definitions of reporting entity and covered entity.

The Proposed Regulation includes an exemption for "business entities whose only business in California is employee compensation or payroll expenses, including teleworking employees." The rationale for this included:
• A large number of teleworking employees since the global pandemic of 2020
• Challenges of interpreting how teleworking may fit into the definition of "doing business in California" in section 96202(a)(8) of the Proposed Regulation
• Seeking to avoid unintended consequences of businesses with only virtual operations in California from leaving the state. 027.7

While we do not disagree with these points, we also believe there may be an unintended consequence where business entities that currently do business in California and have operations in California revise their physical location and structure to where the business entity would only have virtual employees in California to avoid being required to comply with sections 38532 and 38533 of the Health and Safety Code. It is possible CARB already considered this, but we believe this is an important nuance to address in the rationale of the Proposed Regulation.

B. Section 96202. Definitions

There appears to be inconsistency between duplicating definitions in other code sections or paragraphs and referencing the other code sections or paragraphs, such as the references that were included in sections 96202(a)(7) and 96202(a)(8) relating to "doing business" and "doing business in California." We recommend that CARB be consistent on either duplicating or referencing definitions listed in other code sections or paragraphs. In general, we believe referencing the definitions in other code sections or paragraphs may lead to more consistency throughout the code. Changing the reference format may simplify updates and prevent inconsistencies in definitions, as noted in our detailed comments below. 027.8

In addition, as detailed in our comments in subsection A and our comments on the definitions below, we were unable to determine which other individual business entities within its corporate family tree should be included (or consolidated) to determine if a given business entity would meet the definitions of reporting entity under section 96202(a)(11) or covered entity under section 96202(a)(5) for purposes of complying with sections 38532 and 38533 of the Health and Safety Code, respectively.

We have the following specific comments on the proposed definitions in section 96202(a):

(13) Revenue: We appreciate the consistency in the definition of revenue with "gross receipts" under section 25120(f)(2) of the California Revenue and Taxation Code. 027.10

(11) Reporting entity: We noted the definition of "reporting entity" is similar to the Health and Safety Code paragraph 38532(b)(2) with a difference in how the entity's revenue is determined (i.e., the lesser of the entity's two previous fiscal years in the Proposed Regulation rather than the prior fiscal year in section 38532(a)(2) of the Health and Safety Code). In addition, we noted that the form of the entities listed is identical to the definition of "business entity" in paragraph 96202(a)(1). We believe referring to section 38532(a)(2) rather than repeating the definition may simplify updates and prevent inconsistencies in the future should one regulation be updated independent of the other. 027.11

In addition, it is unclear which other individual business entities in their respective corporate family tree should be included in the "reporting entity" in preparing the report and determining whether the entity does business in California. We believe the following items should be clarified:
a. The individual business entity(ies) within a corporate family tree that should submit a report. This includes:
i. Clarifying whether each individual business entity should determine if they meet the criteria to be considered a "reporting entity"
ii. For those individual business entities that meet the criteria to be considered a "reporting entity," the options the entities within a corporate family tree have to group themselves to submit a report
b. The subsidiaries to each of those entities that should be included in the report:
i. All subsidiaries
ii. U.S. subsidiaries only
iii. Only subsidiaries doing business in California
iv. Only subsidiaries that also meet the definition of "reporting entity"
v. A subsidiary that submits a separate report under section 96202
vi. Any combination of the above
c. If subsidiaries that meet the definition of "reporting entity" are also included in the parent entity, would the parent entity and the parent of the parent entity meet the definition of "reporting entity" if they file unitarily?
d. Can subsidiaries that meet the definition of "reporting entity" submit a separate report? If so, would the parent's report include the subsidiary that was reported separately?
e. How do the entities included as part of the "reporting entity" relate to the entities included in the determination of "revenue" under this section?

See also "(10) Parent" and "(16) Subsidiary" below for comments regarding those definitions.

We believe the differences in the definition of "reporting entity" in the Proposed Regulation compared to that in Health and Safety Code paragraph 38532(b)(2) should explicitly be addressed. We offer the following recommendations in defining "reporting entity" for the purpose of Article 6: California Climate Disclosures of Title 17 of the California Code of Regulations to address the differences:
• Acknowledge the difference, retaining section 38532 as the primary definition source: (11) "Reporting entity" shall have the same definition as set forth in section 38532 of the Health and Safety Code, except that "Applicability shall be determined based on the business entity's revenue for the prior fiscal year" shall not apply for purposes of this section. For purposes of this section, the entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue. When applicable, a "reporting entity" shall include a parent (as defined in section 96202(a)(10)) and any subsidiaries (as defined in section 96202(a)(16)).
or
• Create a new definition of "covered entity" within this section separate from the definition of "covered entity" in section 38532: (11) "Reporting entity" means a business entity with total annual revenues in excess of one billion United States dollars ($1,000,000,000) and that does business in California. The entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue. When applicable, a "reporting entity" shall include a parent and any subsidiaries as defined in section 96202(a).

(5) Covered entity: We noted the definition of "covered entity" is similar to the Health and Safety

Code section 38533(a)(4) with a difference in how the entity's revenue is determined (i.e., the lesser of the entity's two previous fiscal years in the Proposed Regulation rather than the prior fiscal year in section 38533(a)(4) of the Health and Safety Code). In addition, we noted that the form of the entities listed is identical to the definition of "business entity" in section 96202(a)(1). We believe referring to section 38533 rather than repeating the definition may simplify updates and prevent inconsistencies in the future should one regulation be updated independent of the other.

In addition, it is unclear which other individual business entities in their respective corporate family tree should be included in the "covered entity" when submitting the report and determining whether the entity does business in California. Our concerns listed in "reporting entity" above also apply.

We believe the differences in the definition of "covered entity" in the Proposed Regulation compared to that in Health and Safety Code section 38533(a)(4) should explicitly be addressed. We offer the following recommendations in defining "covered entity" for the purpose of Article 6 of Title 17 of the California Code of Regulations to address the differences:

027.13

• Acknowledge the difference, retaining section 38533 as the primary definition source: (5) "Covered entity" shall have the same definition as set forth in section 38533 of the Health and Safety Code, except that "Applicability shall be determined based on the business entity's revenue for the prior fiscal year" shall not apply for purposes of this section. For purposes of this section, the entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue.

or

• Create a new definition of "covered entity" within this section separate from the definition of "covered entity" in section 38533: (5) "Covered entity" means a business entity with total annual revenues in excess of five hundred million United States dollars ($500,000,000) that does business in California. The entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue. "Covered entity" does not include a business entity that is subject to regulation by the Department of Insurance in this state, or that is in the business of insurance in any other state.

(10) Parent: We believe there may be a typographical error in the reference to indicia and thought the reference to section 96202(a)(6) should be section 96202(a)(16). 027.14

Also, see "(16) Subsidiary" for comments related to the indicia and reference to section 95833 of Title 17 of the California Code of Regulations.

(16) Subsidiary: It appears there may be an inconsistency in the indicia used to determine "direct corporate association." Section 96202(a)(16) includes a list of indicia of control to determine ownership or control. In addition, the same section states a subsidiary means, "a business entity that another business entity has ownership interest in or control of by direct corporate association as set forth in section 95833 of Title 17 of the California Code of Regulations." It appears that the indicia in sections 95833(a)(1)–95833(a)(2) is included in the list of indicia included in list in section 96202(a)(16) and that three types of indicia from section 95833 to determine a direct corporate association are not included in the list in section 96202(a)(16). These are described in sections 95833(a)(3) and 95833(a)(5)-(a)(6) relating to when two entities are connected through a line of more than one direct corporate association, publicly owned electric utilities operating two facilities and individuals who have shared roles.

027.15

We recommend that the entities that should be considered subsidiaries be clarified, preferably through reference to one or more sections in section 95833 of the California Code of Regulations or listing the indicia without the reference to section 95833 of the California Code of Regulations.

(1) Business entity: The definition of "business entity" includes "other business entity" as one of the forms of entities listed, which we believe may be circular and should be clarified. We recommend the wording be modified to "other entity doing business," which would refer to the definition of "doing business" in section 96202(a)(7) rather than "business entity," which is the term being defined. 027.16

C. Section 96203. Calculation of Fees

027.17 The staff stated the contingency adjustment ("A") for unforeseen costs or revenue shortfalls is currently 10%. It is unclear whether CARB is intending on reviewing, and possibly making an adjustment to, the contingency adjustment periodically to reflect the current and expected economic conditions. We recommend CARB clarifies this point to prevent potential overfunding in future periods.

D. Section 96205. Enforcement

Regarding the enforcement mechanisms necessary to ensure compliance with the fee payment requirements in the Proposed Regulation, we ask CARB to provide details on how enforcement will be assessed and managed. While enforcement is authorized through the assessment of penalties, the proposal does not specify penalty amounts or implications for non-compliance. 027.18

E. Section 96206. Deadline for Reporting under Health and Safety Code section 38532

027.19 We believe the August 10 reporting deadline is inconsistent with the more typical reporting dates of the 15th or 31st of the month and it is unclear what the regular reporting deadline will be in future years. While we understand the potential rationale to align reporting for entities with non-calendar fiscal years, we recommend that the Staff clarify what the regular reporting deadline will be in future years and align such deadlines with a more typical reporting date of the 15th or 31st of the month.

In addition, we believe guidance on how to handle entities with a 5-4-4 accounting period, which results in different fiscal years having different period-end dates, would be beneficial, as this may cause an issue where the fiscal year end may be February 2 one year and January 31 the following year. According to the draft regulations, entities would have a year with no report due and a year with two reports due. We suggest considering "fiscal periods beginning after January 15." This is consistent with how accounting and auditing standards avoid the issue when a 5-4-4 accounting period is used.

Section IV. Benefits Anticipated from the Regulatory Action, Including the Benefits or Goals Provided in the Authorizing Statute

The Proposed Regulation establishes a fee structure and funding for implementation of Health and Safety Code sections 38532 and 38533. We understand that the funding is primarily for covering the costs associated with the hiring of staff to enforce and review compliance. However, we 027.20

recommend establishing a review or adjustment process to avoid unnecessary fees if program costs stabilize but revenue keeps growing due to the 10% annual increase.

* * * * *

We would be pleased to respond to any questions the California Air Resources Board may have about our comments. Please direct any questions to Anthony DeCandido, Partner, at 203.388.7053, or Scott Wilgenbusch, Partner, National Professional Standards Group, at 312.634.3302.

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February 9, 2026

Office of the Secretary
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Via online submission

Re: California Air Resources Board's (CARB) *Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation*

Dear Office of the Secretary:

RSM US LLP (RSM, we) values the opportunity to offer our comments on the California Air Resources Board's (CARB) *Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation* (the Proposed Regulation). RSM is the leading provider of assurance, tax and consulting services focused on the middle market, with nearly 18,000 professionals in 77 U.S. cities, six locations in Canada, one in El Salvador and four in India.

Overall Comments on the Proposal

Overall, we support the intent and function of the Proposed Regulation to clarify the applicability; we also support establishing the fee program under the Climate Corporate Data Accountability Act (codified in Health and Safety Code section 38532) and the Climate-Related Financial Risk Reporting Act (codified in Health and Safety Code section 38533).

Our responses are based on our understanding of the Proposed Regulation as provided in the publicly disseminated materials ahead of the CARB hearing on February 26, 2026. We have included specific comments on the proposal below and also have the following overall thoughts on the proposal:

- **Reporting entity composition:** We believe the regulations are unclear on how to determine what data and entities are included in an entity's report (i.e., the reporting entity). Specifically, how the definitions of parent and subsidiary relate to the definition of reporting entity and which subsidiaries should be included with the parent's report, not be included or be reported separately. We suggest that CARB create a flow chart to assist reporting entities in determining the scope of the subsidiary entities to be included in the parent's report.
- **Determining applicability:** Entities may face uncertainty in determining applicability, even after management review or legal support. It would be beneficial for CARB to provide consultation resources for entities to contact.
- **Cost of implementation:** The "Non-Major Regulation: Statement of the Results of the Economic Impact Assessment (EIA): The creation or elimination of jobs within the State of California" section of the Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation states:

THE POWER OF BEING UNDERSTOOD
ASSURANCE | TAX | CONSULTING

RSM US LLP is the U.S. member firm of RSM International, a global network of independent assurance, tax and consulting firms. Visit rsmus.com/aboutus for more information regarding RSM US LLP and RSM International.

The Proposed Regulation is not expected to directly affect the creation or elimination of jobs within the state, as the estimated compliance costs for this regulation are minimal and not anticipated to influence employment levels. Any potential costs associated with the addition of the first year (2026) corporate GHG reporting deadline through the Proposed Regulation would be negligible, and potentially zero for some companies, and is not expected to create or eliminate jobs.

Some entities that meet the applicability requirements may not be accustomed to reporting such data, and accordingly will likely incur additional costs for implementation of policies, processes and controls over determining the applicability of sections 38532 and 38533 of the Health and Safety Code as well as the determination of the fees under these sections of the Health and Safety Code. As complexity of the reporting entity's structure increases, so do the associated costs of implementing the Proposed Regulation.

Specific Comments on the Proposal

As requested, we have feedback on the following elements of the CARB Staff Report: Initial Statement of Reasons dated December 9, 2025, as well as other feedback on the proposal, explained below:

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A. Section 96201. Applicability

B. Section 96202. Definitions

C. Section 96203. Calculation of Fees

D. Section 96204. Fee Payment and Collection

E. Section 96205. Enforcement

F. Section 96206. Deadline for Reporting under Health and Safety Code section 38532

G. Section 96207. Severability

A. Section 96201. Applicability

It is our understanding that each individual business entity should determine whether it is in scope of sections 38532 and 38533 of the Health and Safety Code. In determining whether a business entity meets the definition of reporting entity or covered entity, and therefore meets the applicability requirement in section 96201(a), we believe it would be necessary to determine which other individual business entities within its corporate family tree should be included (or consolidated) to determine if the business entity meets the definitions of reporting entity under section 96202(a)(11) or covered entity under section 96202(a)(5) for purposes of complying with sections 38532 and 38533 of the Health and Safety Code, respectively. Two of the criteria to meet the definition of a reporting entity or covered entity are:

1. The business entity does business in California,[1] which requires either:
    a. Being commercially domiciled in California[2] or
    b. Meeting a certain threshold of sales in California as defined in section 23101(b)(2) of the Revenue and Taxation Code,[3] and
2. Have revenue, which is equivalent to "gross receipts" under section 25120(f)(2) of the Revenue and Taxation, that meets a defined threshold.[4]

The composition of business entities included will affect the sales in determining whether the business entity does business in California under section 23101(b)(2) of the Revenue and Taxation Code and in determining the revenue (or "gross receipts") under section 25120(f)(2) of the Revenue and Taxation Code.

We believe it is unclear which individual business entities within a corporate family tree should be included when determining whether a given business entity meets the definition of a reporting entity or a covered entity and, therefore, sections 38532 and 38533 of the Health and Safety Code would apply to that business entity.

We recommend CARB design a flow chart to aid entities in evaluating whether they are within the scope of sections 38532 and 38533 of the Health and Safety Code by depicting each decision point in determining which other individual business entities within the corporate family should be included in a given business entity's determination of whether it meets the definition of a reporting entity or covered entity. See our comments in subsection B regarding the definitions of reporting entity and covered entity.

The Proposed Regulation includes an exemption for "business entities whose only business in California is employee compensation or payroll expenses, including teleworking employees."[5] The rationale for this included:[6]

- A large number of teleworking employees since the global pandemic of 2020
- Challenges of interpreting how teleworking may fit into the definition of "doing business in California" in section 96202(a)(8) of the Proposed Regulation
- Seeking to avoid unintended consequences of businesses with only virtual operations in California from leaving the state.

While we do not disagree with these points, we also believe there may be an unintended consequence where business entities that currently do business in California and have operations in California revise their physical location and structure to where the business entity would only have virtual employees in California to avoid being required to comply with sections 38532 and 38533 of the Health and Safety Code. It is possible CARB already considered this, but we believe this is an important nuance to address in the rationale of the Proposed Regulation.

[1] Sections 96202(a)(5) and 96202(a)(11) of the Proposed Regulation
[2] Section 23101(b)(1) of the Revenue and Taxation Code
[3] Section 23101(b)(2) of the Revenue and Taxation Code
[4] Sections 96202(a)(5) and 96292(a)(11) of the Proposed Regulation
[5] Section 96201(b)(5) of the Proposed Regulation
[6] California Air Resources Board's Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation, Staff Report: Initial Statement of Reasons.

B. Section 96202. Definitions

There appears to be inconsistency between duplicating definitions in other code sections or paragraphs and referencing the other code sections or paragraphs, such as the references that were included in sections 96202(a)(7) and 96202(a)(8) relating to "doing business" and "doing business in California." We recommend that CARB be consistent on either duplicating or referencing definitions listed in other code sections or paragraphs. In general, we believe referencing the definitions in other code sections or paragraphs may lead to more consistency throughout the code. Changing the reference format may simplify updates and prevent inconsistencies in definitions, as noted in our detailed comments below.

In addition, as detailed in our comments in subsection A and our comments on the definitions below, we were unable to determine which other individual business entities within its corporate family tree should be included (or consolidated) to determine if a given business entity would meet the definitions of reporting entity under section 96202(a)(11) or covered entity under section 96202(a)(5) for purposes of complying with sections 38532 and 38533 of the Health and Safety Code, respectively.

We have the following specific comments on the proposed definitions in section 96202(a):

(13) Revenue: We appreciate the consistency in the definition of revenue with "gross receipts" under section 25120(f)(2) of the California Revenue and Taxation Code.

(11) Reporting entity: We noted the definition of "reporting entity" is similar to the Health and Safety Code paragraph 38532(b)(2) with a difference in how the entity's revenue is determined (i.e., the lesser of the entity's two previous fiscal years in the Proposed Regulation rather than the prior fiscal year in section 38532(a)(2) of the Health and Safety Code). In addition, we noted that the form of the entities listed is identical to the definition of "business entity" in paragraph 96202(a)(1). We believe referring to section 38532(a)(2) rather than repeating the definition may simplify updates and prevent inconsistencies in the future should one regulation be updated independent of the other.

In addition, it is unclear which other individual business entities in their respective corporate family tree should be included in the "reporting entity" in preparing the report and determining whether the entity does business in California. We believe the following items should be clarified:

a. The individual business entity(ies) within a corporate family tree that should submit a report. This includes:
    i. Clarifying whether each individual business entity should determine if they meet the criteria to be considered a "reporting entity"
    ii. For those individual business entities that meet the criteria to be considered a "reporting entity," the options the entities within a corporate family tree have to group themselves to submit a report
b. The subsidiaries to each of those entities that should be included in the report:
    i. All subsidiaries
    ii. U.S. subsidiaries only
    iii. Only subsidiaries doing business in California

iv. Only subsidiaries that also meet the definition of "reporting entity"

v. A subsidiary that submits a separate report under section 96202

vi. Any combination of the above

c. If subsidiaries that meet the definition of "reporting entity" are also included in the parent entity, would the parent entity and the parent of the parent entity meet the definition of "reporting entity" if they file unitarily?

d. Can subsidiaries that meet the definition of "reporting entity" submit a separate report? If so, would the parent's report include the subsidiary that was reported separately?

e. How do the entities included as part of the "reporting entity" relate to the entities included in the determination of "revenue" under this section?

See also "(10) Parent" and "(16) Subsidiary" below for comments regarding those definitions.

We believe the differences in the definition of "reporting entity" in the Proposed Regulation compared to that in Health and Safety Code paragraph 38532(b)(2) should explicitly be addressed. We offer the following recommendations in defining "reporting entity" for the purpose of Article 6: California Climate Disclosures of Title 17 of the California Code of Regulations to address the differences:

- **Acknowledge the difference, retaining section 38532 as the primary definition source:** (11) "Reporting entity" shall have the same definition as set forth in section 38532 of the Health and Safety Code, except that "Applicability shall be determined based on the business entity's revenue for the prior fiscal year" shall not apply for purposes of this section. For purposes of this section, the entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue. When applicable, a "reporting entity" shall include a parent (as defined in section 96202(a)(10)) and any subsidiaries (as defined in section 96202(a)(16)).

or

- **Create a new definition of "covered entity" within this section separate from the definition of "covered entity" in section 38532:** (11) "Reporting entity" means a business entity with total annual revenues in excess of one billion United States dollars ($1,000,000,000) and that does business in California. The entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue. When applicable, a "reporting entity" shall include a parent and any subsidiaries as defined in section 96202(a).

(5) Covered entity: We noted the definition of "covered entity" is similar to the Health and Safety Code section 38533(a)(4) with a difference in how the entity's revenue is determined (i.e., the lesser of the entity's two previous fiscal years in the Proposed Regulation rather than the prior fiscal year in section 38533(a)(4) of the Health and Safety Code). In addition, we noted that the form of the entities listed is identical to the definition of "business entity" in section 96202(a)(1). We believe referring to section 38533 rather than repeating the definition may simplify updates and prevent inconsistencies in the future should one regulation be updated independent of the other.

In addition, it is unclear which other individual business entities in their respective corporate family tree should be included in the "covered entity" when submitting the report and determining whether the entity does business in California. Our concerns listed in "reporting entity" above also apply.

We believe the differences in the definition of "covered entity" in the Proposed Regulation compared to that in Health and Safety Code section 38533(a)(4) should explicitly be addressed. We offer the following recommendations in defining "covered entity" for the purpose of Article 6 of Title 17 of the California Code of Regulations to address the differences:

- **Acknowledge the difference, retaining section 38533 as the primary definition source:** (5) "Covered entity" shall have the same definition as set forth in section 38533 of the Health and Safety Code, except that "Applicability shall be determined based on the business entity's revenue for the prior fiscal year" shall not apply for purposes of this section. For purposes of this section, the entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue.

or

- **Create a new definition of "covered entity" within this section separate from the definition of "covered entity" in section 38533:** (5) "Covered entity" means a business entity with total annual revenues in excess of five hundred million United States dollars ($500,000,000) that does business in California. The entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue. "Covered entity" does not include a business entity that is subject to regulation by the Department of Insurance in this state, or that is in the business of insurance in any other state.

(10) Parent: We believe there may be a typographical error in the reference to indicia and thought the reference to section 96202(a)(6) should be section 96202(a)(16).

Also, see "(16) Subsidiary" for comments related to the indicia and reference to section 95833 of Title 17 of the California Code of Regulations.

(16) Subsidiary: It appears there may be an inconsistency in the indicia used to determine "direct corporate association." Section 96202(a)(16) includes a list of indicia of control to determine ownership or control. In addition, the same section states a subsidiary means, "a business entity that another business entity has ownership interest in or control of by direct corporate association as set forth in section 95833 of Title 17 of the California Code of Regulations." It appears that the indicia in sections 95833(a)(1)–95833(a)(2) is included in the list of indicia included in list in section 96202(a)(16) and that three types of indicia from section 95833 to determine a direct corporate association are not included in the list in section 96202(a)(16). These are described in sections 95833(a)(3) and 95833(a)(5)-(a)(6) relating to when two entities are connected through a line of more than one direct corporate association, publicly owned electric utilities operating two facilities and individuals who have shared roles.

We recommend that the entities that should be considered subsidiaries be clarified, preferably through reference to one or more sections in section 95833 of the California Code

of Regulations or listing the indicia without the reference to section 95833 of the California Code of Regulations.

(1) Business entity: The definition of "business entity" includes "other business entity" as one of the forms of entities listed, which we believe may be circular and should be clarified. We recommend the wording be modified to "other entity doing business," which would refer to the definition of "doing business" in section 96202(a)(7) rather than "business entity," which is the term being defined.

C. Section 96203. Calculation of Fees

The staff stated the contingency adjustment ("A") for unforeseen costs or revenue shortfalls is currently 10%. It is unclear whether CARB is intending on reviewing, and possibly making an adjustment to, the contingency adjustment periodically to reflect the current and expected economic conditions. We recommend CARB clarifies this point to prevent potential overfunding in future periods.

D. Section 96205. Enforcement

Regarding the enforcement mechanisms necessary to ensure compliance with the fee payment requirements in the Proposed Regulation, we ask CARB to provide details on how enforcement will be assessed and managed. While enforcement is authorized through the assessment of penalties, the proposal does not specify penalty amounts or implications for non-compliance.

E. Section 96206. Deadline for Reporting under Health and Safety Code section 38532

We believe the August 10 reporting deadline is inconsistent with the more typical reporting dates of the 15th or 31st of the month and it is unclear what the regular reporting deadline will be in future years. While we understand the potential rationale to align reporting for entities with non-calendar fiscal years, we recommend that the Staff clarify what the regular reporting deadline will be in future years and align such deadlines with a more typical reporting date of the 15th or 31st of the month.

In addition, we believe guidance on how to handle entities with a 5-4-4 accounting period, which results in different fiscal years having different period-end dates, would be beneficial, as this may cause an issue where the fiscal year end may be February 2 one year and January 31 the following year. According to the draft regulations, entities would have a year with no report due and a year with two reports due. We suggest considering "fiscal periods beginning after January 15." This is consistent with how accounting and auditing standards avoid the issue when a 5-4-4 accounting period is used.

Section IV. Benefits Anticipated from the Regulatory Action, Including the Benefits or Goals Provided in the Authorizing Statute

The Proposed Regulation establishes a fee structure and funding for implementation of Health and Safety Code sections 38532 and 38533. We understand that the funding is primarily for covering the costs associated with the hiring of staff to enforce and review compliance. However, we recommend establishing a review or adjustment process to avoid unnecessary fees if program costs stabilize but revenue keeps growing due to the 10% annual increase.

* * * * *

We would be pleased to respond to any questions the California Air Resources Board may have about our comments. Please direct any questions to Anthony DeCandido, Partner, at 203.388.7053, or Scott Wilgenbusch, Partner, National Professional Standards Group, at 312.634.3302.

Sincerely,

RSM US LLP

RSM US LLP

XBRL US (Campbell Pryde)

Please accept this comment letter from XBRL US in regards to the California Air Resources Board Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Discloure Initial Regulation.

February 9, 2026

1345 Avenue of the Americas
27th Floor
New York, NY 10105
Phone: (202) 448-1985
Fax: (866) 516-6923

California Air Resources Board (CARB)
Clerks' Office
1001 I Street
Sacramento, CA 95814

RE: Response to Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Thank you for the opportunity to provide input in response to the Notice of Public Hearing.

XBRL US is a nonprofit data standards organization whose mission is to improve the efficiency, transparency, and quality of business reporting in the United States through the adoption of open reporting standards. XBRL US is the U.S. jurisdiction of XBRL International, the nonprofit consortium responsible for developing and maintaining the XBRL technical specification.

XBRL is not a product or service, but an open, freely available data standard that enables information to be reported in a structured, machine-readable form. XBRL is widely used by millions of public and private companies, financial institutions, governments, and utilities reporting to more than 130 regulators worldwide. In the United States, banks under the jurisdiction of the Federal Deposit Insurance Corporation (FDIC) have submitted quarterly financial reports in XBRL format for more than 20 years. Public companies and investment management companies have reported to the Securities and Exchange Commission (SEC) in standardized XBRL format for 16 years. More recently, public utilities have been submitting annual financial data to the Federal Energy Regulatory Commission (FERC) in XBRL format, a program now in its fifth year.

While the immediate objective of the proposed CARB rule is to establish two funds to collect fees for SB 253 and 261, and to set an initial reporting deadline, this letter focuses on considerations related to how reported data should be prepared and formatted. We appreciate that CARB noted in the Staff Report its intent to "…*undertake a second rulemaking to establish future reporting dates beyond 2026 and to provide additional details for reporting contents and format, data assurance, and related matters*."

028.1

We respectfully recommend that, in the next phase of rulemaking, CARB includes requirements for data to be submitted in a digital, structured, standardized format using an open standard such as XBRL. The rationale for this recommendation is described below.

First, data submitted in a machine-readable format is easier and less costly to collect, process, and analyze. When data is reported in structured digital form, CARB can reduce or eliminate the need to develop custom extraction and analytics tools for the public to access the data. Regulators and other data users can automate data ingestion and analysis, improving efficiency and timeliness. U.S. federal regulators, the SEC, the FDIC, and the FERC have been benefitting from these advantages for years and many of the same businesses that report in XBRL to federal regulators will fall under the California mandates as well. These companies already have the resources and experience to produce financial data in structured XBRL format; generating climate-related data in structured format will require no additional tools or learning.

028.2

Second, data quality is likely to improve when in standardized format. Structured, granular data enables automated validation rules to check for completeness, internal consistency, and common errors such as incorrect signage or conflicting values. Machine-readable reporting also reduces reliance on manual data entry and review, further improving accuracy and speed of access.

Third, the EFRAG Discussion Paper released in Dec 2025, Connectivity of Financial and Sustainability Reporting, underscores that structured digital data via XBRL is essential for enhancing the connectivity and consistency of reported information across different annual report sections. Implementing these digital standards allows regulators to automate the reconciliation of sustainability disclosures with financial statement line items, ensuring a holistic and coherent view of an entity's climate-related risks.

Fourth, alignment with existing international reporting frameworks can reduce reporting burden for covered entities. Organizations that already report to non-U.S. regulators—such as under the EU Corporate Sustainability Reporting Directive or in IFRS-based jurisdictions—can reuse the same digital reports to satisfy CARB requirements. These regimes already require reporting in XBRL using open taxonomies that capture substantially similar information. CARB could leverage these existing, freely available taxonomies at no cost.

Fifth, structured and standardized data facilitates auditability and assurance through improved traceability, better data quality, and automation. This will assist covered entities in the second phase of rulemaking when assurance requirements will be addressed.

Finally, smaller entities without global reporting obligations can be supported through appropriately designed tools. For example, CARB's spreadsheet-based reporting template could be adapted to generate both human-readable and machine-readable outputs that remain interoperable with international reporting frameworks. As a proof of concept, XBRL US has developed an open-source spreadsheet-based tool aligned with this approach and is currently revising it to match the CARB template.

More broadly, the use of open data standards can strengthen regulatory data collection efforts. XBRL provides a semantic data model that unambiguously defines reported facts at a granular level, enabling consistent interpretation across systems and users. This approach, described in greater detail in this paper, is well suited to climate-related data, including greenhouse gas emissions, air quality metrics, and cap-and-trade program information. Establishing a shared semantic model—through a taxonomy or ontology agreed upon by state and federal regulators—would improve data comparability, accessibility, and reuse across programs and jurisdictions.

028.3

Thank you again for the opportunity to provide feedback on the proposed CARB rule. We would welcome the opportunity to engage further during the second phase of rulemaking on how standardized digital data preparation can reduce costs, improve data quality, and minimize reporting burden. Please contact me if you have any questions or would like to discuss our comments further. I can be reached at (917) 582-6159 or Campbell.Pryde@xbrl.us.

028.4

Sincerely,

Campbell Pryde, President and CEO, XBRL US

John Bode

Please see attached for Corn Refiners Association comments.

February 9, 2026

RE: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

The Corn Refiners Association (CRA) appreciates this opportunity to provide input to the California Air Resources Board (CARB) draft regulatory text implementing SB 253 (the Climate Corporate Data Accountability Act) and SB 261 (the Climate-Related Financial Risk Act), released on December 9, 2025.

CRA is the national trade association representing 100% of the corn refining industry in the United States. America's corn refiners manufacture hundreds of products with thousands of uses, including sweeteners, starches, advanced bioproducts, corn oil, and feed products, from dent corn components such as starch, oil, protein, and fiber.

CRA writes to highlight concerns that the proposed regulatory text could duplicate existing reporting frameworks and impose significant compliance burdens and costs that would be better directed toward meaningful, on-the-ground sustainability and decarbonization initiatives. 029.1

Duplicative Requirements

The proposed regulatory structure would create overlapping and duplicative reporting obligations with existing federal and voluntary frameworks. Rather than improving the quality or usefulness of climate information, the draft regulations would establish parallel processes with different methodologies, timelines, and verification expectations, without clear mechanisms for coordination or harmonization. This approach increases administrative burden and compliance complexity without demonstrating meaningful benefits for regulators, investors, or the public.

For example, many companies already report greenhouse gas emissions under EPA's Greenhouse Gas Reporting Program and provide climate and risk disclosures through widely used voluntary frameworks, including the Greenhouse Gas Protocol, Carbon Disclosure Project, and reporting aligned with the Task Force on Climate-related Financial Disclosures or International Sustainability Standards Board standards. In addition, several other states have introduced climate disclosure legislation that, if enacted, could further compound compliance obligations over time by creating a patchwork of state-specific requirements.

CRA is concerned that layering a new reporting program on top of existing frameworks is unnecessary to achieve the intended transparency objectives. If CARB elects to move forward with additional reporting requirements, CRA encourages the agency to align the final regulatory text with existing federal and voluntary frameworks wherever possible. Allowing companies to rely on comparable

disclosures that have already undergone verification and review, instead of creating separate and duplicative processes, would streamline compliance, improve consistency, and help ensure that resources remain focused on practical and measurable emissions reduction efforts.

Compliance Resources Could Be Redirected Toward Emissions-Reducing Investments

CRA is particularly concerned that the effort, staff time, and financial costs required to comply with the proposed rules, especially for Scope 3 calculations and biennial climate risk reporting, could divert resources away from direct emissions-reduction initiatives. Many corn refiners are undertaking significant sustainability projects, including:

- Deployment of lower-carbon energy systems
- Agricultural supply-chain partnerships that reduce upstream emissions
- Carbon capture and storage projects
- Increased use of renewable electricity

Compliance with the proposed regulations, especially in the early years, could demand substantial additional financial investment in data collection systems, third-party verification, internal reviews, and legal evaluations. CRA believes that these resources are most impactful when directed toward on-the-ground decarbonization rather than duplicative administrative processes.

Scope 3 Requirements

CRA is concerned that the requirement to report Scope 3 emissions is impractical and misaligned with the goal of producing accurate, decision-useful climate disclosures. Unlike Scope 1 and 2 emissions, Scope 3 emissions occur outside a company's direct control, making precise data collection and verification, in many cases, impossible. Companies are expected to rely on estimates from suppliers and distributors, many of whom may lack the capability or obligation to provide emissions data, resulting in inconsistent, unverifiable, and potentially misleading disclosures. Such inaccuracies create uncertainty for regulators, investors, and the marketplace. CRA urges CARB to reconsider the inclusion of Scope 3 emissions in the regulation. 029.2

We appreciate CARB's engagement with stakeholders and look forward to continued collaboration to develop a regulatory framework that is effective, efficient, and supportive of ongoing sustainability leadership.

Sincerely,

John W. Bode
President and CEO
Corn Refiners Association

AS YOU SOW
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El Cerrito, CA 94530
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BUILDING A SAFE, JUST, AND SUSTAINABLE WORLD SINCE 1992

February 9, 2026

Clerk's Office
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Dear Members of the California Air Resources Board:

As You Sow appreciates the opportunity to submit this comment letter to the California Air Resources Board (CARB) on the proposed regulation implementing the Climate Corporate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Act (SB 261). *As You Sow* is a shareholder representative that promotes corporate responsibility. For over 30 years, we have represented shareholders in engaging companies on climate risk, emissions disclosure, and sustainable business practices.

We strongly support SB 261 and SB 253. These landmark laws will provide critical transparency around corporate greenhouse gas emissions and climate-related financial risks, enabling investors, consumers, and businesses to make more informed decisions. Comprehensive emissions reporting incentivizes companies to investigate their supply chains, revealing hidden emissions that could pose material financial risks. Companies may also discover opportunities for decarbonization. 030.1

Moreover, requiring Scope 3 disclosures creates a multiplier effect. Companies providing disclosures often encourage companies within their supply chains to develop their own greenhouse gas emissions reporting processes. Each entity in the value chain has some degree of influence over overall emissions and reductions, and reporting companies can influence Scope 3 emissions reductions upstream and downstream of their operations.

While *As You Sow* strongly supports the Climate Corporate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Act (SB 261), we urge the Board to reconsider the proposed exemption of insurance companies from SB 253's greenhouse gas emissions reporting requirements. We recognize that the insurance exemption under SB 261 is beyond CARB's regulatory authority; however, the proposed SB 253 exemption is a discretionary choice that we urge CARB to reconsider. CARB has not offered a rationale to extend the SB 261 exemption to SB 253. Moreover, no rationale is apparent, as the two statutes serve different purposes.

I. THE PROPOSED INSURANCE EXEMPTION CONFLICTS WITH THE LEGISLATURE'S DELIBERATE DESIGN OF SB 253

We are concerned that CARB's proposed consolidated framework would exempt insurance companies from SB 253's greenhouse gas emissions reporting requirements in the interest of "continuity" with SB 261. That approach is inconsistent with the statutory scheme the Legislature enacted. During the legislative process, policymakers considered different approaches to the treatment of insurers under the two disclosure laws. Ultimately, the climate-related financial risk statute (SB 261) was modified in light of overlap with existing insurance regulatory frameworks, while SB 253 was enacted without any exemption for insurance companies. The absence of such an exemption in SB 253 is therefore deliberate. 030.2

CARB does not have authority to create a categorical exclusion that the statute itself does not provide and that the Legislature declined to adopt. Extending an insurer exemption into SB 253 is not a matter of statutory interpretation but of policy preference, and it would improperly narrow the scope of a law designed to function as an economy-wide emissions disclosure regime.

Importantly, differences in coverage between SB 253 and SB 261 reflect deliberate legislative design, not statutory gaps, and do not authorize CARB to import limitations or exemptions from one statute into the other.

For these reasons, CARB should revise the proposal to require insurance companies that meet SB 253's $1 billion revenue threshold to report their Scope 1, Scope 2, and Scope 3 greenhouse gas emissions on the same basis as other covered entities, consistent with the statute's text and purpose.

II. INSURANCE COMPANIES CONTRIBUTE TO CLIMATE-RELATED RISK

Major insurance companies operating in California hold tens of billions of dollars in fossil fuel-related investments. For example, Berkshire Hathaway holds nearly $96 billion in fossil fuel equities,[1] while State Farm holds $20.6 billion in fossil fuel equities and bonds.[2] Beyond financing high-emitting companies, insurance companies underwrite fossil fuel projects.[3]

Transparency around the insurance industry's exposure to financial risk through its fossil fuel investments is crucial. When California required disclosure of such investments from insurers under the Climate Risk Carbon Initiative in 2017, it explicitly recognized the potential significant financial risks posed to insurers' investments in oil, gas, coal, and utilities—yet this disclosure program was not continued, leaving a critical gap in information.[4] The inclusion of insurance companies under SB 253 would provide a level of transparency that is necessary for shareholders to assess risk as insurance companies continue to invest in and underwrite in the fossil fuel sector. 030.3

The impact of climate change on the insurance industry is increasingly apparent. Insurance companies in California are experiencing rising catastrophe losses resulting from climate change. In 2023, national insurance underwriting losses reached a 10-year high of $38 billion due to more frequent and intense weather-related disasters, reinsurance price increases, and related inflation.[5] 2024 followed as the second-costliest year for catastrophe losses since 2005.[6] An *Insure our Future* report found that the share of insured losses from climate-related causes rose from 31% to 38% over the last decade and continues to rise.[7] These substantial losses have led to dramatic premium increases and insurance market withdrawals that are creating economic impacts far beyond the insurance industry itself.

[1] https://investinginclimatechaos.org/data
[2] https://investinginclimatechaos.org/data
[3] https://us.insure-our-future.com/
[4] https://interactive.web.insurance.ca.gov/apex_extprd/f?p=250:1:0::NO:10,25,30,40
[5] https://www.insurancejournal.com/news/national/2024/03/07/763884.htm
[6] https://www.insurancebusinessmag.com/us/news/property/pandc-returns-to-underwriting-profit-in-2024-529406.aspx
[7] https://insure-our-future.com/wp-content/uploads/2024/12/IoF-Scorecard-2024.pdf

Exempting insurance companies from climate disclosures creates a major gap in understanding the risk of climate change to California and California businesses.

III. EXISTING INSURANCE REPORTING FRAMEWORKS DO NOT ADDRESS EMISSIONS DISCLOSURE

Insurance companies in California report under National Association of Insurance Commissioners (NAIC) standards, which focus on climate-related financial risks but do not require comprehensive greenhouse gas emissions accounting. Although Insurers may disclose Scope 1,2, and "if appropriate," Scope 3 emissions; the framework does not prescribe standardized methodologies, formats, or third-party assurance, and it does not request financed or insured emissions – categories that represent the majority of insurers'' climate impact. In fact, most insurers do not report. A Ceres report found that only 31% of property and casualty insurance groups disclosed metrics and targets, signifying a major gap.[9] 030.4

The NAIC framework and SB 253 serve different purposes. Compliance with one does not satisfy the requirements of the other. For investors, this distinction is critical. Investors evaluating long-term value, exposure, and risk cannot rely solely on partial climate-risk narratives. They need quantified, comparable emissions data—particularly Scope 3—to assess which insurers are aligned with decarbonization trends, which face transition risk, and which are financing or underwriting activities likely to become stranded or uninsurable. Without transparent emissions disclosure, investors cannot accurately price risk, allocate capital, or evaluate whether insurers' business strategies are compatible with emerging regulatory, economic, and physical climate realities.

IV. CONCLUSION AND RECOMMENDATIONS

The proposed exemption of insurance companies from SB 253 would create a gap in California's emissions disclosure framework. Insurance companies are major financiers of greenhouse gas emissions through their investment and underwriting activities yet would face no transparency requirements under CARB's proposed regulation.

We respectfully request that CARB:

1. Remove the proposed exemption for insurance companies under SB 253, requiring insurers to meet SB 253's revenue threshold to report Scope 1, 2, and 3 emissions. 030.5

2. If CARB believes regulatory guidance is needed for insurance industry-specific emissions calculations (particularly for financed and insured emissions), provide such guidance rather than creating a blanket exemption. 030.6

Insurance companies should be subject to the same transparency requirements as other large corporations. Their financed and insured emissions represent a substantial portion of California's and the nation's carbon footprint. 030.7

Thank you for considering these comments.

[9] Ceres, "Navigating Climate Risks: Progress and Challenges in U.S. Insurance Sector Disclosures," June 2024, p.30, https://www.ceres.org/resources/reports/navigating-climate-risks-progress-and-challenges-in-us-insurance-sector-disclosures

Sincerely,

Andrew Behar
CEO
As You Sow Foundation

Danielle Fugere
President and Chief Counsel
As You Sow Foundation

Beveridge & Diamond P.C. (Eric Christensen)

Public comment on CARB's Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure initial regulation.

Beveridge & Diamond P.C.
600 University Street
Suite 1601
Seattle, WA 98101

February 09, 2026

To: California Air Resources Board

From: Beveridge & Diamond P.C.

Re: Public Comments to Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

To Whom it May Concern:

Thank you for the opportunity to provide comments in response to the California Air Resources Board's (CARB) solicitation of public comments on the proposed initial regulations for the Climate Corporate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Act (SB 261).

We respectfully request that CARB consider the following comment as it moves forward in the rulemaking process.

Comment: Limiting Greenhouse Gas (GHG) Emissions Disclosure to "Material" Emissions

SB 261

CARB should limit GHG emissions disclosures under SB 261 to emissions that create a material financial risk to the reporting entity. This limits disclosures to information that is useful for investors, consistent with SB 261's intent to inform investors of climate-related business risks. This approach also aligns with the Securities and Exchange Commission's (SEC) approach in its climate-related financial disclosure rule. In adopting its final climate-related disclosure rule, the SEC changed course from the proposed rule and only required the disclosure of Scope 1 and Scope 2 emissions if the emissions are material.[1] 031.1

[1] The Enhancement and Standardization of Climate-Related Disclosure for Investors, Final Rule, p. 244.

The SEC explained that a registrant should "apply traditional notions of materiality under the Federal securities laws when evaluating whether its Scope 1 and/or 2 emissions are material. Thus, materiality is not determined merely by the amount of these emissions."[2] The SEC reminded registrants that the guiding principle for a materiality determination under the Federal securities laws is "whether a reasonable investor would consider the disclosure of an item of information, in this case the registrant's Scope 1 emissions and/or its Scope 2 emissions, important when making an investment or voting decision or such a reasonable investor would view omission of the disclosure as having significantly altered the total mix of information made available."[3]

We recommend CARB take a similar approach to emissions disclosure under SB 261. We acknowledge CARB's guidance that for the initial reporting period, reporting entities are not required to disclose Scope 1 and 2 emissions. For future reporting periods, we recommend CARB limit the required emissions disclosures to those that are material under the standard of materiality applied to financial disclosures. Doing so would ensure disclosures are relevant and actionable, and consistent with the purposes of SB 261.

SB 253

Similarly, we recommend CARB limit emissions disclosures under SB 253 to material emissions. Materiality in this context could be defined by setting an emissions threshold, similar to both California's GHG Reporting program and the federal GHG Reporting program.[4] Both of these programs require covered facilities to report GHG emissions if emissions exceed 25,000 metric tons of CO2e.[5] CARB could adopt a similar threshold, meaning only those who have emissions that exceed 25,000 metric tons of CO2e would be subject to SB 253 reporting requirements. This would create consistency across the different GHG reporting frameworks and would align with the statute's intent of seeking comprehensive data on GHG emissions in California and mitigating the state's climate risk.[6]

031.2

It would also target the most significant emitters, while minimizing the reporting burden on entities with emissions that do not meet the standard for significance under related GHG reduction frameworks. As CARB acknowledges, the Cap-and-Invest Program covers about 80% of the state's GHG emissions. Quantifying the contributions from the remaining 20% of sources likely would contribute little to advancing the goals of SB 253 since these

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[2] *Id*. at 245.
[3] *Id*. at 245-246.
[4] CARB California Mandatory GHG Reporting; Environmental Protection Agency, GHG Reporting Program,
[5] EPA GHGRP, What is the GHGRP?; CARB Guidance for California's Mandatory Greenhouse Gas Emissions Reporting.
[6] SB 253, Section 1(g), (h).

sources are predominantly small and the burdens of reporting cannot justify the additional informational accuracy that might result.

Many companies will spend significant time and money mapping and calculating their emissions, particularly Scope 3 emissions. Limiting emissions disclosures to material emissions will align with CARB's effort to "design these programs to be the least burdensome" and could decrease costs for reporting businesses, particularly for those who've determined that they do not face material risk from its GHG emissions. [7]

We also recommend that CARB define the materiality of GHG emissions that an individual reporting entity must include in quantifying its GHG emissions. The International Standards Organization (ISO) has developed standards for defining the GHG footprint of organizations and facilities and those standards make clear that an organization may exclude non-material sources of GHG emissions from its emissions assessment.

031.3

Specifically, ISO 14067, which sets forth an accepted methodology for assessing carbon footprints, specifies that a carbon emissions assessment should include only significant sources of GHG emissions and that the study should include criteria specifying thresholds for identifying significant emissions sources and excluding those that are not significant sources.[8] ISO 14044 provides useful guidance for cut-off criteria that allows insignificant sources of GHGs to be omitted from GHG footprint calculations based on mass, energy or environmental significance.[9]

These ISO criteria provide a useful model for CARB to obtain a complete and accurate accounting of GHG emissions in California while excluding insignificant GHG sources, which will help mitigate the burden of GHG reporting under SB 253.

Thank you for your consideration.

Sincerely,

Eric Christensen

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[7] CARB California Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs.
[8] ISO 14067, 5.7 & 6.4.3.4.
[9] ISO 14044:2006(E), 4.2.3.3.3.

February 9, 2026

Chair Lauren Sanchez
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Chair Sanchez and Staff,

The Clean Energy Buyers Association (CEBA) appreciates the opportunity to comment on the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation posted on December 23, 2025, by the California Air Resources Board (CARB).

CEBA is a business association that activates corporate energy buyers to advance low-cost, reliable, carbon emissions-free global electricity systems. CEBA's members comprise one-fifth of the Fortune 500, represent more than $38 trillion in market capitalization, and include institutional energy customers of every type and size. CEBA supports California's clean energy goals, and our members are committed to ambitious, science-based climate action. 032.1

We are aware that the regulation currently before the board is primarily focused on setting the reporting date for the first year of California's greenhouse gas (GHG) reporting program for Scope 1 and 2 emissions, as well as establishing an administrative fee for the program. However, as CARB has noted, it will launch an additional rulemaking once this one is complete. In that subsequent process, it will be important for CARB to address several outstanding program design and implementation questions. We look forward to engaging with CARB as this work moves forward, and it will be especially critical for CARB to clarify how the California GHG Reporting Program will incorporate updates or revisions to the Greenhouse Gas Protocol Corporate Accounting and Reporting Standard, which SB 253 requires California's reporting requirements to align with through at least 2033. 032.2

The GHG Protocol has driven massive decarbonization impact — in fact, the current Scope 2 Guidance has enabled corporate clean energy buyers to secure 127.6 gigawatts (GW) of clean energy in the United States since 2014.[1] CEBA has been deeply engaged in the ongoing public consultation regarding revisions to the GHG Protocol Scope 2 Guidance, which helps companies build the internal business case to pursue carbon emissions-free energy. The guidance is undergoing a revision that may not be finalized until 2027, with an implementation date likely further in the future. Given that the initial reporting deadline for SB 253 is August 10, 2026, we urge CARB to **allow companies to use the *existing* GHG Protocol Scope 2 Guidance (2015) for SB 253 reporting through 2033**. 032.3

[1] https://cebuyers.org/deal-tracker/

032.4 If CARB believes it is necessary to incorporate future Scope 2 revisions, CEBA strongly recommends that CARB **provide public notice, solicit stakeholder input, and conduct a board vote before automatically defaulting to new guidance.** CARB should take note that the proposed guidance under consideration includes much stricter time and location matching requirements, which may be infeasible and costly for some businesses to implement. 032.5

While the Scope 2 Guidance is a voluntary standard, California disclosure regulation is a mandatory requirement. As such, we request that CARB clarify in SB 253 implementing regulations that any new protocols and guidance documents developed by nongovernmental
032.6 organizations will not become binding on California stakeholders until CARB has solicited public input and voted to adopt such new protocols and guidance documents as California regulations, consistent with CARB's well-established public process. Failure to do so could impose costly, infeasible requirements on many businesses and is not consistent with the intent of SB 253.

Additionally, we request that CARB ensure any changes to accounting rules will not undermine existing clean electricity procurement. We ask that CARB **establish clear transition provisions** (e.g., legacy clauses) to avoid causing market uncertainty, penalizing existing long-term contracts executed under the 2015 rules. We request that CARB prioritize maintaining flexibility for organizations of different sizes and operational profiles, and ensuring any future granularity requirements are feasible, scalable, and supported by available data infrastructure.

As an aside, CEBA submits these comments on standards for greenhouse gas reporting in California to address the carbon-intensity guidelines that will be applied. CEBA recognizes that
032.7 the focus of this proceeding is fee regulation and is submitting these comments since they are related, albeit separate. The absence of CEBA's comments on fee regulation does not indicate concurrence with CARB's fee regulation proposal.

CEBA and its members are invested in the success of California's climate disclosure reporting.
032.8 By allowing companies to use the 2015 guidance through 2033, CARB can provide regulatory certainty for reporting entities without jeopardizing the intent or timeline of SB 253. We welcome further dialogue and offer our expertise to help shape solutions that are both rigorous and feasible.

Sincerely,

Lindsay Battenberg
Director of Policy, West
CEBA

Ceres (Jake Rascoff)

Please see the attached PDF for Ceres' comment letter on the initial proposed regulation.

February 9, 2026

Chair Lauren Sanchez
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Ceres Comment on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Chair Sanchez and Staff,

Ceres is grateful for the opportunity to comment on the initial proposed regulation that the California Air Resources Board (CARB) posted in December 2025, which the Board will consider at a public hearing scheduled for February 26, 2026. We appreciate CARB staff's hard work to draft the regulations implementing the corporate disclosure programs established by Senate Bill (SB) 253, the Climate Corporate Data Accountability Act, codified at Health & Safety Code Section 38532; and SB 261, the Climate-Related Financial Risk Act, codified at Health & Safety Code Section 38533.

As we have done in the past to inform comment letters to CARB, Ceres convened a series of virtual corporate roundtables on January 7 and 8, 2026, to solicit input from members of our Policy Network, Company Network, and Investor Network. These include some of the largest global companies with whom we work on an in-depth basis on climate strategy and disclosure, as well as large institutional investors and other financial institutions. The roundtables were held under the Chatham House Rule: participants were free to use the information they received, but statements could not be attributed to any individuals or organizations. All views expressed in this submission are anonymized if they originated from a member of Ceres' networks; where indicated, some statements represent Ceres' independent organizational views.

Over the course of the two roundtables we hosted in early January, Ceres reached more than two dozen climate and financial reporting practitioners representing companies and trade associations from a diverse variety of sectors. We also discussed CARB's initial proposed regulation in one-on-one engagements with several companies and received written feedback in some cases. A few companies that have participated in prior convenings indicated that they did not join these latest roundtables because they did not have comments on CARB's initial proposed regulation. We anticipate more robust engagement related to CARB's forthcoming regulation(s) dealing with the substance of emissions reporting under SB 253.

The provisions discussed herein are the only elements of the initial proposed regulation for which Ceres has feedback; if a section of the regulation is not discussed, it indicates that Ceres does not have comments to provide. Our comments are listed in order of priority.

#1: SB 253 reporting deadline

§ 96076. Deadline for Reporting Under Health and Safety Code Section 38532.

- § 96076(a) establishes that entities reporting under SB 253 shall report their Scope 1 and Scope 2 emissions for the first reporting year (2026) **on or before August 10, 2026**, for the applicable preceding fiscal year as determined in § 96076(b).
    - In § 96076(b), CARB staff have proposed that if a reporting entity's fiscal year ends on or before February 1, the applicable preceding fiscal year would be the one ending in the *current* calendar year. Meanwhile, if a reporting entity's fiscal year ends after February 1, the applicable preceding fiscal year would be the one ending in the *previous* calendar year. CARB staff explained in the *Staff Report: Initial Statement of Reasons* accompanying the proposed regulation: "This approach guarantees at least six months of time between fiscal year end and the proposed reporting deadline, to provide additional flexibility and accommodate the wide range of fiscal year timelines."
- In response to CARB's December 2024 information solicitation to inform the implementation of these laws, Ceres commented that while companies generally agree that emissions data are available six to nine months after the end of a company's fiscal reporting year, the availability of the data does not necessarily mark the end of the reporting process. When we solicited corporate feedback to inform that earlier comment letter, many companies expressed a preference for the ability to report in Q4; one company observed: "Data supporting the carbon footprint can lag the close of the year by a number of months, as much as 4 months after the close of a year/period."
- Companies reiterated these concerns in response to CARB's proposed August 10 reporting date. Several underscored that there is no way to complete assurance engagements in time for an August 10 reporting date, particularly considering the potential shortage of third-party verification providers to meet the demand created by SB 253. One company opined in our recent roundtable: "It opens our company to legal and reputational risk to provide a GHG inventory without assurance where there likely will be changes to our data. It's one thing to put the data in a voluntary sustainability report without assurance; it's another to put it in a regulatory proceeding like this." 033.1
    - Another company suggested that an August deadline would necessitate the submission of an initial report without verification, followed by a final submission after assurance has been completed, increasing the administrative burden on both reporting entities and CARB.
- **Companies are requesting a reporting deadline of October 31 or later, to allow ample time for the processing and calculation of GHG emissions data and a roughly 90-day assurance process thereafter**. Several companies suggested that CARB could open the reporting docket on August 10, then keep it open and accept reports on a rolling basis through the end of the calendar year without penalty.

Ceres recognizes that CARB is exercising substantial enforcement discretion in 2026. As the agency indicated in its December 2024 enforcement notice, entities that were not collecting data (or were not planning to collect data) at the time of the enforcement notice are not expected to submit data for this first reporting cycle. Furthermore, staff guided in the November 2025 public

workshop that limited assurance will not be required for data submissions in 2026, unless the reporting entity will have already received third-party verification on its Scope 1-2 emissions. Considering these accommodations—and recognizing that CARB has only formally proposed an August 10 deadline *for the 2026 reporting year* in this regulation—we appreciate that there is less urgency to amend the reporting deadline in this initial rulemaking. However, most of the companies providing feedback to Ceres have been voluntarily supplying emissions data for a long time; they would like to report their most recent available data from the immediately preceding fiscal year, and they worry that an August 10, 2026, deadline could set a precedent for future reporting deadlines in forthcoming regulation(s). 033.2

If you have any leeway to move this deadline back to at least October, especially for reporting years after 2026 (which we acknowledge will be established in subsequent regulation), these companies would greatly appreciate the flexibility to adhere to their existing reporting calendars. 033.7 Such flexibility would align with the statutory provision in Health & Safety Code Section 38532: "The reporting timelines shall consider industry stakeholder input and shall take into account the timelines by which reporting entities typically receive scope 1 emissions, scope 2 emissions, and scope 3 emissions data, as well as the capacity for an independent assurance engagement to be performed by a third-party assurance provider."

#2: Intercompany transactions within the proposed revenue definition

§ 96072. Definitions.

- § 96072(a)(13) specifies: "'Revenue' has the same meaning as 'gross receipts' under section 25120(f)(2) of the California Revenue and Taxation Code." One company recommended the following clarification: "'Revenue' has the same meaning as 'gross receipts' under section 25120(f)(2) of the California Revenue and Taxation Code. Gross receipts should exclude any intercompany transactions as defined under Cal. Code Regs. Tit. 18, §§ 25106.5-1."
    - When intercompany sales are excluded, the scoping results will match the tax filings for taxpayers submitting a California combined return (i.e., the entity and revenue total used for scoping would be the same as the revenue included in a company's tax filing), which is required pursuant to California tax law. If intercompany sales are included, there is a misalignment between which subsidiaries are doing business for California tax purposes. For example, an entity may come into scope based on intercompany sales that are not listed in a company's tax filing. If intercompany sales are included, CARB may not be able to verify its list of reporting entities with Franchise Tax Board records. Additionally, since partnerships are subject to the implementation fee under the proposed rules, their revenue creates a double counting problem. For tax purposes, partnership revenue flows through to the partners/owners who report their proportionate share on their own tax returns. For example, if a partnership generates $100 in revenue and has two C-corporation owners with 50% ownership each, those owners will each report $50 of partnership revenue on their individual tax returns. Under the proposed fee structure, this same $100 would be counted twice: once at the partnership level (which is subject to the fee) and again 033.3 033.6

at each partner/owner level (who are also subject to the fee). To avoid this double counting, revenue flowing from partnerships to their partners/owners should be excluded from the partners'/owners' gross receipts calculation.

#3: Insurance exemption under SB 253

§ 96071. Applicability.

- § 96071(b)(2) specifies that the laws do not apply to a "business entity that is subject to regulation by the Department of Insurance in this state, or that is in the business of insurance in any other state." Ceres notes that Health and Safety Code section 38533 already explicitly excludes insurance companies, as SB 261 included legislative text carving out insurers. Staff are now proposing to exempt the same entities from Health and Safety Code section 38532 (SB 253).
- Ceres appreciates CARB staff's intent in exempting insurance companies from SB 253 for the sake of continuity, as expressed in the *Staff Report: Initial Statement of Reasons*. We recognize that insurers are subject to regulation by the California Department of Insurance, and we applaud the Department of Insurance for recently proposing a Long-Term Solvency Regulation that would, among other things, require insurers to analyze and disclose their strategies to mitigate climate-related risks.
    - It was logical for SB 261 to exclude insurance companies, since insurers already disclose their climate risk in alignment with the Task Force on Climate-related Financial Disclosures (TCFD) framework, in response to the National Association of Insurance Commissioners' (NAIC) Climate Risk Disclosure Survey. The Metrics and Targets pillar of the TCFD recommendations would supposedly compel the disclosure of Scope 1, Scope 2, and relevant Scope 3 emissions. However, while insurers generally demonstrate high reporting rates in the Governance, Strategy, and Risk Management pillars of the TCFD recommendations, they consistently underperform when translating those disclosures into the measurable management systems required by the Metrics and Targets pillar. 033.4
        - As Ceres detailed in an August 2025 report, *The Measurement Gap: A Deep Dive into Climate Risk Reporting in the U.S. Insurance Sector*, only 29% of insurers provided any information under the Metrics and Targets pillar in response to the latest NAIC survey. Furthermore, Ceres found a critical gap in indirect GHG emissions reporting, with a near-complete absence of reporting for Scope 3 emissions. This is despite Scope 3 representing the vast majority of many insurers' total GHG footprints, making comprehensive emissions measurement essential for understanding these companies' actual climate risk and impact.

Given this critical gap in insurers' emissions reporting practices, Ceres encourages CARB to reconsider this proposed exemption under § 96071(b)(2). Based on Ceres' research on disclosure gaps, insurers' reporting under SB 253 would in many cases result in new information beyond the data that most insurers are currently providing to regulators. The calculation of insurance-associated emissions is evolving, with early adopters reporting to the Partnership for Carbon

Accounting Financials (PCAF) guidelines. In November 2022, PCAF launched the Global GHG Accounting and Reporting Standard for Insurance-Associated Emissions. Reinsurance and insurance companies, many of which are experienced with financed emissions measurement, are investing in systems for assessing and disclosing insurance-associated emissions. We anticipate that data collection and reporting methodologies will continue to improve over time, and the inclusion of insurance companies in SB 253 will provide meaningful data to the state, investors, and other stakeholders. *Ceres notes that this recommendation reflects the internal view of our organization and feedback from our Investor Network, but does not represent input from our company members.*

#4: Fee structure for companies with in-scope subsidiaries

§ 96073. Calculation of Fees.

- § 96073(c) and (d) specify that implementation fees will be apportioned based on the total number of reporting entities and covered entities under SB 253 and SB 261, respectively. In other words, the cost of implementation will be split evenly among all in-scope entities, regardless of how companies ultimately choose to consolidate their reporting.
- Companies pointed out that the proposed fee structure does not achieve the laws' stated goals, because the fees are assessed based on corporate structure (i.e., the fee is allocated to each entity or subsidiary that meets the criteria for reporting), *not* at the level of the organization where financial and pollution abatement decisions are made (i.e., the parent level for companies that choose to consolidate reporting at the parent).
    - If a company has multiple subsidiaries covered under the laws, it will pay the implementation fee several times over, even if the company consolidates reporting at the parent level as permitted under SB 219.
- Ceres appreciates that CARB may not have flexibility to assess fees based on the number of entities that *ultimately submit reports*, rather than the aggregate number of reporting/covered entities; a flat fee provides higher predictability from year to year. Still, we wanted to relay this concern.

033.5

Thank you for your consideration of these comments, and for the staff's diligent work to implement these critical laws.

Sincerely,

Jake Rascoff
Director, Climate Financial Regulation
Accelerator for Sustainable Capital Markets
Ceres

WattTime Comments in Response to CARB's Draft Regulatory Materials for California Climate Disclosure Legislation: Senate Bill 253

WattTime is encouraged that the California Air Resources Board (CARB) is proposing implementation guidelines for Senate Bill 253.[1] However, CARB must consider an important technical contradiction in the proposal as currently drafted. Specifically, Section 38532, subdivision (c)(1)(A)(ii), which establishes the use of the Greenhouse Gas Protocol (GHG Protocol) Corporate Standard for emissions reporting, conflicts with the legislative intent of driving emissions reductions because the GHG Protocol Corporate Standard is not designed to accurately reflect or drive reductions in greenhouse gas emissions and does not do so. The GHG Protocol Corporate Standard is not an appropriate framework for advancing the emissions-reduction priorities established by SB 253, and CARB should consider alternative frameworks. 034.1

Subdivision (c)(1)(A)(ii) dictates that "A reporting entity shall, beginning in 2026, measure and report its emissions of greenhouse gases in conformance with the Greenhouse Gas Protocol standards and guidance, including the Greenhouse Gas Protocol Corporate Accounting and Reporting Standard and the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard developed by the World Resources Institute and the World Business Council for Sustainable Development." Section 1, subdivision (h) justifies these new regulations by stating that "Accurate and comprehensive data … is required to determine a company's direct and indirect GHG emissions, also known as its carbon footprint, and to effectively identify the sources of the emissions and develop means to reduce the same."

However, CARB should note that the GHG Protocol Corporate Standard explicitly states that it does not accurately measure or reduce indirect (scopes 2 and 3) emissions. The Corporate Standard states "Reductions in indirect emissions (changes in scope 2 or 3 emissions over time) may not always capture the actual emissions reduction accurately."[2] This is because the Corporate Standard, and therefore the corresponding Scope 2 Market-Based Method and Location-Based Method, are built on attributional accounting, which allocates "responsibility to entities for emissions/removals arising from specified sources/sinks," in order to help "establish emissions quotas and/or track emissions over time."[3] It is essential that CARB take note that the attributional accounting methodology currently prescribed by the GHG Protocol is designed to measure changes only in a company's in-boundary emissions. Transfers of emissions to other companies are explicitly not included. Therefore, to date, there is no evidence that when an individual company reports reductions in its Scope 2 emissions under this framework, overall emissions have actually reduced. 034.2

As experts such as Professor Matthew Brander state, "Problems arise… when attributional methods are used to inform decisions aimed at reducing GHG emissions because attributional methods do not tell us about consequences that occur outside the entity's defined inventory boundary. As a result, decisions can be blind to indirect impacts and actors can be misled into

[1] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB253
[2] https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf
[3] https://ghginstitute.org/2021/04/21/the-most-important-ghg-accounting-concept-you-may-not-have-heard-of-the-attributional-consequential-distinction/

implementing actions that lower their entity's attributed emissions while inadvertently increasing global emissions."[4]

The heart of this misalignment is that attributional accounting inherently relies on average emissions rates to assign emissions to entities. While average rates are suitable for estimating an entity's share of total emissions in a reporting context, they do not reflect the incremental emissions consequences of specific operational decisions and thus do not effectively drive emissions reducing behavior. The limitations of attributional accounting and average emissions rates is material in practice. When the California Public Utilities Commission evaluated emissions outcomes from energy storage deployment under the Self-Generation Incentive Program (SGIP),[5] it found that using average grid emissions rates did not align with actual emissions outcomes — storage dispatch based on average rates could, in some cases, increase net emissions.[6] For that reason, SGIP now uses marginal emissions data,[7] which are specifically designed to capture the emissions impact of discrete load and generation changes and thus better guide emissions-reducing decisions. The GHG Protocol has explored incorporating marginal emissions rates into Scope 2 guidance, but has not adopted them at this time.

Furthermore, the currently proposed updates to the GHG Protocol's Scope 2 Guidance perpetuate the problem that changes in Scope 2 inventories do not drive real world emissions reductions. The proposed updates to the Scope 2 Market-Based Method include requirements for deliverable, hourly matching, but excludes the crucial third pillar of additionality. There is overwhelming academic evidence that in order for deliverable, hourly matching to be more effective than the current annual matching framework at driving towards decarbonization, it must be coupled with strict additionality requirements and reporting entities would need to reach upwards of 80% matching. Without additionality and near-complete levels of matching, emissions may actually *increase*.[8, 9,10,11,12]

SB 253 tasks CARB with quantifying and causing emissions reductions using the GHG Protocol. Therefore, we propose that CARB needs to use frameworks from the GHG Protocol that are designed for this purpose, specifically the *The GHG Protocol for Project Accounting* (Project Protocol). The Project Protocol establishes methods for measuring the global impact of different actions and the *Guidelines for Quantifying Emissions Reductions from Grid-Connected Electricity Projects* establishes guidance specific to the electricity sector. In fact, the GHG Protocol Corporate Standard reinforces this, stating that "In cases where accuracy is more important, it may be appropriate to undertake a more detailed assessment of the actual

034.3

[4] https://www.tandfonline.com/doi/full/10.1080/17583004.2022.2088402#d1e160
[5] https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/self-generation-incentive-program/self-generation-incentive-program-evaluation-reports
[6] https://www.vox.com/energy-and-environment/2019/12/2/20983341/climate-change-california-batteries-emissions-watttime
[7] https://content.sgipsignal.com/
[8] https://watttime.org/news-and-insights/watttimes-formal-complaint-to-the-greenhouse-gas-protocol-on-the-scientific-merit-of-its-scope-2-proposal-claims/
[9] https://docs.google.com/spreadsheets/d/1lH8oplQGAN7bIAUJSjYSJFDE9IXLEy2umsg9744tp0U/edit?gid=0#gid=0
[10] https://zerogrid.org/wp-content/uploads/dlm_uploads/2025/05/iai-review-research-voluntary-energy-procurement.pdf
[11] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5375940
[12] https://watttime.org/news-and-insights/analysis-mandatory-hourly-matchings-high-costs-would-likely-kill-so-much-clean-energy-procurement-it-would-increase-total-long-run-emissions/

reduction using a project quantification methodology."[13] The Advanced Markets Instruments (AMI) Working Group, as part of the GHGP revision process, is also developing potential new approaches to assessing the consequential emissions impact of companies. Other suitable options include pairing the GHGP Corporate Standard with strict and mandatory additionality tests or a system using California's SGIP marginal emissions signal.

Because they rely on attributional accounting and average emissions factors, neither the Scope 2 Location-Based Method nor the Scope 2 Market-Based Method is equipped to measure or drive actual emissions reductions at the company level. CARB should consider the more appropriate purpose-built accounting approaches described above. 034.4

[13] https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf

Christopher Lish

Monday, February 9, 2026

Clerks' Office
California Air Resources Board
1001 I Street
Sacramento, California 95814

Subject: Don't exempt insurance companies from reporting emissions under law -- Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

To California Air Resources Board Chair Lauren Sanchez and board members:

I urge you to remove the proposed exemption for insurance companies from emissions disclosure requirements.

035.1 Insurance companies play a significant role in financing and backing fossil fuel infrastructure and invest heavily in industries that drive climate change. At the same time, many insurance companies are sticking Californians with the climate bill by withdrawing from communities and denying and delaying claims. Excluding insurance companies from emissions reporting leaves out a sector with a clear and direct connection to growing climate risk that is threatening the state.

The public deserves transparency about the insurance sector's climate harms. This exemption would weaken the rule and undermine public confidence in the climate disclosure program. The regulation should be finalized without delay and applied consistently to all covered corporations, including insurance companies, which clearly meet the criteria of SB 253.

Thank you for your consideration of my comments. Please do NOT add my name to your mailing list. I will learn about future developments on this issue from other sources.

Sincerely,
Christopher Lish
San Rafael, CA

February 9, 2026

Clerks' Office
California Air Resources Board
1001 I Street
Sacramento, California 95814

Honorable members of the California Air Resources Board,

Thank you for this opportunity to comment on the proposed rule to establish fees, timelines, and definitions for implementing the California Climate Corporate Data Accountability[1] and Climate-Related Financial Risk[2] laws. We represent 40 national, state, and local public interest organizations with significant cumulative membership in California. We appreciate the Board's efforts and progress to date to implement these important laws quickly and transparently, and for the opportunity to comment. We urge the Board to remove the proposed exemption from emissions reporting for insurance companies and finalize the rule expeditiously.

036.1

The proposal establishes the fee structure for businesses subject to the laws, definitions needed to implement the rules, reporting deadlines, and available enforcement measures. We generally support these aspects of the proposal. The proposal also includes a list of types of entities exempted from the two reporting programs, including state and federal government entities; tax exempt nonprofits and foundations; companies whose only business in California is the presence of teleworking employees; companies whose only business in the state is wholesale electricity transactions; and insurance companies. The proposal effectively justifies all exemptions except for the last, insurance companies, which is not supported by statutory text or the record of legislative intent.

036.2

036.3

Exempting government and nonprofit entities is reasonable, as the disclosure laws explicitly focus on "corporate" actors with large revenues that "do business in California" and therefore make reportable revenue as defined in California law. The carve out for companies whose only business in the state is the presence of teleworking employees is likewise not controversial, as these companies generally lack a sufficient economic nexus to be considered as "doing business" in the state. We also understand that Senator Weiner wrote a letter clarifying legislative intent to exempt companies whose business in the state is limited to interfacing with California Independent State Operator (CAISO) in the wholesale electricity market.[3]

036.4

However, we urge the Board to reconsider its unjustified exemption from SB 253 reporting for insurance companies doing business in the state. These are clearly corporate entities that make reportable revenue in the state and transact directly with California consumers. While SB 261

[1] California Senate Bill (SB) 253. Wiener, Stats. 2023, ch. 382; codified in Health and Safety Code Section 38532, as amended.
[2] California SB 261. Stern, Stats. 2023, ch.383; codified in Health and Safety Code section 38533, as amended.
[3] California Legislature. Senate Daily Journal 3058. 2023-24 Regular Session. January 30, 2024.

036.5 explicitly exempts insurance companies, SB 253 does not. Extending the exemption would be inconsistent with the statute, diminish the benefits of the program, and create a special carve out for an industry that is tightly linked to the state's climate-related challenges.

An exemption for insurance companies is inconsistent with statute.

The Board has proposed exempting insurance companies from SB 253 reporting "for continuity,"[4] but doing so flatly contradicts the statute. The California legislature originally considered versions of both disclosure bills that did not exempt insurance companies,[5] but ultimately the financial risk disclosure law was adjusted in recognition that it significantly
036.6 overlapped with the financial risk disclosure standard adopted by the National Association of Insurance Commissioners, while the emissions bill was signed into law without an exemption for insurance companies. The Board lacks authority to carve out an exemption that does not exist in the statute and that the legislature considered and rejected. Moreover, if the Board fabricates an exemption for insurers, other sectors are likely to seek exemptions as well. We note also that the two disclosure programs already differ in scope with respect to the number and size of firms required to report due to the different corporate revenue thresholds in the two laws. Other differences in scope are permissible as well—and indeed are required by the differences that the legislature deliberately created between the statutes.

Insurance companies' greenhouse gas (GHG) emissions disclosures are important to California stakeholders.

California is experiencing a property insurance crisis driven in large part by climate change, exacerbated by the insurance industry's support for fossil fuels and harmful responses to the
036.7 rising frequency, intensity, and cost of climate-related disasters. More frequent and destructive climate disasters have led insurers to raise rates, cut coverage, or abandon certain areas altogether (see, for example, State Farm's retreat right before the 2025 Los Angeles wildfires).[6] At the same time, nearly *half* of homeowners' insurance claims nationwide were closed without any payment in 2024[7] while premiums rose eight percent[8]—nearly three times the 2.9 percent inflation rate.

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[4] CARB. "Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation. Staff Report: Initial Statement of Reasons." December 9, 2025.
[5] California SB 449: "Climate-Related Financial Risk." Stern. 2021-2022 Regular Session. February 16, 2021, as amended April 22, 2021; California SB 260: Climate Corporate Accountability Act. Wiener. 2021-2022 Regular Session. January 26, 2021, as amended August 15, 2022.
[6] Jean Eaglesham and Susan Pulliam, "State Farm Was All In on California—Until It Pulled the Plug Before the Fires." *Wall Street Journal.* February 6, *2025.*
[7] Weiss Ratings, "14 Large U.S. Insurers Closed Nearly Half of Homeowner Claims with No Payment in 2024." June 11, 2025.
[8] "Natural Disasters Blamed as Home Insurance Projected to Rise 8% in 2025." *Rethinking65*. May 19, 2025.

Even as insurers complain of growing climate-related losses, the industry's underwriting loss ratios remain low,[9] and overall profits set record highs.[10] In 2025, property insurers made profits of nearly $60 billion on underwriting alone across the country,[11] and that figure excludes investment profits. Executive compensation is increasing thanks in large part to so-called performance-linked pay packages that incentivize claim denials and other anti-consumer practices.[12]

Insurers are also among the leading institutional investors in fossil fuels,[13] investing approximately $580 billion in coal, oil, and gas[14] in 2019 alone. The burning of fossil fuels is the primary cause of climate change,[15] which means insurers' investments are contributing to the extreme weather events that are driving up costs for consumers. Simply put, it is in the public interest for California stakeholders to have more information about insurance companies' impact on the climate and their progress towards their stated climate goals.

Exempting insurance companies from SB 253 reporting would leave a documented emissions gap unaddressed.

036.8 While large insurance companies are disclosing climate-related financial risk reports to the California Department of Insurance,[16] there is a persistent gap in GHG emissions reporting.[17] The insurance industry has argued that GHG emissions generally do not represent a risk to insurers' financial health and thus should not be included in financial risk reporting.[18] This argument lacks merit, but in any event SB 253 addresses this gap because it requires disclosure of the full scope of GHG emissions reporting for corporate actors doing business in the state instead of relying on self-reporting that is limited to emissions that individual firms deem "risky" or "material."

036.9 Thank you for advancing this important effort to ensure corporate transparency and accountability on climate risks, impacts, and action.

Sincerely,

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[9] The property insurance industry's net loss ratio was 71.2 percent in 2024, compared to an average around 80 percent from 1980-2000. See: National Association of Insurance Commissioners. U.S. Property and Casualty and Title Insurance Industries – 2024 Full Year Results; Wang, Shaun S. et al. "U.S. property-casualty: Underwriting cycle modeling and risk benchmarks." *Casualty Actuarial Society*. Vol. 5, Iss. 2. 2012.

[10] See e.g., Jean Eaglesham, "Travelers Notches Record Profits; Insurer's Stock Rises." *Wall Street Journal.* January 22, 2025; Saqib Rahim, "Insurers earn record sums in disaster-free third quarter." E&E News. November 21, 2025; American Association for Justice. "The Insurance Industry is Quietly Making Record Profits." April 1, 2025; Stancil, Kenny. Revolving Door Project. "Don't let home insurers fool you. They're more profitable than ever." July 14, 2025.

[11] Jean Eaglesham, "The Uproar Over Affordability Is Coming for Insurers." *Wall Street Journal*. January 22, 2026.

[12] Dan Wagner and Kenny Stancil. Public Citizen. "Home Insurance Executives Are Raking It In–At Your Expense." 2025.

[13] Investing in Climate Chaos. Urgewald. "Fossil Fuel Investment Report." August 9, 2024.

[14] Hailey Ross, "Climate risks for insurers: Why the industry needs to act now to address climate risk on both sides of the balance sheet." *S&P Global*. August 27, 2021.

[15] United Nations. "Causes and Effects of Climate Change." Accessed January 29, 2026.

[16] California Department of Insurance. NAIC Climate Risk Disclosure Survey Results Database. Accessed 2026.

[17] Ceres. "The Measurement Gap: A Deep Dive into Climate Risk Reporting in the U.S. Insurance Sector." August 12, 2025.

[18] American Property Casualty Insurance Association. Comment to the Securities and Exchange Commission. June 17, 2022.

Public Citizen
Americans for Financial Reform Education Fund

350 Bay Area Action
350 Conejo / San Fernando Valley
350 Contra Costa Action
350 Humboldt
350 Sacramento
350 Silicon Valley
Affordable Homeownership Foundation, Inc.
As You Sow
Bay Area-System Change not Climate Change
California Environmental Voters
Center for Insurance Research
Center for International Environmental Law
Centre for Citizens Conserving Environment & Management (CECIC)
Climate Cabinet Action
Climate Defenders
Coalition for Clean Air
Courage California
Divest Oregon: Reinvest in a Fossil Free Future
Earth Ethics, Inc.
Freeport Haven Project
Friends of the Earth U.S.
Green America
Habitat Recovery Project
League of Conservation Voters
Little Tokyo Service Center
Los Angeles Climate Reality Project
Mossville Environmental Action Now (MEAN)
National Community Reinvestment Coalition (NCRC)
Rise Economy
SanDiego350
Santa Cruz Climate Action Network
Sierra Club California
Stand.earth
The Greenlining Institute
Third Act SoCal
Union of Concerned Scientists
West Berkeley Alliance for Clean Air and Safe Jobs
Youth v. Oil

Individual signatories (Danett Abbott-Wicker, Ji Montgomery, Manning Nelson Rollerson Jr 3, Samuel Molina, Suzanne Baker)

California ISO (Andrew Ulmer)

Please see attached comments.

California Independent System Operator Corporation

February 9, 2026

Via Electronic Submission
Office of the Clerk
California Air Resources Board
1001 I Street
Sacramento, California 95814

Re: Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Chair Sanchez and Members of the California Air Resources Board,

The California Independent System Operator Corporation (ISO) submits these comments to the California Air Resources Board in connection with the above-referenced matter scheduled for a hearing on February 26, 2026. The proposed regulation would exempt tax-exempt entities from the framework to implement Senate Bills (SB) 253 and 261, as amended by SB 219.[1] The proposed regulation would also exempt a business entity whose only activity within California consists of wholesale electricity transactions. Moreover, the proposed regulation clarifies that wholesale sales of electricity do not count for purposes of assessing whether an entity is doing business in California for purposes of SB 253 and 261. These elements of the proposed regulation reflect the legislative intent expressed by the authors of SB 253 and 261.[2] The ISO strongly supports the inclusion of these elements in any action to adopt regulations to implement SB 253 and 261. 037.1

Thank you for consideration of these comments.

Respectfully submitted,

/s/ Andrew Ulmer
Andrew Ulmer
Assistant General Counsel
California Independent System
Operator Corporation
250 Outcropping Way
Folsom, CA 95630
Tel: (916) 673-7797
aulmer@caiso.com

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[1] These bills are codified at California Health & Safety Code §§ 38532 and 38533.

[2] California Senate Journal dated January 30, 2024 at 3058-3059.

Adarsh Srinivasan

On behalf of IETA's 300+ member organizations, we appreciate this opportunity to provide feedback to CARB on the proposed initial regulation to support the Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure programs.

Please refer to the attached document for our response.

IETA

MAKING NET ZERO POSSIBLE

9 February 2026

IETA Comments on CARB's Public Hearing to Consider the Proposed California *Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation (Fee Regulation)*

For more than 25 years, IETA has been the leading global business voice on robust market solutions to tackle climate change while driving clean finance at scale. Our organization represents a broad and diverse group of 300+ businesses, including those with clean assets, exposure and operations across California and the globe. IETA's expertise is regularly called upon to inform carbon market solutions that deliver measurable climate outcomes while addressing economic competitiveness and affordability concerns.

As in all jurisdications, IETA supports practical and robust regulation to aid in climate-related transparency and reward corporate climate action while limiting bad actors. We recognize the need for CARB to collect fees from covered entities to implement the applicable statutes (SB 261, SB 253) and regulations, and we agree with the methodology to establish and collect a flat fee from all entities on an annual basis while encouraging CARB to carefully monitor the program for potential cost savings throughout implementation.

038.1

Accordingly, we encourage CARB to complete rulemaking as soon as possible and finalize the regulation at the February 26 Board meeting. This will enable CARB to move forward with other rulemakings related to SB 253 and/or SB 261.

038.2

As future rulemakings are conducted, **IETA urges CARB to continue closely tracking evolving international carbon accounting, reporting and disclosure frameworks**. As several jurisdictions bring forward similar legislation – all while major existing voluntary standards undergo updates[1] – we remain concerned about growing global fragmentation of disclosure rules and the challenges of interoperability across jurisdictions.

038.3

[1] The Greenhouse Gas Protocol is undergoing revisions across its suite of standards and frameworks, as well as an ongoing harmonization process with ISO. IETA recently submitted comments to the GHG Protocol in response to its proposed updated Scope 2 Guidance: https://www.ieta.org/ieta-comments-to-greenhouse-gas-protocol-scope-2-guidance

To ensure CARB's regulations meet California-specific needs while remaining aligned with evolving external standards, it is critical **that reporting obligations are clearly defined, focused and allow for harmonized reporting that does not layer unnecessary compliance burden**. This can include, in part, by relying on established standards, practices, and methodologies that provide flexibility and avoid duplication.

With a global membership comprising a collective deep expertise in carbon markets and carbon accounting, IETA welcomes the opportunity to provide market insights and technical expertise to support CARB as the process continues.

IETA appreciates this opportunity to provide feedback to CARB on the proposed initial regulation to support the Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure programs.

Natural Resources Defense Council, Earthjustice, Sierra Club California (Elizabeth Derbes)

Please see attachment.

February 9, 2026

SUBMITTED ELECTRONICALLY AT *https://ww2.arb.ca.gov/applications/public-comments*

TO: California Air Resources Board

RE: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation (Implementation of Senate Bills 253 and 261, as amended by SB-219)

The Natural Resources Defense Council (NRDC), Earthjustice, and Sierra Club California welcome the opportunity to comment on the California Air Resources Board's (the "Board) proposed regulation to establish fees, timelines, and definitions for implementing the California Climate Corporate Data Accountability Act[1] ("SB 253") and the Climate-Related Financial Risk Act[2] ("SB 261") (together, the "Acts"). We strongly support a speedy implementation of the Acts. We urge the Board to remove the proposed exclusion for insurers from emissions reporting, which is unauthorized by the language of the Acts.

039.1

039.2

NRDC is an international nonprofit environmental organization with more than three million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and environment. NRDC has offices in Los Angeles, San Francisco, New York City, Washington D.C., Chicago, Montana, New Delhi and Beijing. Through its finance and legal experts, NRDC advocates for sensible financial regulation that allows our financial system to incorporate financial risks from climate change into day-to-day risk management.

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1 California Senate Bill (SB) 253, Wiener, Stats. 2023, ch. 382; codified in Health and Safety Code Section 38532, as amended.

2 California SB 261, Stern, Stats. 2023, ch.383; codified in Health and Safety Code section 38533, as amended.

Earthjustice is the nation's original and largest nonprofit environmental law organization. Nationally and within California, Earthjustice uses the law to protect people's health, preserve magnificent places and wildlife, advance clean energy, and combat climate change. The California Regional Office works extensively on issues concerning air pollution and climate, including participation at the Board's public rulemaking, scoping plan development, and program development workshops. Earthjustice works with a broad range of clients and coalition partners to reduce emissions from industrial, transportation, construction, and area sources across the state. Nationally, we have advocated for and defended the development of strong climate-related corporate disclosure rules and greenhouse gas regulations.

Sierra Club California is the legislative and regulatory arm of Sierra Club's 13 local chapters in California, representing half a million members and supporters, with a mission to practice and promote the responsible use of the earth's ecosystems and resources; to educate and enlist humanity to protect and restore the quality of the natural and human environment; and to use all lawful means to carry out these objectives. Among Sierra Club's highest priorities is advocating for federal regulatory policies that address the impacts of climate change, including impacts to the financial system. Sierra Club also has an investment portfolio of approximately $62 million and represents millions of members and supporters, many of whom have significant investments of their own. The Sierra Club and its members seek more reliable and comparable climate-related disclosures.

Climate-fueled disasters are having devastating effects on California's communities, businesses, and natural resources. Understanding how companies are contributing to and managing those risks is crucial for the state to protect investors, consumers, taxpayers, and state and local resources. Corporate decisions that fail to consider climate-related impacts such as shifting weather patterns or resource availability, or longer and more intense wildfire seasons, exacerbate risk with damaging outcomes. Investors know that decisions made without considering climate-related risks will impact their bottom line. When this information remains opaque, unusable, or not easily comparable, the risk to investors and large customers (including the state) of business failure or underperformance increases. Implementation of these laws should provide transparency that can improve market health and long-term returns that retirees rely on.

Definitions; Exclusions from Applicability

039.3

We support the proposed use of California Revenue and Tax Code section 23101(a), (b)(1), and (b)(2) to define "doing business" and "doing business in California" (Sections 96072(a)(7)-(8) of the proposed regulation). As discussed in more detail in our joint comment to the Board dated March 21, 2025, the definition of "doing business in California" contained in Section 23101 is an appropriate definition to reference for purposes of the reporting requirements of SB 253 and SB 261: it is well-established, will provide clarity to businesses, and contains limitations that

appropriately exclude out-of-state entities with minimal or negligible business in California. We further support the exclusion of wholesale electricity sales from the calculation of an entity's sales in California for purposes of that definition, for the reasons of legislative intent discussed in detail in our March 21, 2025 joint comment (and referenced in the Board's December 9, 2025 Staff Report (the "Staff Report")). 039.4

We take issue, however, with the proposed exclusions in sections 96071(b)(2) and 96072(a)(5) for insurance companies. The Staff Report states correctly that SB 261 "excludes business entities subject to regulation by the Department of Insurance in this state, or . . . in the business of insurance in any other state." The proposed regulation would extend that exclusion to the application of SB 253 as well. This is not authorized by the plain terms of SB 253. The California State Legislature evidently knew how to draft an explicit insurance company exclusion when needed, as it did so in SB 261. It did not require or permit such an exclusion in SB 253. 039.5

The proposal does not seek to justify this exclusion beyond stating that it is being proposed "for continuity." This is no justification at all. The two laws already differ in scope with respect to the number and size of firms that are subject to reporting requirements. Excluding insurance companies from the requirements of SB 253 would not provide "continuity" in any meaningful sense, and is more importantly beyond the Board's statutory remit.

The Legislature had sound reasons for this difference between the Acts. Insurance companies were excluded from SB 261's reporting mandate because they are already subject to climate risk oversight through the California Department of Insurance and are required to report climate risk information in alignment with the Task Force on Climate-Related Financial Disclosures ("TCFD") framework under a standard adopted by the National Association of Insurance Commissioners. No parallel requirement for emissions reporting applies to insurers that would justify excluding them from SB 253, and there are large gaps in U.S. insurers' voluntary emissions reporting.[3] Indeed, a review of the most recent TCFD filings with the Department of Insurance[4] by the top ten California property and casualty insurers[5] reveals that only one made complete disclosure of Scope 3 emissions, and three made no emissions disclosures at all. As the Legislature stated in Section 1 of SB 253:

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[3] Ceres, *The Measurement Gap: A Deep Dive into Climate Risk Reporting in the U.S. Insurance Sector* (Aug. 12, 2025).

[4] California Dept. of Insurance, Climate Risk Disclosure Survey Database, https://interactive.web.insurance.ca.gov/apex_extprd/f?p=201:6:::NO:RP,6,1::

[5] California Dept. of Insurance, 2023 California Property and Casualty Market Share Report, https://www.insurance.ca.gov/01-consumers/120-company/04-mrktshare/2023/upload/Top25grps2023.pdf

- California investors, consumers, and other stakeholders deserve transparency from companies regarding GHG emissions, to inform their decisionmaking;
- Accurate and comprehensive data is required to determine a company's GHG emissions and develop means to reduce them;
- Mandating annual, full-scope GHG emissions reporting will inform investors, empower consumers, and activate companies to improve risk management, and is a critical step for California to protect the state and its residents.

There is no statutory or other justification for excluding insurance companies from this mandate.

Scope 2 reporting rules must be updated in line with the Greenhouse Gas Protocol

SB 253 calls for reporting in conformance with the Greenhouse Gas Protocol (GHGP) accounting and reporting standards. As noted in SB 253's Section 1, the GHGP is the globally recognized GHG emissions accounting and reporting standard. It is a widely adopted, relied upon, and trusted methodology, and appropriate for the statutory purpose. The GHGP has been or is being integrated in a number of policies and standards worldwide.[6] We note, however, that the Board's SB 253 implementation process falls squarely in the GHGP Scope 2 Guidance update process – the first update in a decade, and one that is intended to significantly strengthen the integrity and impact of Scope 2 reporting. To meet the statutory goals of transparency and corporate accountability, it will be critical that the Board implement SB 253 such that the required Scope 2 reporting evolves with the GHGP methodology as that methodology is updated. 039.6

The existing GHGP Scope 2 rules have played an important role in developing corporate demand for clean and renewable energy, spurring the growth of renewable energy markets and supporting the deployment of renewable energy on grids across the world.[7] That said, as grids across the world integrate more renewables, led by jurisdictions like California, research shows the need to move towards more granular time and location matching of clean energy generation with corporate claims of clean energy use, in order to ensure rigorous claims for Scope 2 emissions and drive continued decarbonization.[8] That is the focus of the pending GHGP Scope 2 update,

6 ttps://ghgprotocol.org/sites/default/files/2024-03/GHG-Protocol-Integration.pdf#page=20&zoom=100,92,116

7 https://about.bnef.com/insights/finance/corporate-clean-power-buying-grew-12-to-new-record-in-2023-according-to-bloombergnef/

8 https://arxiv.org/pdf/2511.03049 https://www.cell.com/joule/pdf/S2542-4351(23)00499-3.pdf

and it is imperative for consistency and transparency that CARB adopt the updated methodology in due course. We understand that CARB will consider the details of implementing Scope 2 reporting in a future rulemaking, and we look forward to providing more detailed comments on this topic at that time.

* * * * *

We thank the Board for its consideration of these comments and for its work to advance the implementation of these critical laws, and would be happy to discuss our comments further with the Board's staff.

Respectfully submitted,

Elizabeth Derbes, Director, Financial Regulation and Climate Risk
Natural Resources Defense Council

Fernando Gaytan, Senior Attorney
Earthjustice

Jakob Evans, Senior Policy Strategist
Sierra Club California

https://www.sciencedirect.com/science/article/pii/S2211467X24001950?via%3Dihub
https://www.iea.org/reports/advancing-decarbonisation-through-clean-electricity-procurement

DAIRY INSTITUTE
OF CALIFORNIA

February 9, 2026

Lauren Sanchez
Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Comments on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Ms. Sanchez:

Dairy Institute of California represents milk processors and dairy product manufacturers based in California. Our organization's goal is to support our members' ability to operate sustainably, innovate, and achieve efficiency in their own companies as they provide the highest quality dairy products to domestic and international markets. We appreciate the opportunity to comment on the California Air Resources Board's (CARB) proposed regulations implementing the Climate Corporate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Act (SB 261).

Dairy Institute thanks you for considering the following comments in the development of the initial rulemaking of SB 253 and SB 261. We continue to urge for maximum flexibility that will ultimately impact the ease of compliance and reduce cost burdens that have a real impact on dairy processors.

040.1

Proposed Timelines

The proposal includes an August 10th reporting deadline for emissions data under SB 253 reporting. Although aligning deadlines with CARB's Mandatory Reporting Regulation (MRR) is a thoughtful effort, it does not have the intended streamlining. As proposed, SB 253 requires prior fiscal year emissions reporting, while MRR requires reporting for the prior calendar year, specifically for different and specific categories of emissions. The difference in time periods and data reported significantly erodes the desired efficiencies.

040.2

Dairy Institute agrees with the proposed alternative suggested by the California Chamber of Commerce that would allow for a "rolling" submission, allowing submissions up to twelve months following any entity's individual fiscal year. Providing all entities with the same appropriate window of time, regardless of the fiscal calendar, will create clarity and ultimately

provide the flexibility entities need, especially as requirements become more burdensome.

040.3 Additionally, a singular date deadline has implications for the nearing need for third-party assurance providers, ultimately exacerbating demand. An extended window for submissions will ease the pressure on the limited pool of providers for third-party assurance.

Proposed Fee Structure

040.4 CARB is authorized to assess fees based on the reasonable costs of implementing and administering the statutory greenhouse gas (GHG) reporting and disclosure programs. Dairy Institute is alarmed by the inclusion of costs that go beyond administering the program, directly attributable to all qualifying entities.

040.5 Dairy Institute agrees with CARB's proposal of a flat amount assessed across all qualifying entities to reduce the administrative burden and provide clarity for all entities. Assessing a flat fee instead of a fee based on company size that requires calculation, verification, and excessive management is the streamlined approach needed to make such an extensive climate reporting program workable.

040.6 As dictated by California law, fees must remain strictly limited to actual and reasonable implementation and administration costs. This means the agency's actual verifiable and documented costs—not estimated or average trends. Inflation indexing is allowed only if it closely matches increases in the specific program's costs, and a blanket CPI adjustment alone is unacceptable. The fee structure also includes a 10% contingency to Total Required Revenue for potential unexpected costs, applied even if those costs do not occur. Excess revenue is

040.7 proposed to be maintained with CARB, instead of an attempt to credit back entities or reduce future fee assessments.

040.8 Health and Safety Code sections 38532 and 38533 do not include any authorization for CARB to recover the costs of defending the regulations in court. Dairy Institute is very concerned by this attempt to pass unrelated expenses, such as litigation defense, onto the regulated entities. These costs are a general government responsibility, and entities that are not bringing action against the state for the implementation of this regulation should not be required to cover the costs of legal defense in their annual fees.

040.9 Dairy Institute is very concerned with multiple attempts to go beyond the actual and reasonable regulatory costs, which undermines the integrity of the fee structure and goes beyond CARB's statutory authority.

DAIRY INSTITUTE
OF CALIFORNIA

040.10 Dairy Institute finds the proposed fee enforcement and associated penalties excessive, particularly in cases of technical and administrative errors. Daily compounding penalties for missed or inaccurate payments are excessive and unwarranted. If harm is not being caused or escalated on a daily basis, daily compounding fines should not be levied. The proposed enforcement mechanisms fail to distinguish between minor errors and intentional misconduct, or between first-time and repeat offences. As currently proposed, the penalties are disproportionate to the nature of the offense.

Such enforcement authority does not exist in SB 253 and SB 261, and this overreach undermines the intended obligations. Dairy Institute encourages the use of violation appropriate one-time penalties, established timelines for corrective action, and limitations for late fees and penalties be established to protect from abuse and unintended consequences alike.

Covered Entity Definitions and Determinations

040.11 Dairy Institute has reviewed CARB's list of reporting and covered entities. While preliminary and not exhaustive, it did contain wrongly identified entities. It is essential to establish a clear process for entities to be removed from the list if they do not meet the applicable thresholds for SB 261 or SB 253. Providing a process that would allow companies to be removed from the list will help ensure the accuracy and fairness of the reporting system.

040.12 Without a formal process for review, companies must either comply—often at a significant cost—or challenge their status and risk penalties. Determination, especially in the early years of compliance, involves many variables and complexities. Dairy Institute requests that entities file requests for determination regarding their covered entity status with a required timeline for CARB to provide a written response. In this process, fee levies and reporting requirements should be paused until such a determination is reached.

040.13 Dairy Institute appreciates the use of the prior two fiscal years when determining qualifying status, taking into account revenue abnormalities and fluctuations. While this use of a two-year record is appreciated, additional clarification on on-off transactions or unusual revenue increased would create more consistency and equitability.

040.14 Exempting federal, state, and local governments from covered entities status are inconsistent with the intentions of SB 253 and SB 261. Government activities on all levels are significant drivers of emissions. The state and federal governments have a vast amount of property holdings in the state that are directly linked to emissions. Additionally, government operations

depend on extensive supply chains and large vehicle fleets. Excluding government entities from SB 253 and SB 261 further exposes the laws' inconsistencies, lack of justification, and risk of arbitrary enforcement.

040.15 Dairy Institute appreciates CARB providing flexibility for companies to allow reports to be submitted at either the parent entity or subsidiary level. While we believe that this proposal does grant consolidated reports for parent and subsidiary entities, additional clarity should be given to ensure this is allowable. Consolidated reports will create more streamlined and accurate information while maintaining the intent of SB 253 and SB 261 disclosures.

Compliance Burden and Economic Impact

040.16 It must be noted that substantial direct and indirect compliance costs will be shouldered by covered entities and associated entities alike. The data collection, staffing demands, legal review, and third-party assurance providers will have major cumulative costs. These costs extend beyond to smaller entities preparing information to share with associated covered entities. Regardless of the ultimate qualification, resources must be poured into monitoring and assessing the regulatory applicability. The Initial Statement of Reasons presented does not fully quantify the large-scale economic impact

Future Rulemakings

040.17 Many dairy processors already voluntarily report GHG emissions through existing systems. Our members have indicated a preference for maintaining consistency with reporting structures already in use to avoid overcomplicating the emissions reporting process. We encourage CARB to allow for flexibility in reporting systems and not make the proposed template mandatory in future years. It is important for CARB to allow companies to have discretion in the use of reporting structures, so that they may submit reports prepared for other jurisdictions in accordance with the Greenhouse Gas Protocol. We also maintain our position of reporting directly to CARB, as reporting through a third-party entity raises significant concerns. 040.19

040.20 As CARB looks to establish Scope 3 regulations, Dairy Institute would like to reiterate that Scope 3 emission reporting has a lot more ambiguity and demands clearer definitions. Additionally, there are currently not enough providers to choose from when it comes to third-party

040.21 verification for assurance for Scope 3 emissions. As there will likely be a shortage of available and qualified assurance providers and new providers entering the market, we urge CARB to consider accreditation for third-party verifiers. Dairy Institute also recommends against limiting businesses to a specific approved list of third-party providers.

Conclusion

040.18 Dairy Institute respectfully requests that revisions be considered before adoption in an effort to improve clarity and reduce the burden of compliance. This foundational rulemaking will have a significant impact on future rulemakings and subsequent implementation. Dairy Institute urges maximum flexibility for reporting and compliance to help create a practical and effective reporting system that supports progress toward California's climate goals.

Sincerely,

Katie Davey

Katie Davey

Executive Director

Dairy Institute of California

February 9, 2026

California Air Resources Board (CARB)

1001 I Street, Sacramento, CA 95814

Submitted Electronically

RE: COMMENTS OF CENTER FOR RESOURCE SOLUTIONS (CRS) ON THE CLIMATE CORPORATE DATA ACCOUNTABILITY ACT (SB253).

Dear CARB Staff,

CRS appreciates the opportunity to comment on SB 253's reporting template. Our comments primarily focus on support for market-based accounting recommend that Scope 2 reporting should be consistent with the Greenhouse Gas Protocol's 2015 Scope 2 Guidance.

BACKGROUND ON CRS AND GREEN-E®

CRS is a 501(c)(3) nonprofit organization that creates policy and market solutions to advance sustainable energy. CRS provides technical guidance to policymakers and regulators at different levels on renewable energy policy design, accounting, tracking and verification, market interactions, and consumer protection. CRS also administers the Green-e® programs. For over 25 years, Green-e® has been the leading independent certification for voluntary renewable electricity products in North America. In 2024, Green-e® certified retail sales of nearly 143 million megawatt-hours (MWh), serving nearly 1 million retail purchasers of Green-e® certified renewable energy, including approximately 80,000 businesses.[1]

MARKET-BASED ACCOUNTING SHOULD BE USED THROUGHOUT ALL SCOPES (1, 2, and 3)

CRS reiterates previous comments supporting consistent market-based reporting methodologies throughout Scopes 1, 2, and 3, as this is the only way to assign specified transactions to a company's value chain.[2] Market-based accounting is already standard practice and consistent with existing GHG

041.1

[1] For more information, the 2025 (2024 Data) Green-e® Verification Report will be available here soon: https://www.green-e.org/verification-reports

[2] CRS comments on the Corporate Climate Data Accountability Act: https://resource-solutions.org/document/021325/

Center for Resource Solutions
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San Francisco, CA 94129

w: www.resource-solutions.org
p: 415.561.2100

Protocol's (GHGP) Scope 2 Guidance. But, market-based accounting should also be required for Scope 1 and 3, and such capabilities should be added to the reporting template for at least Scope 1. This would be consistent with California's Low Carbon Fuel Standard (LCFS), which already recognizes market-based attribution of renewable thermal energy through book-and-claim accounting for pipeline-injected biomethane and renewable hydrogen. Under the LCFS, regulated entities may claim the environmental attributes of renewable natural gas (RNG) or biogenic feedstocks when injected into a common-carrier pipeline and used for vehicle fuel or hydrogen production, provided those attributes are uniquely retired and not double-counted.[3] This existing framework demonstrates that market-based instruments, like renewable thermal certificates, are a credible and regulated mechanism for allocating the climate benefits of renewable fuels. CARB should maintain consistency across programs by allowing comparable market-based recognition of renewable fuel attributes within Scope 1 accounting under SB 253. There is additional support for using market-based accounting for Scope 1, highlighted in the Clean Energy Accounting Project (CEAP)'s recent publication Market-Based Accounting for Clean Fuels.[4]

SCOPE 2 REPORTING SHOULD BE CONSISTENT WITH THE GHG PROTOCOL'S 2015 SCOPE 2 GUIDANCE

The GHG Protocol Scope 2 Guidance in effect at the time SB 253 was enacted was the 2015 Scope 2 Guidance, which reflects the accounting framework the Legislature reasonably contemplated when establishing the statute's reporting requirements. That guidance remains the only finalized and widely adopted international standard for Scope 2 accounting.

The GHG Protocol standards and guidance are currently under revision. Proposed updates to Scope 2 accounting and reporting rules include requiring hourly matching for buyers with load above a specified threshold; however, these updates are not expected to be finalized until late 2026, with the full Corporate Standard potentially finalized in 2027 or later.[5] These revisions are not yet complete, and there is no consensus on the role of hourly accounting in corporate GHG disclosure. 041.2

Requiring hourly reporting raises significant implementation concerns, as hourly generation data are not widely available and most regional energy attribute tracking systems, including the Western Renewable Energy Generation Information System (WREGIS), do not yet support credible, standardized

[3] California Code of Regulations, Title 17, § 95488.8(i).
[4] Market-Based Accounting for Clean Fuels Report: https://resource-solutions.org/document/042125/
[5] GHGP Public Consultation – Scope 2: https://ghgprotocol.org/sites/default/files/2025-10/GHG-Protocol-Scope2-Public-Consultation.pdf

hourly tracking.[6] In practice, this could force reporters to rely on estimated or incomplete datasets, resulting in inconsistent, less accurate, and less decision-useful disclosures.

Moreover, even with improved tracking infrastructure, credible and effective utility- and state-administered programs—including renewable portfolio standards, power supply disclosure, and GHG reporting programs—will continue to rely on annual or monthly instruments and supplier data. These programs provide reporting entities with legitimate energy attributes and emissions data that should remain usable for Scope 2 reporting. Treating hourly matching as the sole valid approach would exclude functioning programs and materially increase reporting complexity and cost.

For these reasons, CARB should avoid codifying hourly Scope 2 reporting requirements in regulation and should permit reporting consistent with the 2015 GHG Protocol Scope 2 Guidance. This approach remains credible, transparent, and verifiable, provides continuity with widely adopted market-based accounting practices, and aligns with the standards in place at the time SB 253 was enacted while allowing time for international standards and best practices to mature.

Please feel free to reach out with any questions or requests for clarification.

Sincerely,

Lucas Grimes

Senior Manager, Policy

[6] Center for Resource Solutions, Readiness for Hourly: U.S. Renewable Energy Tracking Systems: https://resource-solutions.org/document/061523/

February 9, 2026

RE: Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

EnergyTag is an independent, not-for-profit organization focused on promoting and enabling robust hourly electricity accounting standards globally. EnergyTag maintains the world's only voluntary, open-source standard detailing how hourly Energy Attribute Certificates (EACs) can be issued and used to robustly verify hourly matching claims, including claims of deliverability and incrementality.

Our standards are supported and developed alongside major stakeholders working on implementing granular electricity accounting including United Nations Energy, AES, Google, CleanCounts, PWC, and Microsoft amongst others.

EnergyTag holds positions on major greenhouse gas reporting and target-setting standards review processes including Greenhouse Gas Protocol Scope 2, Science Based Targets Initiative, and International Organization for Standardization (ISO).

EnergyTag has also advised on US federal and state level policy implementation including 45V Clean Hydrogen Tax Credit rules, Minnesota Carbon Free Standard implementation, and California Power Source Disclosure rules.

Thank you for the opportunity to provide further comment on the implementation of Senate Bill 253.

Please reach out to Alex Piper (alex@energytag.org) with any questions.

Alex Piper
Head of US Policy and Markets
EnergyTag

Summary

042.1 EnergyTag supports the Proposed Regulation as written, recognizing that it is focused on moving SB 253 forward and establishing reporting requirements for 2026.

042.7 Establishing a reporting deadline of August 10, 2026 under this Proposed Regulation is important to get the program started and establish the expectation of annual reporting for compliant companies.

EnergyTag acknowledges that subsequent rulemaking will be where reporting requirements and enforcement provisions will be more thoroughly developed. It is during that process that we wish to make it clear how important it will be for SB 253 regulations to establish direct coordination with the updated Greenhouse Gas Protocol Scope 2 Guidance, expected to be finalized by the end of 2027.

As described in the Staff Report for this rulemaking, the aim of these two reporting bills is to "generate information and greater transparency around corporate GHG emissions and climate-related financial risk," and ensure that "accurate, comparable, and decision-useful climate information is made available to inform investors, lenders, insurers, consumers, and other stakeholders in the state." As we discuss further below, the proposed revisions to the GHGP's Scope 2 Guidance would dramatically improve the accuracy, comparability, and decision-usefulness of corporate Scope 2 inventories, in line with the intent of SB 253.

Part I of this comment expresses support for the legislation and the currently Proposed Regulation.

Part II of this comment expands on the criticality of and justification for ensuring subsequent rulemakings seek to align SB 253 implementation details and requirements with proposed updates to the GHGP's Scope 2 Guidance.

Part I: Support for SB 253

042.2 EnergyTag supports the goals and purpose of SB 253 – greater electricity emissions impact transparency is a foundational step towards improved policymaking, regulatory decisions, public engagement, investment decisions, and voluntary clean energy procurement and climate actions.

Requiring the largest, most well-resourced companies in the world to report on their emissions is sound policy and one being reflected in other regulatory, policy, and voluntary reporting/targeting proceedings including:

- The European Union Carbon Border Adjustment Mechanism

- The European Union Corporate Sustainability Reporting Directive (CSRD)
- SBTi Scope 2 (draft update)
- Clean Cloud Act (US Senate)
- 45V Clean Hydrogen Tax Credit, EU Clean Hydrogen Regulation, UK Clean Hydrogen Regulation

042.3 EnergyTag agrees that increased information about climate-related risks, including company-wide emissions impacts, allow investors, consumers, and other stakeholders to make better-informed decisions in ways that align with their goals. It additionally encourages companies to better understand their exposure to emissions-intensive energy sources, and incentivizes them to invest in clean energy to reduce their emissions.

This legislation further builds on California's ongoing commitment to clean energy and climate transparency and pairs effectively with other programs like the Power Source Disclosure Program hourly reporting requirements starting in 2028.

SB 253 calls specifically for companies to use the Greenhouse Gas Protocol (GHGP) Scope 2 methodology for reporting. This is a widely adopted and relied upon methodology and appropriate for the purposes of this bill—roughly 97% of disclosing S&P 500 companies use the GHGP. The GHGP has been or is being integrated in a number of policies and standards worldwide.

It must be noted, SB 253 implementation coincides with the ongoing process to update the GHGP Scope 2 Guidance, intended to improve the accuracy, integrity, and impact of Scope 2 inventories.

Part II: Ensure alignment between future reporting requirements under SB 253 and the updated GHGP Scope 2 Guidance

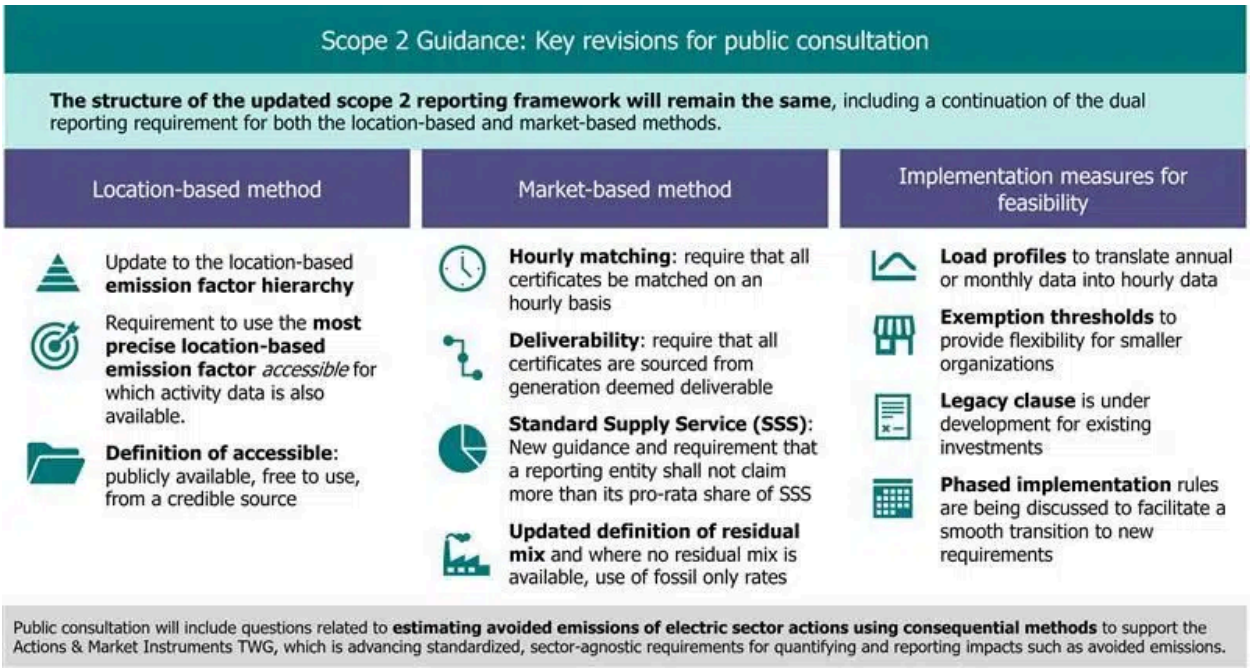
042.4 As subsequent rulemakings are considered, alignment between reporting requirements under SB 253 and the updated GHGP Scope 2 Guidance is essential. While those updates are not yet final, the draft rules indicate a clear direction of travel toward greater accuracy, transparency, and credibility, and a timeline for finalization that can be used by CARB to inform its future rulemakings.

The updated Scope 2 Guidance is expected to be final by the end of 2027. Therefore, EnergyTag recommends that, alongside efforts to align SB 253 rules with updated Scope 2 Guidance, CARB commits to a rulemaking in 2028 to adopt the finalized

GHGP Scope 2 updates and ensure continued alignment between SB 253 and the GHGP.

Background on the update process for Greenhouse Gas Protocol (GHGP) Scope 2

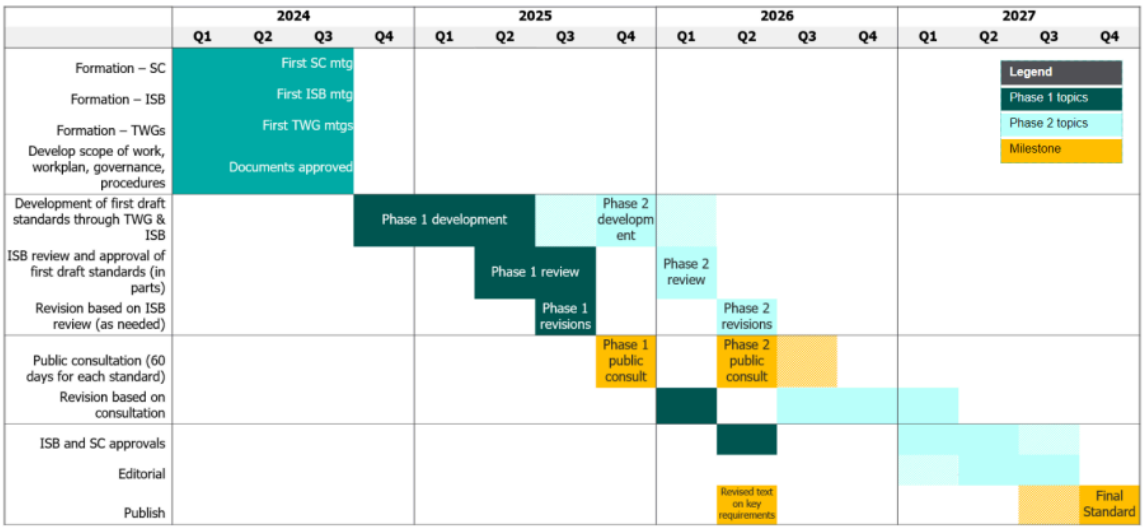
An update to the GHGP Scope 2 Guidance methodology was initiated in 2023. Proposed updates, published in draft form, would require more accurate location-based and market-based inventories. For market-based, this would include requiring hourly matching and deliverability (location-matching) to substantiate market-based Scope 2 reduction claims. As we describe further below, these proposed changes are aligned with leading academic evidence as well as regulatory precedent for effective clean electricity accounting.



Source: GHGP

The public consultation process for feedback on the proposed changes closed on January 31, 2026. Finalization of the Scope 2 Guidance is scheduled for the end of 2027. After that point, there is likely to be a phase-in before new requirements come into effect.

The expected GHGP Scope 2 Guidance update timeline is below:



Source: GHGP

Ensure SB 253 implementation follows the GHGP Scope 2 update

SB253 requires companies to use the GHGP Scope 2 Guidance to account for and report their Scope 2 emission. Today's Scope 2 Guidance allows companies to reduce their market-based Scope 2 emissions by procuring clean electricity completely disconnected in time and location from their consumption. For instance, a company in California can claim purchased solar power to reduce their emissions from nighttime electricity consumption, or claim purchased renewable energy certificates from New York to reduce their emissions in California. These rules have led to credibility challenges and have encouraged companies to seek the cheapest REC available, rather than invest in the range of technologies, including storage, geothermal, and demand flexibility, to advance true decarbonization.

The update process underway is meant to improve the integrity, impact, and feasibility of today's guidance. The following subsections outline why the proposed updates are important and how aligning SB 253 rules to these updates will improve transparency, outcomes, and trust.

Integrity and transparency

Trust and integrity are necessary to make reporting of these numbers have decision-usefulness for investors, civil society, policymakers, and even energy buyers themselves. Continuous improvement towards greater accuracy is the best way to

ensure the GHGP and policies pointing to its accounting rules remain relevant and impactful.

As leading energy transition expert, Michael Liebreich, urges in his Bloomberg article, Pragmatic Climate Reset, "Reform the Greenhouse Gas Protocol carbon-accounting rules. The current ones, written in 1990, allow companies to claim they use 100% renewable power on the basis of annual matching – which means they can offset night-time coal use with extra purchases of daytime solar power. It's absurd and destroys public confidence. The rules are currently under review and need to be tightened."

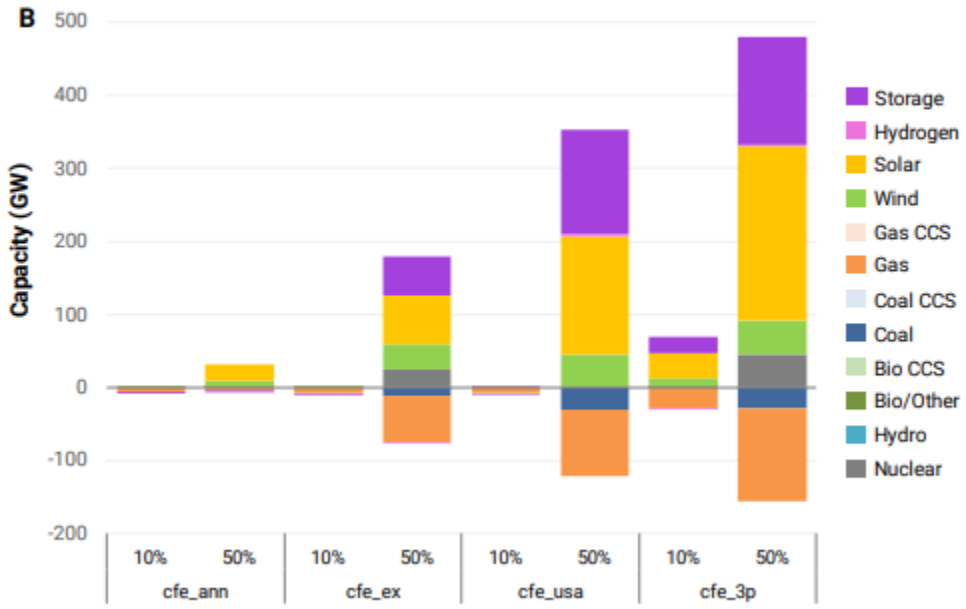
Deep decarbonization

The only way to achieve deep decarbonization everywhere at all times is to first understand where and when clean energy is lacking. Today's accounting and reporting metrics do not provide the level of granularity necessary to identify where and when clean power is most needed. The proposed changes to the GHGP, requiring hourly matching and deliverability, create visibility into these gaps. That can send investment signals to developers and clean energy buyers for technologies to fill those gaps. Hourly accounting is the only Scope 2 accounting methodology that successfully incentivizes and drives storage and clean, dispatchable technologies onto the grid in all peer-reviewed research on the topic.

EPRI was the most recent to come out with a study showing how storage is deployed based on higher levels of hourly matched clean energy procurement. This work is still in pre-print but echoes academic alignment around this point.

System Effects of Carbon-Free Electricity Procurement: Regional Technology and Emissions Impacts of Voluntary Markets

John Bistline[1]*, Geoffrey Blanford[1], Adam Diamant[1], Arin Kaye[1], Daniel Livengood[1], Qianru Zhu[1], Francisco Ralston Fonseca[1]



Configuration (Abbr.)	Description
Carbon-Free Electricity (CFE) Qualification Criteria	
Reference (ref)	On-the-books federal and state electric sector policies and incentives, including the Inflation Reduction Act (IRA), but without voluntary CFE demand; no explicit national CO_2 policy
Three Pillars (cfe_3p)	Qualified generation must be zero-emitting and satisfy temporal matching (i.e., hourly CFE generation must coincide with hourly consumption), incrementality (i.e., CFE resources must be new capacity), and deliverability (i.e., CFE generation must reside in the same region as demand)
Temporal Flexibility (cfe_ann)	Annual/volumetric matching instead of hourly matching but assuming incrementality and deliverability
Resource Flexibility (cfe_ex)	Existing resources allowed instead of excluded but assuming hourly matching and deliverability
Locational Flexibility (cfe_usa)	CFE anywhere in the U.S. qualifies instead of only in the 16 model regions in Figure S1 (we also consider sensitivities with intermediately sized regions) but assuming hourly matching and incrementality

Source: EPRI.[1]

[1] The 10% and 50% results for each case represent 10% or 50% Commercial & Industrial load participation in fully matching their load with clean electricity under the different criteria in each case.

Strengthen the clean energy market

These updates to Scope 2 accounting will also drive stronger, more future-proofed clean energy procurement strategies to the forefront. When companies consider their decarbonization on an hourly and locational basis, they are incentivized to look into clean energy contracting that provides greater around the clock generation. This means more investment into clean energy portfolios, including renewables paired with storage, clean firm generation like geothermal, innovative technologies like long duration energy storage, and strategies to deliver on demand-side flexibility. All of these actions drive money into new technologies, scale of battery storage, and more effectively integrate renewable energy supply.

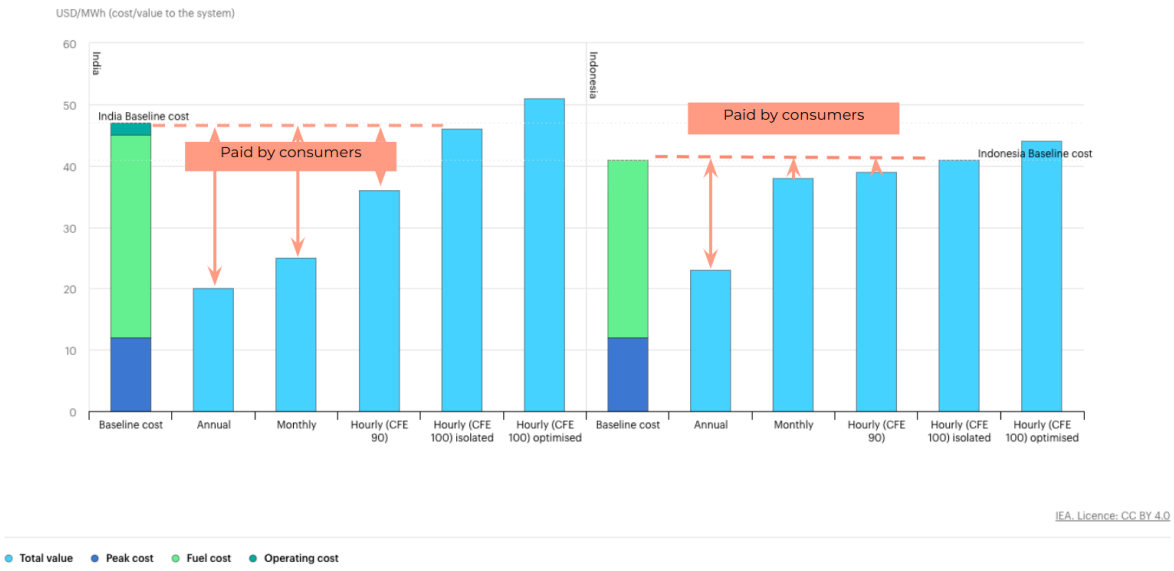
As the IEA writes in their recent report on integrating wind and solar: "Compared to yearly matching, shorter matching periods can deliver a more diverse clean energy portfolio, bringing wind, batteries and clean dispatchable capacities online in addition to cheaper solar PV."

Further, these kinds of reality-based accounting rules will reduce the broad reliance on unbundled renewable energy certificates (RECs) to make claims on Scope 2 emissions reductions. These types of certificates are widely recognized as having very little impact. If Scope 2 reporting rules continue as they are today, these certificates will continue to flood the clean energy markets and allow for large energy buyers to offset their grid energy usage with the cheapest available RECs.

Save on system costs and drive affordability

These greater rates of matching can support more efficient grid operations and ultimately save consumers money on a significant scale. The IEA and Transition Zero have each shown just how much cost reductions can be passed onto consumers based on higher rates of clean energy matching. In India, for example, Transition Zero finds that 70% around-the-clock clean power, a very reasonable level for companies procuring within-market using a mixture of resources, can save the grid system $1 billion compared to 100% annual matching.[2]

[2] Today's levels of hourly matching vary greatly. Some can be 0% matched (if all clean energy procurement is occurring out of market), and some can be at high levels already (estimated to be nearly 80% in Meta's portfolio). For more information on different hourly matching levels, Granular Energy has a primer.



Source: IEA (emphasis added by EnergyTag)

Feasibility of the GHGP Scope 2 update

Complying with the GHGP Scope 2 updates will be imminently feasible. Flexibilities and feasibility measures are proposed and necessary data is broadly available and improving in accessibility.

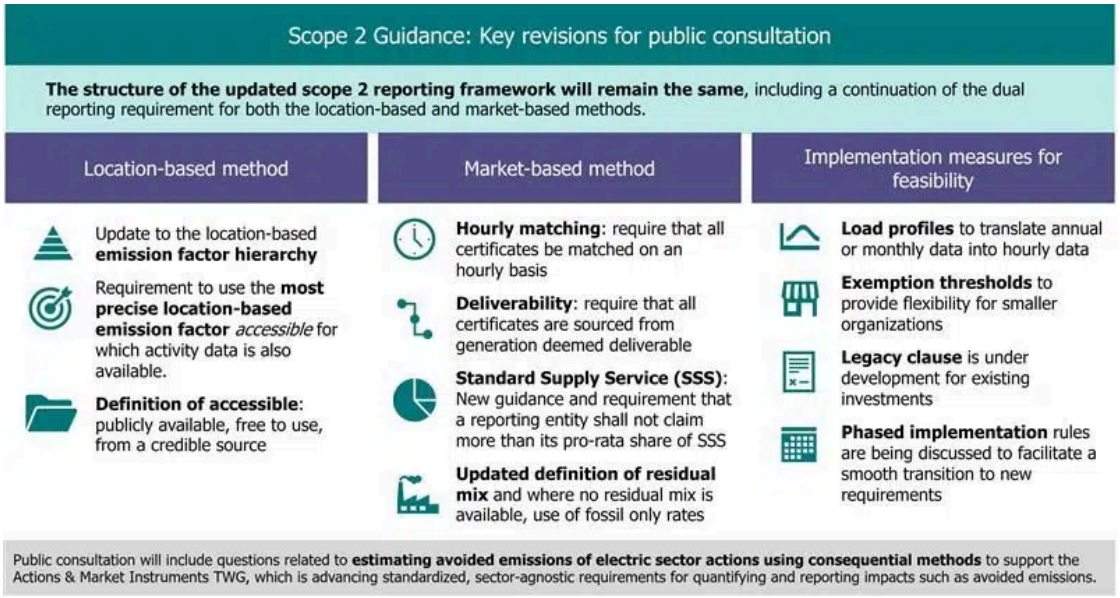
This is not actually new

Hourly tracking is already the basis of power markets. Companies complying with SB 253 are the most well-resourced companies on the market and likely already quite well-versed in power trading and procurement. It only makes sense to begin aligning clean energy accounting with power markets for all the reasons of integrity and impact described above. Put even more simply: it is not new.

GHGP updates are ensuring feasibility

The GHGP Scope 2 update is considering feasibility as a core tenet of all updates. That is why a number of feasibility measures are built into the proposal and more are likely to be included in any final rules:

- The allowance for the use of load and generation profiles to translate annual or monthly data into hourly data
- Exemption thresholds for the smallest organizations
- Legacy clause to protect the value of existing investments
- Phased implementation to facilitate a smooth transition with clarity



Source: GHGP

If SB 253 is implemented in line with updated GHGP Scope 2 Guidance, these flexibilities can also be applied to obligated companies, providing a sufficient transition timeline to enable companies to meet updated requirements.

The proposed hierarchy for supply and demand data that can be used to perform hourly accounting shows how improvement to today's accounting can be done without requiring perfectly accessible data today.

Proposed hierarchy of temporal data for contractual instruments (supply)

Temporal Granularity	Derived from	Applicable to:	Precision
Hourly	Hourly contractual instruments	Electricity consumption above exemption threshold	Higher
	Monthly or annual contractual instruments combined with hourly production meter data from the same production asset		
	Monthly or annual contractual instruments combined with hourly facility-specific production profile		
	Monthly or annual contractual instruments combined with hourly regional publicly available production profile		

Proposed hierarchy of activity data for matching contractual instruments (demand)

Data Granularity	Consumption Data Derived from	Applicable to	Precision
Hourly	Meter data Primary hourly meter data	Electricity consumption above exemption threshold	Higher
	Facility-specific load profile Total facility consumption scaled according to an estimated facility-specific load profile		
	Market-boundary publicly available load profile Total market-boundary consumption scaled according to a general or customer class-specific market-boundary load profile		
	Time-of-use average Total consumption for time-of-use billing periods (e.g., on-/off-peak hours) scaled to the proportion of electricity consumed during each time-of-use period, then averaging by the number of hours within that time-of-use period		
	Flat average Total consumption divided by the number of hours in the corresponding period for which data is available (e.g., if a reporting entity has annual consumption data, they would divide the yearly total by 8,760 hours to calculate an average hourly load)		Lower

Source: GHGP

A number of companies have already begun accounting for their Scope 2 emissions on a granular basis, in line with the proposed GHGP revisions. For example, Google calculated its hourly Scope 2 emissions for its entire global electricity footprint, and regularly releases data on its hourly matching percentage. Similarly, Meta released hourly matching data for the year 2023 for its global data center portfolio.

The value of load profiles

To be clear, most large companies already have access to hourly consumption data – avoiding the need for further feasibility measures. However, the allowance of using load profiles to better estimate usage every hour is a major flexibility as smart meters and hourly meter data continue to become more ubiquitous. The use of load profiles to estimate hourly emissions is far more accurate than today's annual accounting. Moreover, research has found that the use of load profiles does not alter the positive system-wide impacts of hourly matching.

Over time, more companies can secure this data for themselves via better sharing with utilities and investments in smart meters. But in the meantime, for those that do not already have the data access,this commonsense flexibility takes a massive step forward on the impact side without unduly burdening any reporting entity.

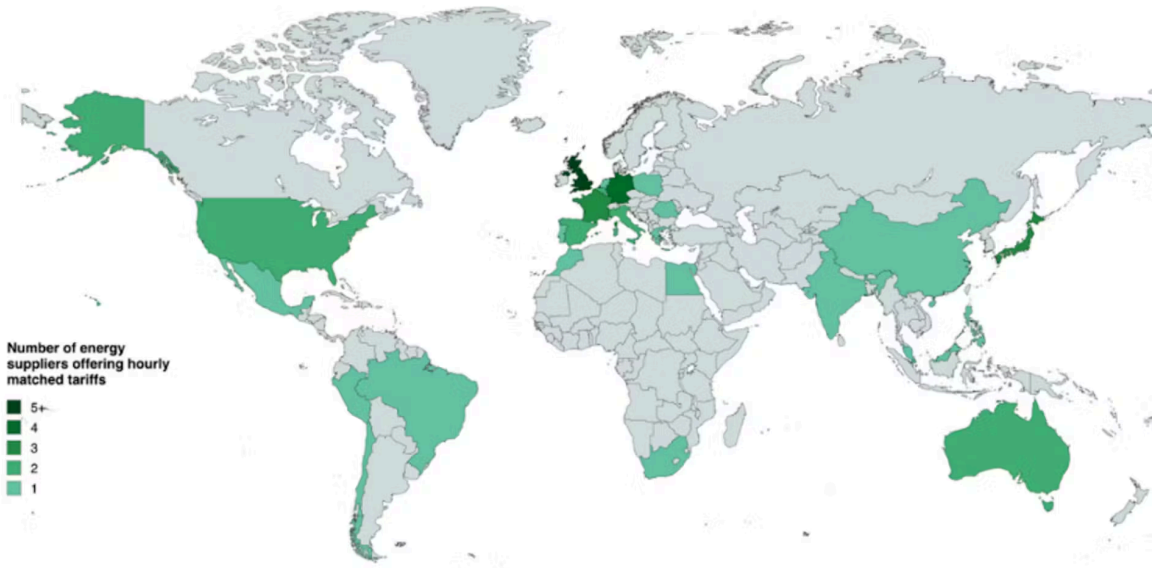
Tools and supplier solutions exist

There are already tools available to support companies in estimating their hourly Scope 2 emissions today. These calculators have been developed to help companies understand what potential GHGP changes may look like for their operations and to demonstrate feasibility of doing more accurate accounting.

Constellation and WattTime/REsurety have both developed and publicized calculators for companies to input load and supply figures and develop hourly Scope 2 emissions estimates.[3] These tools were developed relatively quickly and show that the calculation of more granular Scope 2 emissions is not as complex as some claim.

While the above tools show that Granular Scope 2 *accounting* is feasible for companies today, new solutions are also emerging for companies to engage in hourly matched clean energy *procurement*. Companies that sign power purchase agreements (PPAs) in the grids where they operate will continue to receive Scope 2 inventory credit for their purchases. Moreover, utilities across the world are increasingly offering "hourly matching tariffs," or traceable clean energy accounted on an hourly basis. Granular Energy and Baringa surveyed electricity suppliers around the world and found 52 suppliers already offer an hourly matching tariff or will introduce one in the next six months. The speed with which these offerings have come out (most within the last two years) shows how quickly the market reacts to changes in buying trends, something likely to only increase if the GHGP Scope 2 Guidance adopts the proposed updates for more accurate accounting.

[3] The existence of a calculator does not indicate EnergyTag's support for the methodologies used. In the case of WattTime/RESurety's calculator, the methodology is not transparent and results suggest different assumptions and processes used compared to Constellation's calculator. Any methodology for these types of tools should be made public and justifications should be provided.



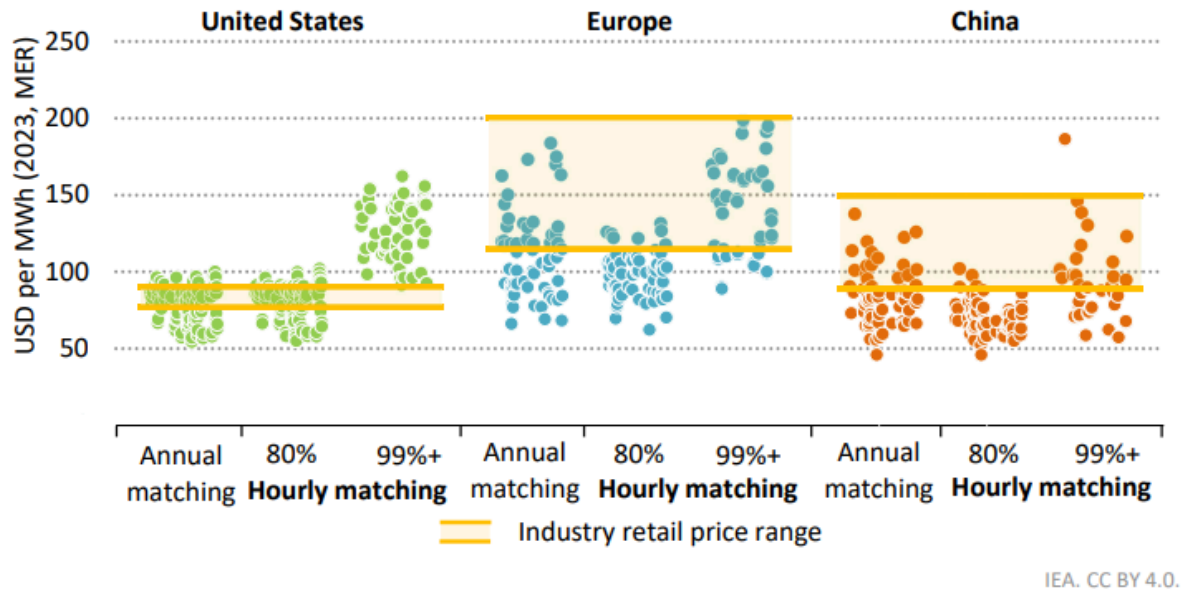
Source: Granular Energy

Companies are already committing to higher levels of matching, showing that hourly accounting is an achievable first step

A number of companies are already committing to purchasing clean energy that matches more of their actual electricity demand around the clock. The Climate Group 24/7 Initiative has six energy buyers signed on as founding partners in achieving higher and higher rates of hourly matching to eventually hit 24/7 targets: Google, Shree Cement, Iron Mountain, Vodafone, AirTrunk, and AstraZeneca.

The IEA finds that achieving high levels of hourly *matching* is already cost-competitive across major markets around the world, with 80% hourly matching is comparable to average industrial retail electricity costs in the US, Europe, and China.

Figure 2.19 ▷ **Total cost of electricity per unit consumed for hybrid options of wind, solar PV and battery in the United States, Europe and China**



Source: IEA

Conclusion

042.5 EnergyTag supports the core purposes of SB 253 – transparency, accountability, and decision-useful information are critical components to accurately identifying climate risk and exposure and driving investment towards needed decarbonization solutions. Accuracy is the critical component, and without following the GHGP's indicated direction towards hourly and locational accounting, this legislation risks missing the mark on intended impacts.

Additionally, if this legislation dictates accounting rules that are less accurate, phase in more slowly, or allow for more exemptions than the GHGP process, there is a significant risk of undermining and confusing global emissions reporting processes. Alignment is critical to reduce the burden on reporting companies and to develop comparable and decision-useful emissions information.

042.6 The GHGP Scope 2 development process is being guided by significant academic, technical, and public input. Aligning SB 253 compliance requirements with GHGP Scope 2 updates, on its scheduled timeline and with its feasibility measures included, is sound policy.

For more information on academic research, regulatory adoption, procurement examples, and more related to hourly accounting and matching, please use this resource developed and maintained by EnergyTag: Granular - 24/7 In Action.

We are interested in answering any further questions or providing further clarity on any of these topics.

Sincerely,

Alex Piper
Head of US Policy and Markets
EnergyTag

CARB (Board Clerk - 2,849 Non-Docket Submissions Received)

Form Letter Received to cotb@arb.ca.gov - Submitted to docket system by Board Clerk on behalf of the Public.

*** CARB RECEIVED 2,849 NON-DOCKET SUBMISSIONS CONTAINING THE COMMENT SHOWN BELOW: ***

"California Air Resources Board Official Comment SB 253,

I urge you to remove the proposed exemption for insurance companies from emissions disclosure requirements. 043.1

Insurance companies play a significant role in financing and backing fossil fuel infrastructure and invest heavily in industries that drive climate change. At the same time, many insurance companies are sticking Californians with the climate bill by withdrawing from communities and denying and delaying claims. Excluding insurance companies from emissions reporting leaves out a sector with a clear and direct connection to growing climate risk that is threatening the state. 043.2

The public deserves transparency about the insurance sector's climate harms. This exemption would weaken the rule and undermine public confidence in the climate disclosure program. The regulation should be finalized without delay and applied consistently to all covered corporations, including insurance companies, which clearly meet the criteria of SB 253. 043.3

Sincerely,"

Coalition of Farm Credit System Institutions (Rachel Saltzman)

Please see attached comment letter.

COMMENTS TO THE CALIFORNIA AIR RESOURCES BOARD
ON
PROPOSED CALIFORNIA CORPORATE GREENHOUSE GAS REPORTING AND CLIMATE-RELATED FINANCIAL RISK DISCLOSURE INITIAL REGULATION

FEBRUARY 9, 2026

These comments to the California Air Resources Board (CARB) are submitted on behalf of a coalition of certain Farm Credit System (FCS) institutions, all of which are federally chartered instrumentalities of the United States.

The FCS is a federally chartered network of borrower-owned cooperative lending institutions and related service organizations dedicated to supporting rural communities and agriculture throughout the United States and Puerto Rico. The FCS was established in 1916 by the U.S. Congress and is a government sponsored enterprise (GSE). Congress designed the FCS "to accomplish the objective of improving the income and well-being of American" farmers, ranchers, and producers and harvesters of aquatic products "by furnishing sound, adequate, and constructive credit and closely related services to them, their cooperatives, and to selected farm-related businesses necessary for efficient farm operations."[1]

The entities participating in these comments to CARB include a select subset of FCS institutions, specifically:

- CoBank, ACB (CoBank), one of the four FCS banks. CoBank is one of the largest providers of credit to the U.S. rural economy, delivering loans, leases, and other financial services to agribusiness, rural infrastructure, and FCS customers in all 50 states.

- AgWest Farm Credit, ACA; American AgCredit, ACA; and Farm Credit Mid-America, ACA, all of which are FCS associations that deliver loans, leases, and other financial services to farmers, ranchers, and other eligible agricultural borrowers in their respective geographic territories.[2]

- The Federal Agricultural Mortgage Corporation (Farmer Mac), a federally chartered GSE that was established by Congress in 1988 to create a secondary market for agricultural real estate mortgage loans, rural housing loans, and rural cooperative loans to improve liquidity and access to long-term credit for farmers and rural communities.[3]

While they are not government entities, the FCS institutions described above were either created directly by Congress or operate under the congressionally created FCS, a GSE, to provide vital liquidity to support domestic agricultural production, rural infrastructure, and rural

[1] 12 U.S.C. §§ 2001(a); 2017(1).
[2] *See* FCA, "About banks & associations," available here.
[3] *See* FCA, Title VIII of the Farm Credit Act of 1971, 12 U.S.C. 2279aa *et seq*. and FCA, "About Farmer Mac," available here. Although Farmer Mac is statutorily defined as an institution of the FCS and is examined and regulated by a common regulator, the Farm Credit Administration (FCA), there are some structural differences from the other FCS institutions as more fully described herein.

homeownership by making long-term credit available to the nation's farmers, rural homeowners, rural utilities, and agribusinesses.

CARB Should Modify the Scope of Its Proposed Exemption for Government Entities to Include Federally Chartered Instrumentalities of the United States.

The coalition writes to explain the unique nature of the role its members play as instrumentalities of the United States and to request that CARB staff make targeted changes to its proposed initial regulation implementing the Climate Corporate Data Accountability and Climate-Related Financial Risk Disclosure laws (referred to herein as SB 253 and SB 261, respectively) to ensure that FCS institutions are exempted, for the reasons provided below.

1. Federally chartered instrumentalities of the United States are similar to companies that are majority government-owned in that they are quasi-governmental entities formed to serve the public interest.

CARB proposes to codify in § 96071(b)(3) an exemption for "Federal, State, and local government entities, and *companies that are majority-owned by government entities (>50.00%)*."[4] The coalition requests that CARB change the proposed exemption in § 96071(b)(3) to encompass all *federally chartered instrumentalities of the United States* due to their unique construct as entities created by the federal government to serve a specific public interest.

044.1

Presumably, CARB's proposed exemption for majority-owned government entities would encompass the Federal Home Loan Mortgage Corporation (Freddie Mac) and Federal National Mortgage Association (Fannie Mae) by virtue of their current ownership by the United States Treasury under their conservatorships. Both Freddie Mac and Fannie Mae are instrumentalities of the United States and were created by federal charter in the same manner as the FCS institutions. For example, one FCS institution—Farmer Mac—has similar characteristics and plays a similar role to Freddie Mac and Fannie Mae in that they are all secondary mortgage market GSEs. Farmer Mac was created by Congress to promote a secondary market in qualified agricultural real estate mortgage loans, similar to the secondary markets in residential mortgage loans served by Fannie Mae and Freddie Mac. Although it is not "government-owned," as an instrumentality of the United States, Farmer Mac's ties to the federal government closely resemble those of these other GSEs that would presumably be exempt under CARB's proposal. As examples: Farmer Mac has a congressionally authorized line of credit with the U.S. Treasury; the Federal Reserve Banks are required to act as Farmer Mac's depositories and fiscal agents, and Farmer Mac has congressionally authorized access to the book-entry system of the Federal Reserve System. Further, five of Farmer Mac's permanent board members are appointed by the President of the United States and confirmed by the Senate.

[4] *See* CARB, Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation, Proposed Regulation Text A-1 (hereinafter Proposed Regulation), available here, at § 96071(b)(3) (emphasis added).

These and other characteristics of FCS institutions demonstrate their interrelationship with the federal government, similar to majority government-owned entities that CARB proposes to exempt. Through the requested modification to § 96071(b)(3), we simply seek to have FCS institutions recognized for their unique status as instrumentalities of the United States government.

Given the specialized purposes and discrete sectors that FCS institutions serve under their federal charters, emissions or climate-related risk information is unlikely to be meaningful or decision-useful for their customer base, which relies on these institutions as a source of dependable liquidity to support agricultural production and rural infrastructure.

2. The requested exemption is necessary to ensure that CARB's reporting framework does not impose duplicative reporting obligations on FCS institutions.

FCS institutions are regulated by the FCA. Climate-related risk is already embedded in FCA's safety and soundness framework, tailored to the FCS institutions' agricultural and rural infrastructure portfolios. FCA's extensive regulatory and supervisory framework—including its climate-relevant oversight of natural disaster and collateral risks—already provides a unified, nationwide system for managing and disclosing the climate-related risks relevant to FCS institutions. Overlaying SB 253/SB 261 requirements on federally chartered instrumentalities of the United States would be duplicative, inconsistent, and overly burdensome, likely resulting in increased administrative costs and inefficient uses of resources by FCS institutions (by requiring them to divert resources from mission delivery to SB 253/SB 261 compliance activities), the impact of which is ultimately felt by customers in the communities these institutions serve. Regulatory frameworks should not impose unnecessary burdens, particularly where federal laws, regulations, and direct oversight already govern the field. CARB's proposed requirements would create exactly this problem—a second, competing disclosure regime that is not harmonized with FCA's prudential and investor protection requirements.[5]

For these reasons, the coalition requests that CARB finalize its Proposed Regulation with a slightly modified government exemption in § 96071(b)(3) to encompass federally chartered instrumentalities of the United States, as follows:

[5] The legislature exempted insurance companies from reporting climate-related risks under SB 261, presumably because many of these companies are already required to annually report climate-related risks via the TCFD-aligned "Climate Disclosure Risk Survey" adopted by the National Association of Insurance Commissioners (NAIC). For similar reasons, it would make sense for CARB to exempt FCS institutions from reporting because they already are subject to comprehensive requirements for investor disclosures—making the additional California-specific reports and disclosures duplicative of pre-existing federal requirements. *See, e.g.*, 12 C.F.R. § 620.5 (FCA regulatory requirements for annual reports to shareholders, which must describe—among other things—"any seasonal characteristics of the institution's business" and "risk exposure").

§ 96071. Applicability.
"(b) This article does not apply to the following entities:

* * *

(3) Federal, State and local government entities, ~~and~~ companies that are majority-owned by government entities (>50.00%), and federally chartered instrumentalities of the United States;"

Conclusion

We appreciate the opportunity to provide input on the Proposed Regulation. If you have any questions or would like to discuss this submittal, please contact Rachel Saltzman at rsaltzman@hunton.com or 202-955-1598.

The Greenlining Institute (Monica Palmeira)

Comments from The Greenlining Institute on the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation Implementing Senate Bills 253 and 261

THE GREENLINING INSTITUTE

The Greenlining Institute
360 14th Street, 2nd Floor
Oakland, CA 94114
www.greenlining.org

February 9, 2026

Chair Lauren Sanchez
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Comment on the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation Implementing Senate Bills 253 and 261

Dear Chair Sanchez,

On behalf of The Greenlining Institute ("Greenlining"), we appreciate the opportunity to provide comments to the California Air Resources Board ("CARB") in response to the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation ("Proposed Initial Regulation"). Greenlining submits the below comments and recommendations in strong support of a robust and effective approach to implementation of SB 253 and SB 261, further cementing CARB and California's climate leadership in a time of retrenchment and backslides.

Founded in 1993, Greenlining is committed to building a just economy that is inclusive, cooperative, sustainable, participatory, fair, and healthy. We work towards a future where communities can build wealth, live in healthy places filled with economic opportunity, and are ready to meet the challenges posed by climate change. The effects of emissions and our rapidly changing climate are not equal. Communities of color and low-income communities experience climate-related impacts and disasters with both less preparedness and less resources to recover. They are also far more likely to live in areas exposed to excessive emissions, contributing to poorer health outcomes and higher susceptibility to climate disasters than wealthier, whiter communities.

We can not make informed decisions on how to address the climate crisis without accurate data on what is contributing to it. This Proposed Initial Regulation paves a critical path forward for corporations to support California's climate leadership. Establishing this foundation of information sharing will help CARB and the State of California build better and more equitable solutions to the climate crisis.

045.1

With these goals in mind, Greenlining supports much of what is in the Proposed Initial Regulation. This includes the proposed fee structure, penalties, and deadlines. We see these as essential to ensuring timely, consistent, and enforceable implementation of SB 253 and SB 261.

THE GREENLINING INSTITUTE

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A clear, entity-based fee structure will enable CARB to sustain the staffing and capacity necessary to operate these programs, while transparent and specific penalties with firm deadlines establish regulatory certainty for participating companies. Although some regulated entities have raised concerns about initial compliance burdens and assurance timelines, the phased approach to the verification requirements creates an important balance between flexibility and the need to preserve the integrity of the disclosure framework over time.

Our primary recommendation for CARB is to **reconsider the proposed exemption of insurance companies from SB 253 reporting requirements.** While SB 261 explicitly excludes insurers, SB 253 does not, and extending that exemption is inconsistent with the enabling statute and legislative intent. Insurers are corporate entities doing business in California, generating revenue, and having real impacts on the environment via their underwriting and investment decisions. Existing disclosure regimes under the California Department of Insurance and the National Association of Insurance Commissioners Climate Risk Disclosure Survey are, at present, insufficient in their scope and jurisdiction to effectively substitute for the full scope of reporting under SB 253, specifically under the Metrics and Targets pillar of Scope 3 emissions. This is especially critical because this pillar is where much of the insurance industry's impacts are likely to be found. 045.2

Exempting insurers would create a major blind spot in California's overall, multi-agency climate disclosure system at a time when the state is facing an acute insurance availability and affordability crisis driven by climate-related disasters. Including insurers under SB 253 implementation would generate materially new information for regulators, investors, and the public, and would align California with emerging standards such as the Partnership for Carbon Accounting Financials for insurance-associated emissions.

Once again, we appreciate the opportunity to provide the above comments and recommendations with a priority towards timely implementation, maximum transparency, and critical accessibility of reported data, and commend CARB on their leadership in this rulemaking. We look forward to timely and robust implementation of these critical laws.

Sincerely,

Monica Palmeira
Associate Director for Economic Equity
The Greenlining Institute

BERKSHIRE HATHAWAY ENERGY

February 9, 2026

Clerk's Office
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Submitted online via https://ww2.arb.ca.gov/lispub/comm/bclist.php

Re: Berkshire Hathaway Energy Comments on CARB's Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Berkshire Hathaway Energy ("BHE") is a global energy services provider serving more than 13 million customers and end-users throughout the U.S., Great Britain and Alberta, Canada. BHE does business in California and anticipates it is subject to reporting requirements under the Corporate Climate Data Accountability Act authorized by Senate Bill 253 ("SB 253") and the Climate-Related Financial Risk Act authorized by Senate Bill 261 ("SB 261"), both as amended by SB 219. We appreciate the opportunity to provide comments on the California Air Resources Board's ("CARB") Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation posted December 23, 2025 (the "Proposed Rule").

046.1 While BHE supports CARB's goal of establishing a workable fee framework to administer these climate-related disclosures required by SB 253 and SB 261, the Proposed Rule, as currently drafted, does not provide sufficient clarity regarding which entities within a parent-subsidiary corporate structure may be assessed an implementation fee under Subarticle 2 (Fees), nor how that fee assessment relates to or interacts with consolidated reporting under SB 253 and SB 261. Absent clarification, this uncertainty creates a risk of inconsistent fee assessment and unequal treatment.

046.2 This uncertainty is compounded by the fee enforcement provisions of the Proposed Rule, which appear to exceed CARB's statutory authority and do not provide a mechanism for dispute. Finally, without additional detail regarding the regulatory implementation of the SB 253 and SB 261 disclosure frameworks, it is impossible for stakeholders to make meaningful comments on CARB's Proposed Rule. 046.3

046.4 For these reasons, BHE encourages CARB to: (1) clarify which entities in parent-subsidiary structures are responsible for fee payment, and regardless, provide that fees will be assessed on a per-filing basis; (2) align fee assessment with the statutory structure of SB 253 and SB 261 by assessing fees on a per-filing basis; (3) align any enforcement of fee nonpayment with the statutory authority provided in SB 253 and SB 261; and (4) allow additional comment on Subarticle 2 of the Proposed Rule after CARB releases additional proposed regulations that further articulate implementation of SB 253 and potentially SB 261. 046.5

046.6

The Final Rule Should Clearly Identify Which Legal Entities in Parent-Subsidiary Structures are Subject to a Fee.

Subarticle 2 of the Proposed Regulation provides that annual fees are assessed on "reporting entities" and "covered entities," and that CARB will issue a fee determination notice to each "affected entity." However, the regulation does not define the term "affected entity," nor does it explain how CARB will identify the fee-paying entity where a parent company and one or more subsidiaries are involved.[1] Although the Proposed Rule defines "parent" and "subsidiary,"[2] those definitions are not linked to any operative provision governing fee liability. As a result, entities are left without clarity as to whether CARB intends to assess a fee to a parent company only, assess fees to individual subsidiaries that independently meet statutory revenue and "doing business in California" thresholds, or assess fees to both parent and subsidiary entities even when reporting is consolidated at the parent level. This lack of clarity is particularly significant because the Proposed Rule would establish a fee enforcement mechanism with daily penalties for nonpayment[3] making clear identification of the fee-liable entity essential for due process and compliance planning.

046.7

The Proposed Rule Should Clearly Align Fee Assessment With the Statutory Structure of SB 253 and SB 261 by Assessing Fees on a Per-Filing Basis.

The ambiguity in the Proposed Rule is compounded by the different ways in which SB 253 and SB 261 treat parent-subsidiary relationships for reporting purposes. Under SB 261, the statute expressly provides that climate-related financial risk reports may be consolidated at the parent company level and that, where a subsidiary qualifies as a covered entity, the subsidiary "is not required to prepare a separate climate-related financial risk report" if included in a parent's consolidated report.[4] The statute therefore makes a clear distinction between a subsidiary's *potential eligibility* as a covered entity and its *actual reporting obligation* when the parent consolidates reporting. SB 253 similarly places reporting obligations on the "reporting entity" and requires disclosure of Scope 1 and Scope 2 emissions from sources the reporting entity owns or directly controls,[5] with reporting to be conducted in accordance with the Greenhouse Gas Protocol. And SB 253, as amended by SB 219, similarly provides that a subsidiary that qualifies as a reporting entity is not required to prepare a separate report if reporting is consolidated at the parent company level. Neither statute, however, specifies how consolidated reporting affects fee liability, leaving that issue for CARB's implementation.

046.8

In light of these statutory provisions, it is unclear how CARB intends to apply the fee framework in Section 96073 of the Proposed Rule—particularly the calculation variables N_{38532} (number of reporting entities) and N_{38533} (number of covered entities)—in cases where a parent company elects or is permitted to file a consolidated report encompassing one or more subsidiaries.

[1] *Proposed Rule*, §§ 96071, 96073-96074.
[2] *Id*., § 96072(a)(10), (16).
[3] *Id*., § 96075.
[4] CAL. HEALTH & SAFETY CODE § 38533(b)(2).
[5] CAL. HEALTH & SAFETY CODE § 38532(b)(2)-(4).

Specifically, the Proposed Rule does not clarify whether a subsidiary whose emissions or climate-risk disclosures are included in a parent's consolidated report will be counted as a separate "reporting entity" or "covered entity" for fee purposes or whether subsidiaries that do not have an independent reporting obligation, but are nonetheless covered by a report, may be assessed a separate fee. CARB has also not explained in the Proposed Rule whether it will assess separate fees for every entity covered by a single report. If the fee is assessed on a per-entity basis, as opposed to a per-filing basis, CARB stands to assess multiple fees for the same report where reporting is consolidated at the parent level. BHE strongly encourages CARB to assess a single fee *per filing entity,* which would enhance CARB's ability to administer reports and reporting obligations under SB 253 and SB 261, promote uniformity and predictability for filers, and more efficiently serve the purposes of the relevant statutes.

Additionally, without further clarification, the Proposed Rule creates a risk of inconsistent fee assessment across similarly situated corporate groups, depending on how CARB interprets and applies the undefined term "affected entity." This uncertainty is particularly acute for companies with complex corporate structures and regulated subsidiaries, including energy and utility holding company systems. Moreover, assessing fees on subsidiaries that do not have an independent reporting obligation—particularly where a parent is reporting on their behalf—would be difficult to reconcile with both the structure and intent of SB 253 and SB 261, which tie fee authority to the administration and implementation of reporting obligations. Fees assessed in the absence of a corresponding reporting obligation could also undermine the statutory direction that fees be "actual and reasonable" costs of administering these programs.[6]

046.9

To address these issues and to ensure predictable, administrable and equitable implementation, BHE respectfully requests that CARB address, either in the final regulation text or in binding guidance, the following:

1. The entity that submits the required report is the only fee-liable entity in a parent–subsidiary structure where reporting is consolidated at the parent level under SB 253 and/or SB 261.

046.10

2. That subsidiaries whose reporting obligations are satisfied through a parent's consolidated filing are excluded from the count of N_{38532} or N_{38533} for purposes of calculating the annual fee.

3. How CARB will ensure that a single corporate group is not assessed duplicative fees for the same underlying reporting activity when parent-level consolidation is permitted or required.

4. The meaning and scope of the term "affected entity" in Section 96074(a), including whether that term is intended to encompass only the reporting or covered entity that is responsible for filing, or potentially multiple entities within the same corporate family.

[6] CAL. HEALTH & SAFETY CODE §§ 38532(c)(1)(G), 38533(c)(2).

Providing this clarity in the final rule will improve transparency, support compliance and better align the fee structure with the reporting frameworks established by SB 253 and SB 261.

The Final Rule Should Ensure That Fee Enforcement is Consistent with Statutory Authorization and Provides a Dispute Procedure.

Given the lack of clarity regarding fee assessment, it is problematic that the Proposed Rule would authorize penalties, injunctions and per-day violations for "the failure to pay the full amount of any fee required," classifying each day after the due date as a separate violation and invoking CARB's administrative hearing procedures to enforce collection.[7] However, neither SB 253 nor SB 261 identifies "nonpayment of an administrative implementation fee" as an enumerated
046.11 violation for which CARB is directed to adopt enforcement rules. To the contrary, SB 253's penalty provision addresses reporting-related noncompliance (e.g., non-filing, late filing) and expressly caps penalties in a "reporting year." SB 261 likewise directs CARB to adopt administrative penalties tied to reporting obligations (e.g., failure to make the required report publicly available or publishing an inadequate report). Neither statute expressly authorizes treating fee nonpayment as a substantively separate violation subject to daily penalties and injunctive relief under Title 17.

This lack of statutory authority is especially problematic here because the Proposed Rule lacks sufficient information for potentially regulated parties to determine which specific legal entities within a parent-subsidiary structure will receive fee assessments, and whether those assessments will be correct. As discussed above, the regulation does not define "affected entity" and does not specify how CARB will count entities in consolidated reporting scenarios when determining N_{38532} and N_{38533} for the fee formula. Compounding this ambiguity, the Proposed Rule does not outline any process to dispute or administratively challenge a fee assessment before penalties begin to accrue—there is no dedicated invoice protest, appeal or reconsideration mechanism for fee determinations (compare Section 96075's penalty and injunction tools with the absence of a fee-assessment contest provision).

BHE respectfully submits that, before adopting any regulation that imposes daily penalty exposure for fee nonpayment, CARB should: (1) identify the specific statutory authority for fee-nonpayment enforcement under SB 253 and SB 261, or tailor the enforcement text to the statutes' enumerated reporting violations; and (2) adopt a clear, timely and accessible fee-dispute process (e.g., an invoice protest window tolling penalties while a good-faith challenge is pending; defined evidentiary standards; and a written decision subject to administrative rehearing). These steps would better align Subarticle 2 with the Legislature's reporting-centric enforcement directives and ensure basic procedural fairness where the Proposed Rule presently leaves who is liable and how an entity can contest liability uncertain.

[7] *Proposed Rule*, §§ 96075(a)-(d), 96074(c).

CARB Should Provide an Additional Opportunity for Public Comment on the Fee Structure After Clarifying Fee Applicability for Parent–Subsidiary Structures and for Consolidated Reporting.

Because the Proposed Rule does not yet clearly define which legal entities within a parent-subsidiary corporate structure are subject to fee assessment under Subarticle 2, stakeholders currently lack a meaningful opportunity to evaluate the practical and economic implications of the proposed fee structure. The substantive effect of the fee calculation provisions in Section 96073—including the determination of the number of reporting entities (N_{38532}) and covered entities (N_{38533})—necessarily depends on how CARB ultimately resolves the questions regarding fee liability for parent companies versus subsidiaries, and the interaction of fee assessment with consolidated reporting under SB 253 and SB 261. Until those threshold issues are clarified, it is not possible for regulated entities to fully assess whether the proposed fee methodology is reasonable, equitable or consistent with the statutory directive that fees reflect CARB's actual and reasonable program administration costs.

046.12

Accordingly, BHE respectfully requests that CARB commit to accepting and responding to public comment on the fee structure and fee schedule after these clarifications have been made in subsequent rulemaking. In particular, BHE urges CARB to:

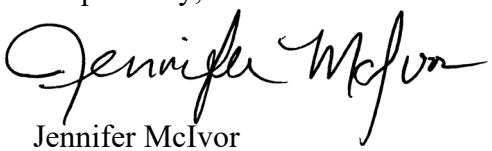
- defer final evaluation of stakeholder comments on the fee calculation methodology until CARB has clarified which entities may be assessed a fee when reporting is consolidated at the parent level; and
- provide a clear procedural opportunity for potentially affected entities to comment on the fee structure once the scope of fee-liable entities is known.

Providing an opportunity to comment on the fee schedule *after* these clarifications are issued is essential to ensure meaningful notice and comment and to allow stakeholders to evaluate the fee structure based on the substantive regulatory framework that will govern their compliance obligations. Without such an opportunity, regulated entities would be forced to comment on a fee proposal in the abstract, without understanding how the regulation will apply to real-world corporate structures. Proceeding to finalize the fee structure under these circumstances would deprive the public of a fair opportunity to understand and comment on the real-world implications of the proposal and would risk a rulemaking record that does not meaningfully grapple with the most consequential design choices.

BHE seeks assurance that CARB will allow stakeholders to provide informed input on the fee provisions once the contours of fee applicability are sufficiently defined. This approach would improve the quality of the administrative record, reduce the risk of unintended or inequitable outcomes, and support successful implementation of SB 253 and SB 261 consistent with legislative intent.

BHE welcomes continued engagement with CARB to ensure the effective implementation of SB 253 and SB 261.

Respectfully,



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American Forest and Paper Association (Julie Landry)

Comments from the American Forest and Paper Association can be found in the attachment.

American Forest & Paper Association

February 9, 2026

Lauren Sanchez
Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: AF&PA Comments on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Ms. Sanchez,

On behalf of our members, the American Forest & Paper Association (AF&PA) appreciates the opportunity to comment on the proposed initial regulation to implement the Climate Corporate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Act (SB 261). We are writing to support comments filed by the California Chamber of Commerce (CalChamber).

Introduction

The American Forest & Paper Association (AF&PA) serves to advance public policies that foster economic growth, job creation and global competitiveness for a vital sector that makes the essential paper and packaging products Americans use every day. The U.S. forest products industry employs more than 925,000 people, largely in rural America, and is among the top 10 manufacturing sector employers in 44 states. Our industry accounts for approximately 4.7% of the total U.S. manufacturing GDP, manufacturing more than $435 billion in products annually. AF&PA member companies are significant producers and users of renewable biomass energy and are committed to making sustainable products for a sustainable future through the industry's decades-long initiative — *Better Practices, Better Planet 2030*.

Our members have decreased their greenhouse gas (GHG) emissions by 36 percent between 2005 and 2022 through improving energy efficiency, switching to less carbon-intensive fuels, and continued use of carbon-neutral biomass. In California, the industry employs more than 55,000 individuals in nearly 385 facilities, contributes $477 million in state and local taxes, and manufactures more than $23.6 billion in products.

We are writing to support the comments filed by the CalChamber in their entirety. We would like to highlight the following points made in the CalChamber comments: 047.1

- The rulemaking proposes significant defining terms that will result in substantial compliance costs for applicable entities, and therefore CARB should be required to conduct a Standardized Regulatory Impact Assessment (SRIA) under the Administrative Procedure Act (APA) for major regulations. 047.2
- The proposed August 10 reporting deadline poses a concern for companies that must not only compete for a limited pool of third-party assurance providers, but also contend with increasingly complex emissions reporting requirements. CARB should consider alternative solutions outlined by CalChamber. 047.3
- AF&PA shares CalChamber's legal concerns regarding various elements of the proposed regulation. 047.4
- The proposed enforcement and penalty provisions should be revised to be more proportional, fair, and durable, as outlined by CalChamber. 047.5
- Definitions relating to applicability should be further refined to avoid overbreadth. 047.6
- CARB should establish a codified safe harbor to protect good-faith compliance efforts. 047.7

Thank you for your consideration of these comments. If you have any questions, please contact me at Julie_Landry@afandpa.org.

Sincerely,

Julie Landry

Vice President, Government Affairs

American Forest & Paper Association

Dave Jones

February 9, 2026

Clerks' Office
California Air Resources Board
1001 I Street
Sacramento, California 95814

Honorable members of the California Air Resources Board,

Thank you for this opportunity to comment on the proposed rule to establish fees, timelines, and definitions for implementing the California Climate Corporate Data Accountability[1] and Climate-Related Financial Risk[2] laws. I appreciate the Board's efforts and progress to date to implement these important laws quickly and transparently, and for the opportunity to comment. I urge the Board to remove the proposed exemption from emissions reporting for insurance companies and finalize the rule expeditiously.

048.1

048.2

The proposed rule establishes the fee structure for businesses subject to the laws, definitions needed to implement the rules, reporting deadlines, and available enforcement measures. We generally support these aspects of the proposal. The proposed rule also includes a list of types of entities exempted from the two reporting programs, including state and federal government entities; tax exempt nonprofits and foundations; companies whose only business in California is the presence of teleworking employees; companies whose only business in the state is wholesale electricity transactions; and insurance companies. The proposed rule effectively justifies all exemptions except for the last, insurance companies, which is not supported by statutory text or the record of legislative intent.

048.3

048.4

Exempting government and nonprofit entities is reasonable, as the disclosure laws explicitly focus on "corporate" actors with large revenues that "do business in California" and therefore make reportable revenue as defined in California law. The carve out for companies whose only business in the state is the presence of teleworking employees is likewise not controversial, as these companies generally lack a sufficient economic nexus to be considered as "doing business" in the state. I also understand that Senator Weiner wrote a letter clarifying legislative intent to exempt companies whose business in the state is limited to interfacing with California Independent State Operator (CAISO) in the wholesale electricity market.[3]

048.5

However, I urge the Board to reconsider the proposed rule's unjustified exemption from SB 253 reporting for insurance companies doing business in the state. These are clearly corporate entities that make reportable revenue in the state and transact directly with California consumers. While SB 261 explicitly exempts insurance companies, SB 253 does not. Extending the exemption to SB 261 would be inconsistent with the statute, diminish the benefits of the

048.6

[1] California Senate Bill (SB) 253. Wiener, Stats. 2023, ch. 382; codified in Health and Safety Code Section 38532, as amended.
[2] California SB 261. Stern, Stats. 2023, ch.383; codified in Health and Safety Code section 38533, as amended.
[3] California Legislature. Senate Daily Journal 3058. 2023-24 Regular Session. January 30, 2024.

program, and create a special carve out for an industry that is tightly linked to the state's climate-related challenges.

An exemption for insurance companies is inconsistent with statute.

The Board has proposed exempting insurance companies from SB 253 reporting "for continuity,"[4] but doing so flatly contradicts the statute. The California legislature originally considered versions of both disclosure bills that did not exempt insurance companies,[5] but ultimately the financial risk disclosure law in SB 261 was adjusted to exclude insurers in
048.7 recognition that it significantly overlapped with the financial risk disclosure standard adopted by the National Association of Insurance Commissioners and implemented by the California Department of Insurance. I know this because I helped to draft the original version of SB 261 and provided technical assistance to its author as SB 261 and SB 253 moved through the Legislature.

SB 253 --the emissions disclosure bill -- was signed into law without an exemption for insurance companies. The California Department of Insurance does not require insurers to disclose emissions, nor does the NAIC Climate Risk Disclosure Survey. So the Legislature expressly did not exclude insurers from emissions disclosures under SB 253.

The Board lacks authority to carve out an exemption that does not exist in the statute and that the Legislature considered and rejected. Moreover, if the Board fabricates an exemption for insurers, other sectors are likely to seek exemptions as well . I note also that the two disclosure programs already differ in scope with respect to the number and size of firms required to report due to the different corporate revenue thresholds in the two laws. Other differences in scope are permissible as well—and indeed are required by the differences that the legislature deliberately created between the statutes.

Insurance companies' greenhouse gas (GHG) emissions disclosures are important to California stakeholders.

California is experiencing a property insurance crisis driven in large part by climate change,
048.8 exacerbated by the insurance industry's support for fossil fuels and harmful responses to the rising frequency, intensity, and cost of climate-related disasters. More frequent and destructive climate disasters have led insurers to raise rates, cut coverage, or abandon certain areas altogether (see, for example, State Farm's retreat right before the 2025 Los Angeles wildfires).[6] At the same time, nearly *half* of homeowners' insurance claims nationwide were closed without

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[4] CARB. "Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation. Staff Report: Initial Statement of Reasons." December 9, 2025.
[5] California SB 449: "Climate-Related Financial Risk." Stern. 2021-2022 Regular Session. February 16, 2021, as amended April 22, 2021; California SB 260: Climate Corporate Accountability Act. Wiener. 2021-2022 Regular Session. January 26, 2021, as amended August 15, 2022.
[6] Jean Eaglesham and Susan Pulliam, "State Farm Was All In on California—Until It Pulled the Plug Before the Fires." *Wall Street Journal.* February 6, *2025.*

any payment in 2024[7] while premiums rose eight percent[8]—nearly three times the 2.9 percent inflation rate.

Even as insurers complain of growing climate-related losses, the industry's underwriting loss ratios remain low,[9] and overall profits set record highs.[10] In 2025, property insurers made profits of nearly $60 billion on underwriting alone across the country,[11] and that figure excludes investment profits. Executive compensation is increasing thanks in large part to so-called performance-linked pay packages that incentivize claim denials and other anti-consumer practices.[12]

Insurers are also among the leading institutional investors in fossil fuels,[13] investing approximately $580 billion in coal, oil, and gas[14] in 2019 alone. The burning of fossil fuels is the primary cause of climate change,[15] which means insurers' investments are contributing to the extreme weather events that are driving up costs for consumers. Simply put, it is in the public interest for California to have more information about insurance companies' emissions due to their impact on the climate and to have information about their progress towards their stated climate goals.

Exempting insurance companies from SB 253 reporting would leave a documented emissions gap unaddressed.

048.9 While large insurance companies are disclosing climate-related financial risk reports to the California Department of Insurance,[16] there is a persistent gap in GHG emissions reporting.[17] The insurance industry has argued that GHG emissions generally do not represent a risk to insurers' financial health and thus should not be included in financial risk reporting.[18] This

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[7] Weiss Ratings, "14 Large U.S. Insurers Closed Nearly Half of Homeowner Claims with No Payment in 2024." June 11, 2025.

[8] "Natural Disasters Blamed as Home Insurance Projected to Rise 8% in 2025." *Rethinking65*. May 19, 2025.

[9] The property insurance industry's net loss ratio was 71.2 percent in 2024, compared to an average around 80 percent from 1980-2000. See: National Association of Insurance Commissioners. U.S. Property and Casualty and Title Insurance Industries – 2024 Full Year Results; Wang, Shaun S. et al. "U.S. property-casualty: Underwriting cycle modeling and risk benchmarks." *Casualty Actuarial Society*. Vol. 5, Iss. 2. 2012.

[10] See e.g., Jean Eaglesham, "Travelers Notches Record Profits; Insurer's Stock Rises." *Wall Street Journal.* January 22, 2025; Saqib Rahim, "Insurers earn record sums in disaster-free third quarter." E&E News. November 21, 2025; American Association for Justice. "The Insurance Industry is Quietly Making Record Profits." April 1, 2025; Stancil, Kenny. Revolving Door Project. "Don't let home insurers fool you. They're more profitable than ever." July 14, 2025.

[11] Jean Eaglesham, "The Uproar Over Affordability Is Coming for Insurers." *Wall Street Journal*. January 22, 2026.

[12] Dan Wagner and Kenny Stancil. Public Citizen. "Home Insurance Executives Are Raking It In–At Your Expense." 2025.

[13] Investing in Climate Chaos. Urgewald. "Fossil Fuel Investment Report." August 9, 2024.

[14] Hailey Ross, "Climate risks for insurers: Why the industry needs to act now to address climate risk on both sides of the balance sheet." *S&P Global*. August 27, 2021.

[15] United Nations. "Causes and Effects of Climate Change." Accessed January 29, 2026.

[16] California Department of Insurance. NAIC Climate Risk Disclosure Survey Results Database. 2026.

[17] Ceres. "The Measurement Gap: A Deep Dive into Climate Risk Reporting in the U.S. Insurance Sector." August 12, 2025.

[18] American Property Casualty Insurance Association. Comment to the Securities and Exchange Commission. June 17, 2022.

argument lacks merit, but in any event SB 253 addresses this gap because it requires disclosure of the full scope of GHG emissions reporting for corporate actors doing business in the state instead of relying on voluntary, self-reporting that is limited to emissions that individual firms deem “risky” or “material.”

048.10 Thank you for advancing this important effort to ensure corporate accountability and transparency on climate risks, impacts, and action.

Sincerely,

Dave Jones
California Insurance Commissioner, Emeritus

SIFMA (Kim Chamberlain)

Attached please find SIFMA's Comments on CARB's Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation. We appreciate the opportunity to provide feedback and are happy to answer any questions.

Kim Chamberlain, SIFMA
kchamberlain@sifma.org

sifma
Invested in America

February 9, 2026

Submitted electronically via https://ww2.arb.ca.gov/
Lauren Sanchez
Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Comments on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Chair Sanchez:

The Securities Industry and Financial Markets Association ("SIFMA")[1] appreciates the opportunity to provide comments to the California Air Resources Board ("CARB") regarding implementation of the Climate Corporate Data Accountability Act ("SB 253") and the Climate-Related Financial Risk Act ("SB 261"), each as amended by the Greenhouse gases: climate corporate accountability: climate-related financial risk Act ("SB 219").

Many SIFMA members are actively working to comply with new climate disclosure regulations being implemented by regulators worldwide. In addition to these requirements, many firms have already been voluntarily reporting their greenhouse gas ("GHG") emissions and climate-related financial risks, often using international voluntary frameworks such as the TCFD recommendations, the GHG Protocol, SASB standards, World Economic Forum Stakeholder Capitalism Metrics, and GRI standards. SIFMA members also use climate-related information disclosed by others to inform investment and business decisions. Given this experience, SIFMA is well-positioned to offer insights on how CARB regulations under SB 253 and SB 261 can produce reliable disclosures while minimizing the burden on reporting companies. Accordingly, SIFMA has provided the recommendations below to further inform CARB's regulatory approach under SB 253 and SB 261.[2]

[1] SIFMA is the leading trade association for broker-dealers, investment banks and asset managers operating in the U.S. and global capital markets. On behalf of our industry's nearly 1 million employees, we advocate on legislation, regulation, and business policy affecting retail and institutional investors, equity and fixed income markets and related products and services. We serve as an industry coordinating body to promote fair and orderly markets, informed regulatory compliance, and efficient market operations and resiliency. We also provide a forum for industry policy and professional development. SIFMA, with offices in New York and Washington, D.C., is the U.S. regional member of the Global Financial Markets Association (GFMA). For more information, visit http://www.sifma.org. SIFMA appreciates the assistance of Michael Littenberg and Marc Rotter of Ropes & Gray LLP in the preparation of this response.

[2] SIFMA has made five other CARB submissions. The first was written comments to CARB on March 8, 2025, providing a discussion of key principles that should inform CARB's approach to regulation under SB 253 and SB 261, along with specific responses to select questions included in CARB's Information Solicitation (the "March 8th

Recommendations: SIFMA urges CARB to make three targeted revisions to its proposed rules implementing SB 253 and SB 261: (1) adopt a December 31 reporting deadline for all disclosure under SB 253; (2) clarify the definition of "revenue" in the proposed rules to conform with the approach suggested by CARB staff at its November 18, 2025 workshop (the "November Workshop"); and (3) refine the fee administration framework to provide for a single consolidated invoice to parent entities, clarify that CARB will determine which entities are in scope, and establish a robust dispute and reconciliation process. Additionally, we recommend that CARB clarify that it will not use the proposed definitions of "parent" and "subsidiary" to prescribe the organizational boundaries that should be used when preparing a consolidated report. These changes will enhance reliability, administrability, and alignment with established disclosure and assurance practices.

1. SB 253 Reporting Deadline for Scope 1 and Scope 2 Emissions. *The reporting deadline should be December 31.*

   SIFMA urges CARB to set the reporting deadline for disclosure in proposed § 96076(a) at December 31 and retain CARB's proposed definition of "applicable preceding fiscal year" in proposed § 96076(b). An August 10 deadline is incompatible with the time required to produce assured emissions disclosures: SIFMA member survey data indicates that internal data collection and review can for many institutions take in excess of four to five months, and third-party assurance can require up to an additional three to six months, a combined timeline that presses up against and often extends past August 10. A December 31 deadline generally accommodates this process, aligns with established GHG reporting practices, and positions the program for success as Scope 3 requirements phase in. 049.1

   When CARB proposes Scope 3 reporting requirements, SIFMA also urges CARB to align the timing of Scope 3 emissions disclosure with a December 31 deadline for Scope 1 and Scope 2 emissions disclosure. A single, calendar-based reporting deadline that is consistent across all scopes would provide clarity and certainty for reporting entities, support consistent administration and enforcement by CARB, and reflect the interconnected nature of emissions data collection, internal review, and assurance processes. 049.2

   To assess the feasibility of an August 10 reporting deadline, SIFMA surveyed its members regarding their current GHG emissions reporting practices. SIFMA's membership includes numerous large, medium and small broker-dealers, investment banks and asset managers, many of whom have substantial experience in GHG emissions reporting. All 16 respondents currently report Scope 1 and Scope 2 emissions, and 11 049.3

SIFMA Letter"), available here. The second, on August 14, 2025, was a document summarizing key takeaways from SIFMA's June 17 virtual meeting with CARB staff. The third, on August 29, 2025, SIFMA submitted a letter addressing CARB's proposal to publish a list of companies that CARB believes would be required to report under SB 253 and SB 261 under the approach discussed by CARB staff at the August 21, 2025 virtual public workshop on SB 253, SB 261 and SB 219. The fourth, on September 11, 2025, SIFMA submitted a letter addressing the August 21, 2025 Climate Disclosure Workshop, available here. Finally, on October 27, 2025, SIFMA submitted a letter addressing the draft reporting template CARB provided for Scope 1 and Scope 2 GHG emissions pursuant to SB 253, available here.

currently report at least some Scope 3 emissions. Thirteen respondents obtain assurance over their Scope 1 and Scope 2 reporting, and a smaller number obtain assurance over at least some Scope 3 information. As such, the survey respondents are well positioned to share practical experience regarding the time and processes required for sophisticated institutions to produce reliable GHG emissions disclosures.

The first step in producing GHG emissions disclosures is to gather the relevant information internally and review it for accuracy, followed by internal governance and sign off processes involving senior management and relevant committees. Half of respondents indicated that, for Scope 1 and Scope 2 emissions, this initial data collection and internal review process alone takes at least four to five months, with several respondents indicating that it takes significantly longer. These internal processes typically support the preparation of emissions information across multiple scopes, rather than being conducted independently for each scope.

Obtaining third-party assurance is a subsequent and distinct step in the reporting process. Respondents reported that obtaining assurance can require significant additional time, with several institutions indicating that assurance requires three to six additional months. The length of time required depends on factors including the scope of assurance, the complexity of the reporting entity's operations, the assurance providers familiarity with the reporting entity and the provider's capacity. Respondents also noted that timelines may lengthen in future years as companies strengthen internal controls and independent review processes, and in some cases consider transitioning to new assurance providers, in response to emissions reporting transitioning from a voluntary exercise to a regulatory requirement. Timelines for reporting may further be extended if companies are required to disclose information with different level of detail or presentation than is typical under existing practice and other regimes.[3] These pressures will be compounded by assurance provider capacity constraints as SB 253 and other climate disclosure regimes expand the number of companies seeking independent assurance.

The challenges of meeting an August 10 deadline would likely be even greater for companies with fewer resources and less experience reporting GHG emissions than the respondents to SIFMA's survey.

SIFMA acknowledges that assurance is optional for the first year of reporting.[4] However, establishing a reporting deadline that is incompatible with obtaining assurance would disincentivize companies from pursuing assurance for the first year of reporting, even where they are otherwise prepared to do so.

[3] For example, see our October 27, 2025 letter to CARB addressing the draft reporting template CARB provided for Scope 1 and Scope 2 GHG emissions pursuant to SB 253, available here.

[4] CARB staff indicated that limited assurance of Scope 1 and Scope 2 emissions data will not be required in the slides presented at the November Workshop and in Question 20 of its publication "California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs: Frequently Asked Frequently Asked Questions About Regulatory Development and Initial Reports."

Reporting deadlines that do not accommodate the full cycle of data collection, internal review, and assurance create a risk that companies will be forced to rely on estimates or incomplete information. Compressed timelines can impede internal controls and assurance review processes, increase the likelihood of subsequent revisions, and reduce comparability and confidence in reported data.

These concerns will intensify as the program matures. Respondents that currently publish Scope 3 emissions information indicated that gathering and validating Scope 3 data takes substantially longer than for Scope 1 and Scope 2, reflecting reliance on third-party information, methodological complexity, and extended internal review processes. For example, companies required to calculate and report on Scope 3 category 15 financed emissions will be confronted with significant challenges, especially in providing calculations for the numerous asset classes for which no widely agreed methodology for calculating emissions data is available.[5] An August 10 deadline for Scope 1 and Scope 2 emissions, which is already impractical for assured GHG emissions disclosures, will become increasingly difficult to sustain as Scope 3 disclosure requirements are phased in beginning in 2027 and become even more difficult as the assurance requirements become substantially more extensive with a shift to reasonable assurance for Scope 1 and Scope 2 emissions and limited assurance for Scope 3 emissions in 2030.[6] 049.4

Establishing a unified December 31 deadline now avoids locking in a timeline that CARB will need to revisit in the coming years. A December 31 deadline serves both regulatory clarity and data integrity, and will strengthen the effectiveness, credibility, and durability of California's climate disclosure program. 049.5

CARB's proposed definition of "applicable preceding fiscal year" in proposed § 96076(b) continues to be both important and appropriate to permit companies that have a fiscal year end other than December 31 sufficient time to produce reporting.[7] 049.6

2. Covered Entities and Revenue Definition Consistencies. *CARB should resolve the discrepancy between the definition of "revenue" provided in CARB's proposed regulations and materials from its November Workshop and its workshop on May 29, 2025 (the "May Workshop") by cross-referencing the Form 100, Schedule F, Line 1a definition of gross receipts and explicitly excluding from the definition any income* 049.7

[5] While not within the scope of the current rulemaking, when proposing rules regarding Scope 3 emissions reporting, CARB should follow the approach taken in the Greenhouse Gas Protocol, as discussed in the March 8th SIFMA Letter, and provide companies with sufficient time to adapt to the development of new methodologies for Scope 3 reporting.

[6] When the assurance requirements for Scope 1 and Scope 2 GHG emissions under SB 253 move to reasonable assurance beginning in 2030, reporting processes under SB 253 will become more onerous than many other mandatory climate reporting regimes, including the European Union's Corporate Sustainability Reporting Directive. Reporting entities will need significant additional time to obtain assurance at a level that will not be required for mandatory climate disclosure reporting in other jurisdictions.

[7] While not within the scope of the current rulemaking, when proposing rules regarding the content of reporting under SB 253, CARB should acknowledge that certain companies report GHG emissions on a basis other than their fiscal year and provide flexibility to do so.

sources in the financial sector, such as interest, fees, dividends, and investment income, in its final regulations.

At the November Workshop, CARB stated that corporations should calculate "revenue" (for purposes of determining if they were required to report under SB 253 or SB 261) by reference to what they reported on California FTB Form 100, Schedule F, Line 1a ("gross receipts") for the applicable fiscal year. However, the definition of "gross receipts" under Rev. & Tax. Code § 25120(f)(2), which CARB proposed adapting as the definition "revenue" for purposes of SB 253 and SB 261, includes amounts not reported under that line item.[8] CARB should align the regulations with its workshop guidance by revising the proposed regulatory definition of "revenue" to reference the amount reported on Line 1a of Schedule F.

At the May Workshop, CARB acknowledged feedback in its workshop materials (slide 24) that "income sources in the financial sectors such as interest, fees, dividends, and investment income should not be considered revenue as they do not represent GHG emissions." CARB staff then stated at the November Workshop that "certain financial institutions such as holding companies and mutual funds would be excluded by virtue of the definition of revenue staff are proposing as they generally do not report gross receipts." CARB should provide additional clarity on this point to companies operating in the financial sector and explicitly incorporate that approach in its final regulations.

3. Fees. *CARB should further clarify in the final regulations or subsequent guidance its role in determining which entities are in scope and administering fees under SB 253 and SB 261.*

We recommend that CARB clarify in the final regulations several aspects of its proposed administration of fees in order to reduce uncertainty among reporting entities, support efficient administration of SB 253 and SB 261, and minimize unnecessary administrative burdens on reporting entities. 049.8

In the proposed rules, CARB proposes a flat, per-entity fee structure and indicates that CARB will issue written fee determination notices to reporting entities on an annual basis. However, the proposed rules do not make it clear how CARB will determine which entities are subject to the fee, how CARB will identify the total number of reporting entities for fee calculation purposes, or how fees will be invoiced and collected where reporting is conducted on a consolidated basis.

CARB should clarify that it is responsible for determining which entities are reporting entities under SB 253 and covered entities under SB 261. While the proposed rules would require entities to maintain records demonstrating whether they meet the applicable "revenue" and "doing business in California" thresholds, the proposed rules

[8] We believe there may be other misalignments between the definition and the line item referred to in the CARB guidance as well including, for example, with respect to how income from affiliated entities is reported, especially where an entity serves as a "pass-through" or "conduit" to support affiliated excluded insurance companies.

also contemplate that CARB will issue fee determination notices to reporting entities. Clarifying that CARB is responsible for identifying which entities are in scope under SB 253 and SB 261 would avoid confusion, promote consistent application of SB 253 and SB 261, and better support consolidated, parent-level reporting structures.

If, alternatively, CARB intends to rely on information submitted by entities to determine the total number of reporting entities or covered entities, as applicable, for purposes of calculating the per-entity fee, CARB should clearly specify the information required, the form in which it must be submitted, and the timeline for submission. Because fees are assessed on a per-entity basis and consolidated reporting is permitted under SB 253 and SB 261, relying solely on consolidated reports would not necessarily provide CARB with sufficient information to determine the total number of reporting entities for fee calculation purposes.

In addition, in alignment with prior guidance indicating that fees may be paid at the parent company level, CARB should clarify how it intends to invoice and collect fees where a parent company submits consolidated reporting on behalf of multiple subsidiaries. To reduce the administrative burden and improve payment efficiency, CARB should produce a consolidated invoice under which CARB issues a single fee determination notice to a parent entity filing a consolidated report, which itemizes the fees attributable to each reporting entity and/or covered entity within the applicable corporate group and permits the parent entity to remit a single payment on behalf of all reporting entities and/or covered entities. 049.11

Additionally, CARB should establish a formal invoice dispute process, allowing reporters to challenge the identification of in-scope entities and any resulting changes to the per-entity flat fee. The proposed rules are silent on how disputes would be resolved or how adjustments would be made where the number of reporting entities and/or covered entities changes following a dispute. We believe this process is necessary given the potential for inaccuracies in CARB's preliminary lists of in-scope entities. Providing a defined dispute resolution and reconciliation process would improve transparency and ensure fair and predictable fee administration. 049.9

Finally, CARB's initial rulemaking does not directly address the substance of reports that will be required under SB 253 and SB 261. However, it does include broad definitions of "parent" and "subsidiary." When proposing rules on the content of reports under SB 253 and SB 261, CARB should not use those definitions to prescribe the organizational boundaries that should be used when preparing a consolidated report. As discussed in the March 8th SIFMA Letter, CARB should adopt the same approach as was taken by the SEC in adopting its climate-disclosure rules and allow companies to set to their own organizational boundaries for purposes of consolidated reporting. 049.10

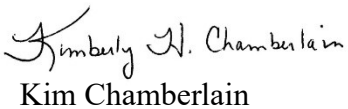
SIFMA appreciates CARB's engagement with stakeholders as it develops the regulatory framework for SB 253 and SB 261. The recommendations outlined above are intended to help CARB achieve its objectives of enhancing climate-related transparency and accountability, while ensuring that the resulting requirements are practical, administrable, and aligned with established

reporting and assurance practices. By adopting the recommendations described above, CARB can facilitate high-quality, decision-useful disclosures without imposing unnecessary burdens on reporting companies. SIFMA and its members remain committed to supporting CARB's efforts as the rulemaking process continues.

If you have any questions or would like to discuss any of these points further, please contact Melissa MacGregor (mmacgregor@sifma.org; 202 962 7300), Kim Chamberlain (kchamberlain@sifma.org; 202 962 7411), or our counsel Michael Littenberg (Michael.Littenberg@ropesgray.com; 212 596 9160) and Marc Rotter (Marc.Rotter@ropesgray.com; 212 596 9138) at Ropes & Gray LLP.

Sincerely,

Melissa MacGregor
Deputy General Counsel and
Corporate Secretary
SIFMA



Kim Chamberlain
Managing Director and
Associate General Counsel
State Government Affairs
SIFMA

Cc: Sydney Vergis, California Air Resources Board
Michael Littenberg, Partner, Ropes & Gray
Marc Rotter, Counsel, Ropes & Gray

American Iron and Steel Institute (Tyler Hengen)

Attached are the comments of the American Iron and Steel Institute regarding the proposed implementation of CARB's GHG Emissions Disclosure and Climate-Related Financial Risk Programs. Questions and additional follow-up may be directed to Tyler Hengen, Director of Sustainability at thengen@steel.org. AISI believes that

American Iron and Steel Institute

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Kevin Dempsey
President and Chief Executive Officer

February 9, 2026

Ms. Courtney Prideaux Smith
Principal Deputy Executive Officer
California Air Resources Board

Re: ***Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation***

Dear Ms. Smith:

The American Iron and Steel Institute (AISI) submits the following comments to the California Air Resources Board (CARB) on the *Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation.*[1] This regulation implements legislation mandating greenhouse gas (GHG) disclosure and climate risk reporting for U.S.-based businesses doing business in California.

AISI serves as the voice of the American steel industry in the public policy arena and advances the case for steel in the marketplace as the preferred material of choice. AISI's membership is comprised of integrated and electric arc furnace (EAF) steelmakers, steel pipe and tube manufacturers and steel processors and fabricators, reflecting the production and distribution of both carbon and stainless steels. These steels are critical to America's national and economic security, including roads and bridges, buildings, the electrical grid, cars and trucks and all clean energy technologies. AISI also represents associate members who are suppliers to or customers of the steel industry.

The American steel industry is essential to U.S. national and economic security and our nation's critical infrastructure. Further, the domestic industry is the cleanest and most energy efficient of the leading steel industries in the world. Of the major steel-producing countries, steel production in the U.S. has the lowest energy usage and embodied CO_2 emissions per ton of steel produced. By contrast, Chinese steel

[1] *Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation*, CALIFORNIA AIR RESOURCES BOARD https://ww2.arb.ca.gov/rulemaking/2025/california-corporate-greenhouse-gas-reporting-and-climate-related-financial-risk

production creates CO_2 emissions that are over double that in the U.S per ton of steel produced.[2] In fact, in a recent report published by the United States International Trade Commission (USITC), the emissions factors for domestically-produced steel ranged from 22 percent to 156 percent lower than internationally-produced steel on average across all geographies considered, dependent on price category.[3]

AISI believes that there are important considerations that should be made when developing and implementing this regulation, as outlined below. Additionally, AISI has prepared the attached *Recommendations on Implementation of Emissions and Climate-Related Financial Risk Disclosure Programs* (guidance document) for use by agencies and state governments considering and developing similar programs. While this guidance document was developed to convey more generally the viewpoint of the American steel industry towards state-level disclosure programs much of the content was initially developed in conjunction with the ongoing development of CARB's climate disclosures reporting regulation.[4]

- **Maintain "Good Faith" Provisions for Companies Responsible for Disclosure**

  CARB's proposed regulation is to be commended for its general clarity. The proposed text clearly identifies the fee structure, associated penalties, and the enforcement mechanism to address noncompliance. Further, as "[e]ach potentially-regulated entity remains responsible for compliance with statutory requirements"[5], it is appreciated that "CARB will exercise enforcement discretion for the first reporting cycle, on the condition that entities demonstrate good faith efforts to comply with the requirements of the law."[6] While AISI appreciates that CARB will recognize "good faith" efforts during the first reporting year, AISI believes that extension of this "good faith" standard in subsequent years would reflect the

050.1

[2] *Steel Climate Impact 2025*, GLOBAL EFFICIENCY INTELLIGENCE https://www.globalefficiencyintel.com/steel-climate-impact-2025-an-international-benchmarking-of-energy-and-ghg-intensities (p. 3)
[3] Based on analysis of USITC calculation so default emissions factors by country. https://www.usitc.gov/publications/332/pub5584_0.pdf (appendix G).
[4] *Proposed Regulation Text A-1*, CALIFORNIA AIR RESOURCES BOARD https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/reg%20text.pdf
[5] *California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs: Frequently Asked Questions About Regulatory Development and Initial Reports (CARB FAQs)*, CALIFORNIA AIR RESOURCES BOARD https://ww2.arb.ca.gov/sites/default/files/classic/FAQs%20Regarding%20California%20Climate%20Disclosure%20Requirements_Nov.pdf
[6] *The Climate Corporate Data Accountability Act ENFORCEMENT NOTICE December 5, 2024*, CALIFORNIA AIR RESOURCES BOARD https://ww2.arb.ca.gov/sites/default/files/2024-12/The%20Climate%20Corporate%20Data%20Accountability%20Act%20Enforcement%20Notice%20Dec%202024.pdf

complicated nature of this regulation and the challenges associated with both implementation and compliance.

- **Uniform Disclosure Requirements for All Companies Supplying Products for Use in California**

  AISI appreciates that the regulation seeks to "complement an existing suite of climate policies aimed at achieving statewide carbon neutrality by 2045."[7] However, the regulation's goals and clarity of structure cannot compensate for its fatal flaw: by applying geographical constraints on what entities must report, the program will not meet the CARB's stated goal to further "California's continued climate leadership to help advance transparency around corporate GHG emissions and assessed climate-related risks."[8]

  As communicated to CARB in its March 21, 2025 submission, AISI believes that climate disclosure obligations can highlight the American steel industry's place as the world's cleanest and most energy efficient producers of steel.[9] To successfully highlight the energy efficiency of American steel, disclosure requirements must be applied equally to all companies supplying products to the California market, regardless of where corporate parents are domiciled or how the products enter the state, be it through U.S.-based operations or through foreign corporations operating through vendors.

  CARB's frequently asked questions (FAQ) document reveals the flaw at the core of this regulation. The FAQ posed a question asking "[i]f a subsidiary of a foreign parent company is subject to reporting under HSC §§ 38532 and/or 38533, does that mean the foreign parent company is also subject to the same reporting requirements under HSC §§ 38532 and/or 38533?" [10]

  In response, CARB noted that:

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[7] *Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation Staff Report: Initial Statement of Reasons*, CALIFORNIA AIR RESOURCES BOARD https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/isor.pdf

[8] *Id.* at 2.

[9] *Information Solicitation to Inform Implementation of California Climate-Disclosure Legislation: Senate Bills 253 and 261, as Amended by SB 291*, AMERICAN IRON AND STEEL INSTITUTE (March 21, 2025).

[10] CARB FAQs at p. 9 https://ww2.arb.ca.gov/sites/default/files/classic/FAQs%20Regarding%20California%20Climate%20Disclosure%20Requirements_Nov.pdf

HSC §§ 38532 and 38533 **only apply to U.S.-based companies.** If this foreign company is not a U.S.-based company as defined in HSC §§ 38532 and 38533, t**hen that foreign company is not subject to the requirements of HSC §§ 38532 or 38533** The foreign parent company **may choose** to submit a consolidated report on behalf of any subsidiaries subject to the reporting requirements (see above)."[11]

The proposed regulations impose a mandatory regulatory burden on U.S.-based companies that would not apply to foreign steelmakers. The regulation's failure to compel equivalent disclosure from foreign-based corporations ensures that the state's data will be incomplete and inaccurate – incentivizing some to provide "cherry picked" data that seeks to put the GHG disclosures and climate risk of its U.S.-based subsidiaries in the best possible light. And steelmakers who sell into California via vendors who do not meet the revenue thresholds to require disclosure will be in the best possible position: these companies will have no direct reporting obligations. Schemes to avoid "doing business in California" will emerge as a form of regulatory relief. This will skew the data California uses as it seeks carbon neutrality and, in the case of steel[12], undercount the state's carbon footprint given that American-made steel is cleaner than that of its foreign competitors. In essence, "greenwashing" of critical climate disclosure and risk data is baked into the CARB's regulation.[13]

050.2

Failure to require GHG disclosure and/or climate risk disclosure from foreign-based parent companies ensures CARB will implement a system that imposes a greater regulatory burden upon good-faith actors and incentivizes incomplete and inaccurate data collection, undermining the state's professed goals.

- **Corporate-Wide Reporting for Consistency and Full Supply-Chain Representation**

AISI welcomes the fact that the proposed regulation enables climate disclosure at a corporate-wide level and believes that this will not only minimize the burden on

[11] *Id.* At 9 (emphasis added).
[12] The regulation's flaws are not unique to steel and will impose additional regulatory burdens on both U.S.-based corporations and any company that meets the statutory thresholds and does business directly in California instead of through intermediaries. Sadly, it appears that CARB sees this structure as a feature and not a bug that undermines American manufacturing and accurate reporting. "HSC §§ 38532 and 38533 only apply to U.S.-based companies. If this foreign company is not a U.S.-based company as defined in HSC §§ 38532 and 38533, then that foreign company is not subject to the requirements of HSC §§ 38532 or 38533." CARB FAQs at p. 10.
[13] *Greenwashing – the deceptive tactics behind environmental claims*, THE UNITED NATIONS https://www.un.org/en/climatechange/science/climate-issues/greenwashing.

050.3 reporting entities but also will help to shed light on the full emissions profile of a company. Corporate-wide reporting reduces inconsistencies, improves data quality, and minimizes redundant reporting effort for companies that typically calculate and disclose information based on the entire corporate carbon footprint. Further, many companies receive reporting assurance at a corporate-wide level. To require separate assurance for segments of a corporation could be cost-prohibitive and would require unnecessarily duplicative efforts by reporting companies.

- **Standardized Scopes and Calculation Rules for Accurate Reporting and Disclosure for Steel Products**

AISI supports the approach of accepting disclosures in alignment with internationally-recognized standards, such as the GHG Protocol, the International Sustainability Standards Board's International Financial Reporting Standards, and
050.4 the Task Force on Climate-related Financial Disclosures 2017.[14] These standards provide robust and widely-adopted methodologies, which enable consistency and credibility across the disclosure landscape.

AISI urges CARB to continue to accept broad reporting in alignment with these internationally-accepted standards beyond the first year of implementation. This will not only reduce administrative burden and duplicative effort on behalf of the reporting entities but will benefit CARB's program by demonstrating a commitment to consistency, transparency, and integrity in the state's reporting and disclosure regimens.

050.5 At the point at which CARB begins collection of Scope 3 data, the Scope 3 categories to be disclosed should be only those determined to be material by the individual reporting companies. Mandatory disclosure of immaterial Scope 3 categories will unduly burden the reporting companies by requiring additional data collection efforts that will not impact the rigor and completeness of emissions estimates.

- **Reasonable Reporting Deadlines**

050.6 To best ensure compliance, it is imperative that reasonable deadlines be provided for all covered entities. While the GHG disclosure reporting deadlines are proposed for August 10, 2026, for 2025 data, AISI believes that this deadline is overly rushed.

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[14] *SB 253/261/219 Public Workshop: Update on California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs (Slide 6)*, CALIFORNIA AIR RESOURCES BOARD https://ww2.arb.ca.gov/sites/default/files/classic/SB%20253%20261%20Nov%20Workshop%20slides%20%28Updated%29.pdf

While CARB's work to date has been helpful in providing clarity on the expected reporting, the regulation is still not finalized, and by the time it is finalized, it is entirely possible that the regulation will have been in final form for less than six months before the date by which initial reporting is required to take place.

Companies need a minimum of one year from the date at which the final regulation is issued to review and understand reporting requirements, conduct a gap analysis of existing data collection capabilities, develop a compliance action plan to bridge any gaps in data availability, invest in the necessary systems and/or technological upgrades to capture the required data, and implement standard operating procedures and/or training protocols needed to accurately interpret and validate the additional data so that it aligns with California's standards. Forcing companies to report without adequate preparation time will increase the burden of compliance and lessen both data quality and completeness. Data collected hastily will likely be inaccurate and/or incomplete and could potentially affect the ability of consumers in California to make informed market decisions.

While CARB has indicated it will grant leniency and reciprocity in the reporting requirements for the initial reporting period, these leniency and reciprocity provisions have not been established as programmatic requirements but rather simply proposals. Should this level of leniency and reciprocity not be included in the final program, CARB must seriously consider extending the reporting deadline for the initial reporting period.

CARB should also make clear the potential implications for disclosure at a corporate-wide versus company-wide level. For example, if a company decides to provide corporate-wide disclosure in the first disclosure period, is that company then obligated to continue providing data at the corporate-level in subsequent disclosure periods? The structure and expectations around allowable data outside of the first year of disclosure must be made clear before these programs are implemented so that companies may make fully informed decisions.

050.7

- **Clarity on Security, Use, and Limitations of Data**

As CARB collects data, it must take steps to ensure that any nonpublic, corporate data it collects is protected. CARB must develop a plan for data security that protects such information from potential exposure. AISI believes that the best way to avoid potential data security concerns is to rely on publicly-available reporting gathered in conformance with applicable international frameworks. In the development of this data security plan, CARB should engage broadly with industry

050.8

associations, such as AISI, to ensure that the proposed approach is adequately protective of any confidential or proprietary information.

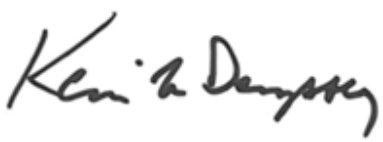
050.9 Finally, AISI strongly encourages CARB to periodically assess whether the goals of the program are being met by the implemented regulations. This should include assessment of the collection of Scope 3 data given the potential high uncertainty in terms of quality and representativeness.

As previously mentioned, AISI's guidance document is included with these comments as an attachment in the hope that it can assist with further development and refinement of this program. AISI is prepared to offer additional assistance to CARB in the development of this program so that it can be reflective of the true environmental performance of American steel producers.

050.10 It cannot be ignored that this regulation suffers from a fatal statutory flaw that imposes a greater regulatory burden on U.S.-based companies than on foreign-based ones. This flaw is further magnified by the fact that corporations that operate through out-of-state vendors face no regulatory burden as these corporations are not required to comply with the regulation – no matter their size, volume of product used in California, or total GHG emissions and climate risk. The flaw all but ensures that CARB's data collection will result in an incomplete accounting of GHG emissions and climate risk associated with commerce in California. AISI urges CARB to expand the scope of its regulatory scheme and encourage corporate-wide reporting based upon internationally-recognized standards – for corporate parents, both U.S.-based or foreign-based – of any "covered entity" or product sold into the state.

Please do not hesitate to contact Tyler Hengen, AISI Director, Sustainability and Environment, at 605.430.2848 (phone) or thengen@steel.org (email) if you have any additional questions or would like further information from AISI.

Sincerely,



Kevin Dempsey
President and CEO
American Iron and Steel Institute

Attachment: AISI *Recommendations on Implementation of Emissions and Climate-Related Financial Risk Disclosure Programs*

Recommendations on Implementation of Emissions and Climate-Related Financial Risk Disclosure Programs

Introduction

AISI serves as the voice of the American steel industry in the public policy arena and advances the case for steel in the marketplace as the preferred material of choice. AISI's membership is comprised of integrated and electric arc furnace (EAF) steelmakers, steel pipe and tube manufacturers and steel processors and fabricators, reflecting the production and distribution of both carbon and stainless steels. These steels are critical to America's national and economic security, including roads and bridges, buildings, the electrical grid, cars and trucks and all clean energy technologies. AISI also represents associate members who are suppliers to or customers of the steel industry.

Background

Recently, there have been increased efforts at the state level to require companies meeting certain criteria to disclose Scope 1-3 greenhouse gas (GHG) emissions for their companies, as well as to disclose climate-related financial risk reports related to their company operations. Examples include California's Senate Bill (SB) 253 and 261 legislation,[1] as well as pending or proposed legislation in additional states.[2] While the usage of the disclosed information will not be fully understood until after the point that data disclosure begins, it is reasonable to expect that the data may be used in areas such as state-level environmental assessments, policy and trade decision-making, and product procurement, among other areas.

As the steel sector is an industry that is anticipated to be affected broadly by these disclosure programs, AISI has developed the following recommendations for state policymakers, disclosure program developers and regulating bodies to take into consideration when designing and implementing their programs.

Overview of the American Steel Industry

Steel is vital to a modern, sustainable society. The same steel that enables manufacturers to make lighter, more fuel-efficient vehicles, and taller, safer structures is also repeatedly recyclable. While competing materials focus their sustainability claims on

[1] https://ww2.arb.ca.gov/our-work/programs/california-corporate-greenhouse-gas-ghg-reporting-and-climate-related-financial

[2] https://www.regulatoryandcompliance.com/2025/04/state-climate-disclosure-bills-a-growing-trend/

specific phases of product application, steel's superior performance minimizes environmental impact when measured through the entire life cycle.

Steel is primarily produced using one of two methods: the Blast Furnace/Basic Oxygen Furnace (BF/BOF) route and the Electric Arc Furnace (EAF) route.

The blast furnace is the first step in producing steel from iron oxides. The blast furnace converts iron ore to a high purity molten iron or pig iron. The furnace uses a solid carbon reductant called coke, and limestone to produce this pig iron, which is then further processed with recycled steel scrap in the Basic Oxygen Furnace to produce steel. Today, natural gas is increasingly being added in place of a portion of the coke burden in the blast furnace to improve the process and this in turn can reduce carbon emissions. Direct reduced iron and recovered iron bearing materials are also added to support efficiency or productivity.

The EAF is different from the BF/BOF route as it does not produce iron and solely produces steel. The EAF produces steel by using predominantly electrical current and some fuel to melt scrap steel, direct reduced iron, and/or pig iron, to produce molten steel. The largest source of carbon emissions associated with EAF steelmaking are scope 2 GHG emissions that come from the production of the electricity used to melt the scrap and/or iron, although there are also carbon emissions associated with the production of any direct reduced iron or pig iron used in an EAF.

While these two production routes look different, both production routes remain necessary today to produce the various steel products needed to meet the demands of the various steel consuming industries, and all domestic steel producers, regardless of production route, have and continue to take strong actions towards minimizing carbon and other GHG emissions and climate-related risks.

Downstream of the BF/BOF or EAF processes, additional processing occurs. Steel from the BF/BOF or EAF is then put through a reheat furnace, followed by hot or cold rolling mills, strip mills, pickling lines, heat treating, and various finishing lines to transform the steel into its final form. For many companies, these processes may not occur at the same location as the upstream steel production, and may not be undertaken by the same company that produced the steel upstream. As a result, emissions associated with these processes may be Scope 1 and 2, or may be downstream Scope 3.

Sustainability of the American Steel Industry

In the United States, the steel industry leads the world in reducing GHG emissions in our steelmaking processes. Further, the steel products created domestically demonstrate superior sustainability performance that minimizes environmental impact.

The American steel industry has adopted EAF technology at a much more accelerated rate than the global industry, resulting in a lower average carbon emissions intensity compared to steel made elsewhere. Over 70 percent of the steel produced in the U.S. is

via the EAF route, compared to approximately 29 percent globally. Additionally, American stainless steel is produced exclusively through EAF production and primarily uses recycled scrap.

In addition, the American steel industry operates blast furnaces that are also among the most carbon efficient in the world. These integrated steel mills in the U.S. are almost entirely fed by domestically-sourced iron ore pellets, compared to more carbon intensive sintered ore used in China and elsewhere, resulting in significantly lower carbon emissions, as well as lower emissions of nitrogen oxides (NOx), sulfur dioxide (SO_2) and particulate matter.

In addition to demonstrated success in reducing the emissions intensity of steel production domestically, the emissions factors associated with the energy mix used for steelmaking in the United States are lower than in other steel-producing regions such as China and India, due to use of natural gas and renewable energy. This cleaner energy mix helps produce the most carbon efficient steel.

The American steel industry also continues to make key investments to further decrease its carbon emissions and advance its leadership position on sustainability. American steelmakers have made investments to increase the use of direct reduced iron (DRI) and hot briquetted iron (HBI), both of which are produced using natural gas in place of coke, which can lower emissions for both integrated steel mills and EAF steel mills.

While the American steel industry has continued to demonstrate leadership in sustainability and reducing emissions, American steel is not the only steel in the domestic market. Imported steel can make up 20 percent or more of the steel consumed domestically, and the climate related impacts of these imported materials are generally much higher. In fact, a study produced in 2023 by Global Efficiency Intelligence found that, at an import market share of 28 percent, the emissions associated with those imported products made up 45 percent of the total steel-attributable emissions domestically.[3] While this study was a country-level assessment, it is reasonable to assume that imports can make up significant portion of products consumed in individual states. Collecting data on the emissions embodied in products imported into the U.S. and specific states from other countries is thus critical to ensure state level disclosure programs reflect the full range of emissions associated with various steel products.

[3] Hasanbeigi, A., Global Efficiency Intelligence. Embodied CO_2 Emissions in Steel Imports to the U.S. 2023 https://static1.squarespace.com/static/5877e86f9de4bb8bce72105c/t/648047410f5f795c07bbc488/1686128469952/Embodied+carbon+in+US+steel+import-final.pdf

Objective

This document aims to provide recommended guidance on the development and implementation of emissions and climate-related financial risk disclosure programs. These programs should be developed in a way that approaches disclosure requirements equitably, without regard to geographic considerations, and should not place undue administrative burden or put companies at potential reputational risk due to unreasonable reporting requirements.

Inclusion of Companies Without Regard to Country of Origin

While setting exemptions or inclusions of companies is reasonable, further defining those exemptions or inclusions to apply only to U.S.-based companies is not appropriate. If the goals of the program are to understand the emissions and climate-related financial risk associated with those products consumed and/or produced in the respective states, then this approach ultimately hinders successful accomplishment of those goals. This is especially important given steel produced outside the U.S. is generally more carbon intensive than domestic steel.

Limiting disclosure requirements to domestic companies creates a structural imbalance that disadvantages U.S.-based producers. Companies that manufacture products outside the United States but then sell those products in a state are "doing business" in the state and should be subject to the same disclosure requirements as domestic companies. Exempting these foreign companies from disclosure obligations undermines transparency, distorts market competition, and places an undue compliance burden on domestic firms.

It is not reasonable to place additional administrative burdens, as well as potential reputational risk, on domestic companies required to report, while companies based outside of the state that are selling their products in the state are not similarly burdened and can simply continue to operate unencumbered by these requirements.

Guidance: To ensure a level playing field and meaningful climate accountability, disclosure programs should apply equally to all producers with material economic activity in the state, regardless of the location of the entity's corporate jurisdiction or production locations.

Requiring foreign companies to report their emissions and climate-related financial risk does not pose insurmountable challenges, especially given the increasingly widespread adoption of such disclosure requirements in other jurisdictions. As discussed further below, the least burdensome approach to requiring foreign company reporting would be to align state disclosure requirements with existing international standards under which many foreign companies must already report similar information. A prime example of such an existing international standard is the EU Corporate Sustainability

Reporting Directive (CRSD),[4] which already mandates a number of corporate-wide reporting requirements for entities doing business in the EU.

Permit Corporate-Wide Reporting

AISI supports California Air Resources Board (CARB) decision to permit reporting of climate-related disclosures at the corporate-wide level and encourages similar adoption of corporate-wide reporting by other states considering or implementing these programs.

Adoption of a corporate-wide reporting approach holds many benefits, both to the companies required to disclose information, as well as to the states requiring disclosure. For many companies, emissions disclosure and risk reporting are already occurring at the corporate level, largely aligned with domestic and international standards that should be acknowledged and accepted at the state level. Accepting existing corporate-wide reporting reduces administrative burdens and duplicative requirements on the companies and ensures the most consistency possible among reporting entities.

Corporate-wide disclosure provides a comprehensive view of a company's climate-related risks and emissions profile. Verification and assurance of emissions disclosures already occur largely at the corporate level, and requiring reporting at a sub-entity level introduces significant extra effort in compiling, verifying, and assuring this separated data, without meaningfully improving the transparency or usefulness of the data. Streamlined reporting at the corporate parent level reduces these burdens while still providing users of this information with a clear and accurate picture of a company's emissions profile and climate-related financial risk.

Further, based on the international nature of the steel industry's supply chains, corporate-wide reporting ensures that material supply chain emissions are wholly captured, and supports the ability of states to require disclosure by foreign companies. For domestic steel companies, corporate-wide reporting will by its nature incorporate at least some emissions from other jurisdictions. This is due to the fact that virtually all domestic steel companies have operations across multiple jurisdictions.

Requiring disclosure at a sub-entity level poses significant potential burden to companies. Not only does this introduce additional effort and work on behalf of the companies in compiling or separating data at the sub-entity level, but these companies also would face potentially significant additional costs associated with verification and assurance at sub-entity levels. For many steel producers, the cost of reporting at multiple sub-entity levels could be expected to be in the hundreds of thousands of dollars.

[4] https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

Guidance: States should adopt corporate-wide emissions and risk reporting to align with existing standards, reduce administrative and financial burdens, ensure comprehensive supply chain coverage, and support consistent, assured disclosure across domestic and foreign operations.

Scopes and Calculations

To ensure effective and transparent disclosure of emissions and climate-related financial risk, state programs should align with internationally recognized frameworks such as the Greenhouse Gas Protocol (GHG Protocol)[5] and the International Sustainability Standards Board (ISSB) International Financial Reporting Standard (IFRS).[6] These standards provide robust, widely adopted methodologies for emissions quantification and climate-related financial disclosure, enabling consistency, comparability, and credibility across jurisdictions.

The standardized scopes and taxonomy of these widely accepted international standards offer a common structure for emissions and risk disclosure. Mandating unique state-specific approaches to reporting would introduce methodological confusion and increase compliance costs, particularly for entities operating across multiple jurisdictions. Alignment with established scopes ensures that disclosures reflect real-world operational boundaries and financial exposures, facilitating meaningful analysis by regulators and those using the information disclosed through these programs.

Accepting disclosures prepared in accordance with established international standards also avoids duplicative reporting and fosters regulatory efficiency. This reciprocity will allow regulators to focus on the goals of the program and eliminate redundancy for those reporting entities. This approach additionally reduces potential burden on industry and accelerates the adoption of thoroughly verified and assured climate disclosures.

In a globalized economy, fragmented climate disclosure approaches risk inaccurate or obscured data, inconsistent approaches, and ultimately may impede meaningful progress toward decarbonization. By aligning with internationally recognized standards and accepting reciprocal filings, regulators can uphold transparency, reduce burden, and strengthen the integrity of climate-related emissions and related data.

[5] https://ghgprotocol.org/corporate-standard

[6] https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/

Guidance: To promote consistent, credible, and efficient climate disclosure, regulators should align with internationally recognized standards such as the GHG Protocol and ISSB IFRS, accepting reciprocal filings to minimize burden, avoid fragmentation, and ensure transparent, comparable data across jurisdictions.

For completeness, consistency, and transparency purposes, all major production processes should be included in emissions disclosure, but care should be taken to avoid inclusion of processes that are immaterial. In terms of the Greenhouse Gas (GHG) Protocol[7] categories, the emissions categories required by states should be limited to all Scope 1 and Scope 2, and only Scope 3 categories determined to be material by the individual reporting companies. Extending requirements beyond those categories will not materially impact the rigor and completeness of emissions estimates and will overcomplicate data collection efforts on the part of reporting companies.

Guidance: Limit required Scope 3 emissions estimates to those determined to be material by individual reporting companies.

Further, for risk disclosure, companies may not currently undertake new corporate climate-risk assessments on an annual or biennial basis. Often these assessments are based on material changes, such as acquisitions, that potentially impact risk and therefore may not align with an annual reporting cycle. For companies required to report, states should strongly consider allowing for a self-attestation of "No Change" to the previous risk profile submitted for those submissions occurring after initial disclosure. This will minimize additional reporting burdens and will benefit state programs by reducing administrative burdens associated with processing duplicative and repetitive disclosures that contain no new information.

Guidance: To reduce unnecessary burden and streamline oversight, states should allow companies to self-attest "No Change" in climate-risk disclosures when no material updates have occurred since the prior disclosure.

Reporting Timeline

One important way to reduce the burden on reporting companies is to establish reasonable reporting timelines, based on when companies will have the required information under standard operating conditions. For both emissions and risk disclosure, requiring the reporting of information for a calendar year shortly after the beginning of the following year is not reasonable and will not produce accurate data

[7] https://ghgprotocol.org/

reports. Collecting, consolidating, and processing data, preparing reports, audits, verification, and assurance are all processes that require adequate time for completion prior to any reporting deadline. Without taking this into account, states will receive estimated, unvetted data that will then require subsequent substantial revisions by reporting companies. Additionally, thousands of companies are expected to be subject to state level rules. There are a limited number of firms and auditors that can provide assurance in accordance with ISO standards or standards by American Institute of Certified Public Accountants. This will impact the timing of companies' ability to report.

Furthermore, setting unreasonably early deadlines for required disclosures introduces significant potential reputational risk for reporting companies. Under such circumstances, a reporting company would likely be required to estimate information to meet the early deadline and then later amend its report when final, verified data becomes available. Setting reasonable deadlines based on when final and reliable data are available would avoid these concerns while still ensuring states are provided the data once available.

For emissions disclosure programs, Scope 1 and 2 GHG emissions for the reporting year can generally be expected to be available as of July 1 of the following calendar year. Because reporting companies are reliant on their upstream and downstream suppliers, who will be operating under similar timeframes for their emissions reporting, verification and assurance of Scope 3 emissions will likely not be available until the 3rd quarter of the following year.

In order to streamline reporting and minimize administrative burdens, states should consider requiring all reporting, both for emissions disclosure and climate-related financial risk, at the same time and not until the 3rd quarter of the year following the year for which data are being reported (i.e. information reflecting activities in 2025 should not be required until 3rd quarter 2026). This would allow reporting companies to allocate resources to state-specific reporting programs only once a year, rather than multiple times throughout the year.

Guidance: To ensure data accuracy, reduce reputational risk, minimize reporting burdens and support broad program acceptance, states should require emissions and climate-risk disclosures for a calendar year no earlier than the 3rd quarter of the following year, aligning with standard corporate data availability and assurance timelines.

Conclusion

To implement effective and equitable state level climate-related financial risk and emissions disclosure programs, states should ensure that reporting is required of all producers doing business in the state, regardless of the country of origin of their products. In addition, states should permit corporate-wide reporting, consistent with widely utilized international reporting standards and set reasonable reporting deadlines aligned with when final verified emissions data will reasonably be available.

AISI welcomes the opportunity to engage with state policymakers, program developers, and other stakeholders to further assist in developing these programs in an effective way that encourages domestic production and procurement.

Governance

These recommendations are to be updated as new guidance, procedures, rules, or regulations emerge. To ensure that this controlled document remains up to date, the guidelines in this document will be reviewed and revised by the AISI Sustainability Committee on an as needed frequency prior to being published as a revised version.

Version Number	Date	Key Revisions
1.0	February 9, 2026	--

AISI Contact Information:
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Jodie Muller
President & CEO

February 9, 2026

California Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Uploaded to CARB comment portal and submitted by email to: climatedisclosure@arb.ca.gov

Re: WSPA Comments on the Proposed California Corporate Greenhouse Gas Reporting Program and Climate-Related Financial Risk Disclosure Program Initial Regulation

The Western States Petroleum Association (WSPA) appreciates the opportunity to comment on the California Air Resources Board's (CARB) Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation.[1] WSPA is a non-profit trade association that represents companies that safely explore for, produce, refine, transport and market petroleum, petroleum products, natural gas and other energy supplies in California, Washington, Oregon, Nevada, and Arizona.

WSPA reminds CARB that the U.S. Chamber of Commerce and other organizations have filed a federal lawsuit seeking to have California's Corporate Greenhouse Gas Reporting Act (SB 253) and Climate-Related Financial Risk Disclosure Act (SB 261) declared unconstitutional.[2] WSPA supports this legal challenge and maintains that these laws should be invalidated and their enforcement enjoined. As of November 18, 2025, the enforcement of SB 261 has already been enjoined pending appeal, and during oral argument on January 9, 2026, the United States Court of Appeals for the Ninth Circuit expressed concerns regarding the legality of certain aspects of *both* laws. Accordingly, CARB should defer any further actions to implement these laws pending final resolution of ongoing legal challenges, given the significant remaining uncertainty regarding the legality of such actions. 051.1

In the meantime, WSPA submits the following comments regarding the proposed initial regulation.[3]

1. **CARB should preserve flexibility for reporting entities to address data availability challenges for the initial SB 253 report.**

The deadline for reporting entities to submit their initial SB 253 report is August 10, 2026. CARB is proposing to establish a February 1 cutoff date to determine which fiscal year's data entities must submit for the initial report, with entities whose fiscal year ends on or before February 1, 2026 reporting data from their fiscal year ending in 2026, and entities whose fiscal year ends after that date reporting their 2025 data. WSPA urges CARB not to adopt this mandatory cutoff date. 051.2

Setting a mandatory cutoff date fails to account for data availability challenges for many complex organizations and diverges from the optional approach described in CARB's November 2025 public

[1] CARB, Proposed SB 253 Regulation Text A-1; available at: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/reg%20text.pdf. Accessed January 2026.
[2] *See Chamber of Commerce of the United States of America v. Randolph*, No. 2:24-cv-00801 (C.D. Cal.).
[3] Nothing in this submission should be considered an admission of lawfulness on the part of WSPA or its members. WSPA and its members reserve the right to challenge the underlying statutes or implementing regulations as unconstitutional or otherwise unlawful.

workshop.[4] As WSPA has previously explained,[5] data from the prior fiscal year is generally not available for external reporting until the third or fourth quarter of the following year, particularly for complex organizations with multiple business units, international operations, or reliance on third-party data providers. For these entities, developing a complete and reliable GHG inventory often requires more than six months, making it impractical to finalize and disclose GHG reporting for SB 253 within the timeline implied by a mandatory "applicable preceding fiscal year" requirement for reporting in 2026.

Instead, WSPA urges CARB to incorporate a data availability provision for the first reporting year. This approach would provide entities with the flexibility necessary to ensure accurate, complete, and meaningful disclosures.

2. WSPA strongly supports retaining optionality for entities to select boundary approaches for reporting.

WSPA maintains its position, elaborated in previous comment letters,[6,7] that CARB should retain flexibility for entities to select one of the three boundary approaches defined by the GHG Protocol: equity share, financial control, or operational control.[8] Allowing reporting entities to select an approach that aligns with existing sustainability and investor reporting practices, including established regulatory frameworks or industry best practices (e.g., the U.S. Environmental Protection Agency's GHG emissions reporting program and sustainability reporting guidance for the oil and gas industry released by Ipieca, the American Petroleum Institute, and the International Association of Oil and Gas Producers), and would mitigate confusion arising from inconsistent presentations of reporting data and enhance the usefulness of reported information by recognizing diverse corporate structures. 051.3

Additionally, although CARB has clarified that it will not enforce SB 261 reporting requirements,[9] the agency previously confirmed that entities will have flexibility in selecting a climate disclosure framework under SB 261. For example, entities reporting in alignment with the 2017 Task Force on Climate-Related Financial Disclosures (TCFD) recommendations may use any of the three GHG Protocol organizational boundary approaches. Therefore, limiting flexibility in selecting the GHG emissions reporting boundary under SB 253 could cause disclosures under SB 253 and SB 261 to become misaligned, resulting in information that is not coherent or useful for decision-making. Mandating a reporting boundary for SB 253 while allowing flexibility under SB 261 would also undermine CARB's goal of reducing confusion and streamlining compliance where possible. 051.4

In sum, CARB should explicitly authorize reporting entities, in this and any subsequent regulations, to select the GHG emissions disclosure boundary approach most appropriate for their respective operations and disclosures. 051.5

3. CARB should revise its proposed recordkeeping requirements to limit burdens on reporting entities meeting an appropriate threshold of "doing business in California."

[4] *See* CARB SB 253/261/219 Public Workshop: Update on California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs. November 2025; recording available at: youtube.com/watch?v=h979MRn7JfE&feature=youtu.be and slides available at: https://ww2.arb.ca.gov/sites/default/files/classic/SB%20253%20261%20Nov%20Workshop%20slides%20%28Updated%29.pdf.

[5] *See* WSPA Comments on the Information Solicitation to Inform Implementation of California Climate Disclosure Legislation: Senate Bills 253 and 261. March 21, 2025; available at: https://ww2.arb.ca.gov/system/files/webform/public_comments/22731/WSPA%20SB%20253%20and%20261%20Climate%20Disclosure%20Information%20Solicitation%20Letter%203-21-2025.pdf.

[6] *Ibid*.

[7] *See* WSPA Comments on Draft Reporting Template for Scopes 1 and 2 GHG Emissions. October 27, 2025; available at: https://ww2.arb.ca.gov/system/files/webform/public_comments/53876/wspa-sb-253-draft-reporting-template-comments-with-citations-10-27-2025.pdf.

[8] *See* U.S. EPA, Scopes 1 and 2 Emissions Inventorying and Guidance; available at: https://www.epa.gov/climateleadership/determine-organizational-boundaries. Accessed January 2026.

[9] *See* CARB, Enforcement Advisory Climate-Related Financial Risk Reporting (SB 261). December 1, 2025; available at: https://ww2.arb.ca.gov/sites/default/files/2025-12/Dec%201%20SB%20261%20Enforcement%20Advisory.pdf.

CARB's proposal includes a data retention provision requiring entities subject to the regulation to maintain records demonstrating that they "meet the revenue and doing business in California thresholds."[10] This self-certification requirement is inconsistent with CARB's stated rationale of using publicly available and verifiable information to determine applicability. Reporting entities should not bear the additional burden of justifying their inclusion or providing proprietary business information beyond what is necessary for compliance. 051.6

In addition, CARB's proposal states that entities must provide these records to CARB if requested, without clarifying the circumstances in which this information may be requested. If CARB maintains the proposed data retention requirements, then, at a minimum, CARB should clearly define the circumstances under which records can be requested. WSPA also continues to urge CARB to develop clear guidance on how it will manage and use data provided by entities while protecting proprietary and confidential information. Clear guidance will help define data requirements, prevent the submission of extraneous information, mitigate proprietary data leakage risks, and reduce unnecessary administrative costs for both CARB and reporting entities. 051.7 051.18

CARB should also reconsider its proposed definition of "doing business in California." The proposed definition imposes grossly disproportionate compliance requirements by implicating global operational data for companies that may have only a fraction of their business operations and income in California. To address these outsized burdens, WSPA recommends the following revisions:

- For domestic entities that meet the global revenue threshold but are not organized or commercially domiciled in California, WSPA recommends that an entity be considered within the scope of the regulation only if it: (1) meets the sales threshold in Revenue and Taxation Code (RTC) § 23101(b)(2); (2) reports more than $200 million in California-allocated/apportioned business income, adjusted annually for inflation; and (3) is registered to do business in California with the Secretary of State pursuant to General Corporation Law § 191. 051.8
- For unitary filers not commercially domiciled in California and with no California sales in excess of the amount in Section 23101(b)(2) – but who have allocated California sales due to their subsidiaries' operations – WSPA proposes revising the second sentence of Section 96072(a)(8) of the proposed regulation as follows: "For this section, 'taxpayer' in subsection 23101(b) is substituted with the term 'entity,' and to determine an entity's sales in California under Revenue and Taxation Code § 23101(b)(2), the sales of a subsidiary are not attributed to its parent notwithstanding any unitary tax return filed by them, and wholesale electricity sales are excluded."

4. CARB's Scope 1 and 2 reporting template should remain optional, and entities should be permitted to submit verified emissions data from their own reports.

WSPA strongly encourages CARB to retain flexibility for reporting entities to rely on reporting mechanisms other than CARB's Scope 1 and 2 reporting template.[11] Mandating the template's use would impose unnecessary administrative burdens, leading to inconsistent or confusing reporting that is unhelpful to stakeholders. As WSPA has previously explained,[12] the template is overly complex, which risks over-collection of information, including confidential business data, without providing decision-useful information as intended by statute. 051.9

To address these issues, CARB should confirm that entities that develop their own GHG or sustainability reports that include verified Scope 1 and 2 emissions data would be permitted to submit the relevant emissions data from these reports in lieu of using the standard template. This approach provides flexibility

[10] CARB, Proposed SB 253 Regulation Text A-1; available at: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/reg%20text.pdf. Accessed January 2026.
[11] See CARB "Draft Scope 1 and 2 GHG Reporting Template." October 10, 2025; available at: https://ww2.arb.ca.gov/our-work/programs/corporate-ghg-reporting/resources.
[12] *See* WSPA Comments on Draft Reporting Template for Scopes 1 and 2 GHG Emissions. October 27, 2025.

for entities to align reporting with existing internal processes, third-party verification, and other regulatory or investor reporting practices, while maintaining data transparency and compliance with SB 253. Critically, this approach should not require the submission of the entire company-developed report, but only the specific, relevant verified emissions data.

WSPA urges CARB to clarify in the regulation that the template is optional for all reporting years, allowing entities to submit company-prepared reports with verified Scope 1 and 2 emissions data without being forced to use CARB's template.

5. CARB should ensure that any more granular emissions disclosures beyond the aggregated Scope 1 and 2 GHG totals remain optional and are not subject to separate third-party verification.

In addition to retaining flexibility for reporting entities to rely on reporting mechanisms other than CARB's Scope 1 and 2 reporting template,[13] CARB should limit mandated reporting information to aggregated totals of Scope 1 or Scope 2 emissions. As WSPA explained in our previous letter,[14] any disclosure of more granular Scope 1 and Scope 2 data should be optional and should not be subject to separate third-party verification. Mandating disaggregated reporting would unnecessarily complicate the implementation of SB 253 without providing additional decision-useful information.

CARB's draft reporting template introduces unnecessary complexity by requiring Scope 1 and Scope 2 emissions to be disaggregated by both source and individual GHG species, with no meaningful difference or benefit to shareholders beyond aggregated emissions disclosure. This complexity is compounded by inherent differences between source categories for Scope 1 and Scope 2 emissions. For example, the template requests Scope 1 emissions by stationary, mobile, process, and fugitive sources, while it requests Scope 2 emissions by electricity, heating, steam, and cooling sources. These disparities in emissions sources increase reporting burdens and reduce the clarity of the reported data, making it more difficult for stakeholders to interpret. 051.10

By ensuring that any additional reporting beyond aggregated Scope 1 and 2 GHG emissions remains *optional*, regardless of whether an entity uses CARB's reporting template, CARB would better achieve its stated commitment to an effective, efficient, and streamlined implementation of SB 253. WSPA encourages CARB to clarify that such additional reporting is optional in the regulation for both 2026 and future years to avoid potential compliance ambiguity, consistent with CARB's regulatory approach in the Frequently Asked Questions (FAQ) Regarding California Climate Disclosure Requirements.[15]

6. CARB should confirm that it will not enforce limited assurance requirements for initial reports and will support flexibility and efficiency in the verification process.

WSPA requests that CARB modify the regulatory text to explicitly waive all assurance requirements for the first SB 253 report due in 2026, even for entities that have previously obtained third-party verification for Scope 1 and 2 emissions under a different voluntary or regulatory reporting framework. While CARB has provided guidance on enforcement discretion in its FAQ, the current regulatory text does not reflect this waiver. To avoid confusion and regulatory uncertainty, CARB should explicitly state that it will exercise enforcement discretion for the 2026 submission of Scope 1 and 2 emissions for any entity not receiving limited assurance under California's specific requirements, regardless of whether that entity has already obtained assurance on its collected data. 051.11

[13] *Ibid*.
[14] *See* WSPA comments on Draft SB 253 Scope 1 & 2 Reporting Template. October 27, 2025.
[15] *See* CARB, California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs: Frequently Asked Questions About Regulatory Development and Initial Reports, Question 21. Updated November 17, 2025; available at: https://ww2.arb.ca.gov/sites/default/files/classic/FAQs%20Regarding%20California%20Climate%20Disclosure%20Requirements_Nov.pdf.

Additionally, CARB should maintain flexibility for reporting entities to use applicable GHG emissions reporting standards to accommodate diverse organizational structures and global compliance obligations. For example, CARB should clearly authorize the use of current versions of existing protocols like the International Organization for Standardization (ISO) 14060 family (e.g., ISO 14064-3:2019 standard) and International Standard on Sustainability Assurance (ISSA) 5000 for assurance purposes. Such protocols are widely used in the United States and provide an internationally recognized framework for Scope 1 and Scope 2 GHG emissions verification. To support process efficiency and avoid unnecessary administrative burden, CARB should not require application of the Mandatory Reporting Regulation verification process, as doing so would impose an excessive administrative and capital burden on a program that lacks the financial underpinnings of a Cap-and-Invest program. 051.12

While SB 253 and SB 261 do not create a private cause of action, compliance with CARB's regulation will likely increase liability risks under other legal theories. These risks include unfounded claims of greenwashing, consumer fraud, and/or human rights claims stemming from mandated disclosure in areas where data is often based on assumptions and is difficult to meaningfully quantify. As such, WSPA strongly urges CARB to include language limiting liability for reported information under any statute or other cause of action. 051.13

7. CARB should allow parent companies to make a single combined fee payment for their subsidiaries and not assess fees for parent-company entities that are not directly subject to the regulation.

CARB's November workshop presentation[16] indicates that a parent company may submit a single combined payment to cover all fees for its subsidiaries. However, this fee payment option is not reflected in the proposed regulatory text. To reduce administrative burdens and enhance clarity, CARB should revise the proposed Section 96074 to explicitly allow parent companies to make one combined payment for multiple subsidiaries, consistent with its workshop presentation. 051.14

Additionally, the proposed regulatory text should clarify that annual fees apply only to reporting entities subject to the regulation. Parent entities that are not directly subject to the regulation but report on behalf of their subsidiaries under the consolidated fee payment option should not be assessed a separate, additional annual fee. 051.15

8. The proposed regulation should remove all definitions and requirements related to SB 261.

On November 18, 2025, the U.S. Court of Appeals for the Ninth Circuit granted an injunction pending appeal against the enforcement of SB 261.[17] In response, CARB issued an Enforcement Advisory on December 1, 2025, stating that it will not enforce SB 261 reporting requirements.[18] Nevertheless, the proposed regulation includes SB 261-related provisions, including definitions and fee requirements. Retaining these provisions creates unnecessary confusion and is facially inconsistent with the court's order enjoining CARB from "applying or taking any action to enforce" SB 261. Accordingly, WSPA urges CARB to remove all SB 261-related definitions and requirements from the proposed regulatory text. 051.16

9. The definition of "Required Revenue" should not include legal defense fees.

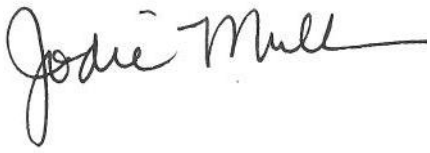
Section 96072(a)(12) of the proposed regulation defines "Required Revenue" as "the total amount of funds necessary to recover the costs of implementation or expenditures under the programs established

[16] *See* CARB, SB 253/261/219 Public Workshop: Update on California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs, Slide 16. November 18, 2025; available at: https://ww2.arb.ca.gov/sites/default/files/classic/SB%20253%20261%20Nov%20Workshop%20slides%20%28Updated%29.pdf.
[17] *U.S. Chamber of Commerce v. Sanchez,* Case No. 25-5327 (9th Cir.).
[18] *See* CARB, Enforcement Advisory Climate-Related Financial Risk Reporting (SB 261). December 1, 2025; available at: https://ww2.arb.ca.gov/sites/default/files/2025-12/Dec%201%20SB%20261%20Enforcement%20Advisory.pdf.

by HSC §§ 38532 or 38533, respectively, for each fiscal year, based on the number of personnel positions, including salaries and benefits, contracting costs, and all other costs, ***including legal defense of this article***, as approved in the California Budget Act for that fiscal year." (emphasis added). The inclusion of such legal defense fees is an improper barrier to the exercise of First Amendment rights to petition the government, which includes filing lawsuits to challenge unconstitutional laws. It further violates due process rights by imposing an unconstitutional penalty for accessing the court system. This provision must be removed from the proposed definition. 051.17

Thank you for CARB's ongoing engagement with stakeholders, and for considering our comments.

Sincerely,



Jodie Muller
President & CEO

ATTACHMENT A

Chamber of Commerce of the United States of America et al v. California Air Resources Board et al Doc. 77

O

United States District Court
Central District of California

CHAMBER OF COMMERCE OF THE UNITED STATES OF AMERICA et al.,

Plaintiffs,

v.

CALIFORNIA AIR RESOURCES BOARD et al.,

Defendants.

Case № 2:24-cv-00801-ODW (PVCx)

ORDER GRANTING DEFENDANTS' MOTION TO DISMISS PLAINTIFFS' SECOND AND THIRD CAUSES OF ACTION [38]

I. INTRODUCTION

Plaintiffs Chamber of Commerce of the United States of America ("U.S. Chamber"), California Chamber of Commerce, American Farm Bureau Federation, Los Angeles County Business Federation, Central Valley Business Federation, and Western Growers Association bring this action challenging California Senate Bills ("SB" or "SBs") 253 and 261 against Defendants Chair of the California Air Resources Board ("CARB") Liane M. Randolph, Executive Officer of CARB Steven S. Cliff, and California Attorney General Robert A. Bonta (collectively, the "State") for violation of the United States Constitution's First Amendment, Supremacy Clause, and limitations on extraterritorial regulation. (*See* First Am. Compl. ("FAC") ¶¶ 92–112, ECF No. 28.) The State moves to dismiss Plaintiffs' Supremacy Clause and

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extraterritoriality claims. (Mem. P. & A. ISO Mot. Dismiss. ("Mot." or "Motion"), ECF No. 38-1).[1]

For the reasons discussed below, the Court **GRANTS** the State's Motion to Dismiss and dismisses Plaintiffs' Supremacy Clause and extraterritoriality claims.[2]

II. BACKGROUND[3]

On October 7, 2023, Governor Gavin Newsom signed SBs 253 and 261 into law. (FAC ¶ 3.) A brief description of each law follows.

A. Senate Bill 253

SB 253 originally directed that by January 1, 2025, CARB "shall develop and adopt regulations" for "reporting entit[ies]"—businesses with total annual revenues over $1 billion "that do[] business in California." Cal. Health & Safety Code §§ 38532(b)(2), (c)(1). After the FAC was filed, California delayed this deadline to July 1, 2025. (Notice Amends. SBs 253 & 261 ("Not. Amends."), ECF No. 72.)[4] SB 253 is expected to directly apply to more than 5,300 companies. (FAC ¶ 44.)

SB 253 requires CARB to develop regulations that require reporting entities to annually disclose their Scope 1, Scope 2, and Scope 3 emissions. (*Id.* ¶ 47); Cal. Health & Safety Code § 38532(c)(1).

- Scope 1 emissions are "all direct greenhouse gas emissions that stem from sources that a reporting entity owns or directly controls, regardless of location, including, but not limited to, fuel combustion activities." (FAC ¶ 47a); Cal. Health & Safety Code § 38532(b)(3).

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[1] The State also moved to dismiss all of Plaintiffs' claims against Attorney General Bonta, arguing that sovereign immunity bars these claims. (Mot. 21–22.) In their Reply, the State, without conceding the point, withdrew this argument. (Reply 1 n.1, ECF No. 49.)

[2] Having carefully considered the papers filed in connection with the Motion, the Court deemed the matter appropriate for decision without oral argument. Fed. R. Civ. P. 78; C.D. Cal. L.R. 7-15.

[3] All factual references derive from the FAC, unless otherwise noted. *See Ashcroft v. Iqbal*, 556 U.S. 662, 678 (2009) (stating that well-pleaded factual allegations are accepted as true for purposes of a motion to dismiss).

[4] On October 16, 2024, Defendants informed the Court that, on September 27, 2024, Governor Newsom signed amendments to SBs 253 and 261 into law. (Not. Amends.) These amendments took effect on January 1, 2025. (*Id.*)

- Scope 2 emissions are "indirect greenhouse gas emissions from consumed electricity, steam, heating, or cooling purchased or acquired by a reporting entity, regardless of location." (FAC ¶ 47b); Cal. Health & Safety Code § 38532(b)(4).
- Scope 3 emissions are "indirect upstream and downstream greenhouse gas emissions, other than scope 2 emissions, from sources that the reporting entity does not own or directly control and may include, but are not limited to, purchased goods and services, business travel, employee commutes, and processing and use of sold products." (FAC ¶ 47c); Cal. Health & Safety Code § 38532(b)(5).

SB 253 does not mandate entities to report avoided emissions, or so-called "Scope 4 emissions." (FAC ¶¶ 50–51, 69.)

SB 253 requires CARB to ensure that its regulations mandate entities to measure and report Scope 3 emissions "in conformance with the Greenhouse Gas protocol standards and guidance." (*Id.* ¶ 48); Cal. Health & Safety Code § 38532(c)(2)(A)(ii). The law further directs CARB to develop and adopt regulations to "minimize[] duplication of effort" by allowing entities "to submit to the emissions reporting organization . . . reports prepared to meet other national and international reporting requirements." *Id.* § 38532(c)(2)(D)(i). CARB must also develop and adopt regulations that ensure reporting entities obtain third-party assurances as to the quality and accuracy of the reported emissions. *Id.* § 38532(c)(2)(F). These emissions data will be publicly available, and CARB will ensure the creation of a public report on the disclosures. (FAC ¶ 61); Cal. Health & Safety Code §§ 38532(d)(1), (e).

SB 253 requires CARB to adopt regulations that authorize it to seek administrative penalties for "nonfiling, late filing, or other failure to meet the requirements" of the law. (FAC ¶ 63); Cal. Health & Safety Code § 38532(f)(2)(A). As of the date of the FAC, the law required CARB to adopt regulations mandating reporting entities to pay an annual fee upon filing disclosures to cover the costs of administration and implementation of the new reporting requirements. (FAC ¶ 62.) The recent amendment still requires CARB to issue regulations mandating reporting

entities pay an annual fee, but no longer makes that fee due upon the filing of disclosures. (Not. Amends.); Cal. Health & Safety Code § 38532(c)(2)(G)(i).

B. Senate Bill 261

SB 261 applies to any entity with total annual revenues over $500 million "that does business in California." (FAC ¶ 34); Cal. Health & Safety Code § 38533(a)(4). SB 261 is expected to apply to more than 10,000 companies. (FAC ¶ 34.)

Starting on January 1, 2026, SB 261 will mandate each applicable entity to biennially disclose on its website two categories of climate-related financial risk information, defined as information related to "material risk of harm to immediate and long-term financial outcomes due to physical and transition risks" to the business. (*Id.* ¶¶ 36, 39); Cal. Health & Safety Code § 38533(a)(2).[5] These two categories are:

- The entity's climate-related financial risk, in accordance with the recommended framework and disclosures contained in the Final Report of Recommendations of the Task Force on Climate-related Financial Disclosures (June 2017), (FAC ¶ 36), Cal. Health & Safety Code § 38533(b)(1)(A)(i); and
- The entity's measures adopted to reduce and adapt to climate-related financial risk disclosed in its biennial report, (FAC ¶ 37), Cal. Health & Safety Code § 38533(b)(1)(A)(ii).

SB 261 requires CARB to adopt regulations that authorize it to seek administrative penalties—no more than $50,000—for reporting entities that fail to publish a report or that make an inaccurate one. (FAC ¶ 43); Cal. Health & Safety Code § 38533(f)(2). SB 261 required covered entities to pay an annual fee upon filings disclosures starting on January 1, 2026. (FAC ¶ 43). This, too, was amended

[5] The legislation's full definition of "climate-related financial risk" is as follows: "material risk of harm to immediate and long-term financial outcomes due to physical and transition risks, including, but not limited to, risks to corporate operations, provision of goods and services, supply chains, employee health and safety, capital and financial investments, institutional investments, financial standing of loan recipients and borrowers, shareholder value, consumer demand, and financial markets and economic health." Cal. Health & Safety Code § 38533(a)(2).

to require covered entities to pay an annual fee, but to no longer make it due upon the filing of disclosures. (Not. Amends.); Cal. Health & Safety Code § 38533(c)(2)(A).

In its FAC, Plaintiffs bring four causes of action under 42 U.S.C. § 1983. In Count I, Plaintiffs allege that SBs 253 and 261 violate the First Amendment. (FAC ¶¶ 92–99.) In Count II, Plaintiffs assert that the Constitution and federal law preempt SBs 253 and 261, which violate the Supremacy Clause. (*Id.* ¶¶ 100–06.) In Count III, Plaintiffs claim that the laws violate the U.S. Constitution's limits on extraterritorial regulation, including the dormant Commerce Clause. (*Id.* ¶¶ 107–12.) Lastly, in Count IV, Plaintiffs seek payment of attorneys' and expert fees. (*Id.* ¶¶ 113–15.) As relief, Plaintiffs seek declarations that SBs 253 and 261 are "null, void, and with no force or effect," and an injunction enjoining the State from "implementing, applying, or taking any action whatsoever to enforce" SBs 253 and 261. (FAC, Prayer for Relief ¶ 116.)

Before discovery began, Plaintiffs moved for summary judgment on their First Amendment claim, (Mot. Summ. J., ECF No. 48), and the State separately moved to deny or defer the motion under Federal Rule ("Rule" or "Rules") of Civil Procedure 56(d), (Mot. Den. Defer Mot. Summ. J., ECF No. 57). The Court granted the State's motion to defer Plaintiff's motion for summary judgment under Rule 56(d) and granted Plaintiffs leave to re-file their motion after the close of discovery. (*See* Order Summ. J., ECF No. 73.)

The State now moves to dismiss Plaintiffs' Supremacy Clause and extraterritoriality claims under Rules 12(b)(1) and 12(b)(6). (Mot.) The Motion is fully briefed. (Mot.; Opp'n, ECF No. 43; Reply, ECF No. 49.)[6]

[6] The State also requests that the Court take judicial notice of certain documents. Because the Court reaches its conclusions without relying on those documents, it **DENIES** the request. (Req. Judicial Notice, ECF No. 39.)

III. LEGAL STANDARD

A. Rule 12(b)(1)

Under Rule 12(b)(1), a party may move to dismiss based on a court's lack of subject matter jurisdiction. *See* Fed. R. Civ. P. 12(b)(1). "A Rule 12(b)(1) jurisdictional attack may be facial or factual." *Safe Air for Everyone v. Meyer*, 373 F.3d 1035, 1039 (9th Cir. 2004). A facial attack "accepts the truth of the plaintiff's allegations but asserts that they are insufficient on their face to invoke federal jurisdiction." *Leite v. Crane Co.*, 749 F.3d 1117, 1121 (9th Cir. 2014) (internal quotation marks omitted). Conversely, a factual attack "contests the truth of the plaintiff's factual allegations, usually by introducing evidence outside the pleadings." *Id*. The party attempting to invoke a court's jurisdiction bears the burden of proof for establishing jurisdiction. *See Sopcak v. N. Mountain Helicopter Serv.*, 52 F.3d 817, 818 (9th Cir. 1995).

B. Rule 12(b)(6)

A court may dismiss a complaint under Rule 12(b)(6) for lack of a cognizable legal theory or insufficient facts pleaded to support an otherwise cognizable legal theory. *Balistreri v. Pacifica Police Dep't*, 901 F.2d 696, 699 (9th Cir. 1988). To survive a dismissal motion, a complaint need only satisfy the minimal notice pleading requirements of Rule 8(a)(2)—a short and plain statement of the claim. *Porter v. Jones*, 319 F.3d 483, 494 (9th Cir. 2003). The factual "allegations must be enough to raise a right to relief above the speculative level." *Bell Atl. Corp. v. Twombly*, 550 U.S. 544, 555 (2007). That is, the complaint must "contain sufficient factual matter, accepted as true, to state a claim to relief that is plausible on its face." *Iqbal*, 556 U.S. at 678 (internal quotation marks omitted).

The determination of whether a complaint satisfies the plausibility standard is a "context-specific task that requires the reviewing court to draw on its judicial experience and common sense." *Id.* at 679. A court is generally limited to the pleadings and must construe all "factual allegations set forth in the complaint . . . as

true and . . . in the light most favorable" to the plaintiff. *Lee v. City of Los Angeles*, 250 F.3d 668, 679 (9th Cir. 2001). However, a court need not blindly accept conclusory allegations, unwarranted deductions of fact, and unreasonable inferences. *Sprewell v. Golden State Warriors*, 266 F.3d 979, 988 (9th Cir. 2001).

Where a district court grants a motion to dismiss, it should generally provide leave to amend unless it is clear the complaint could not be saved by any amendment. *See* Fed. R. Civ. P. 15(a); *Manzarek v. St. Paul Fire & Marine Ins. Co*., 519 F.3d 1025, 1034 (9th Cir. 2008). Leave to amend may be denied when "the court determines that the allegation of other facts consistent with the challenged pleading could not possibly cure the deficiency." *Schreiber Distrib. Co. v. Serv-Well Furniture Co.*, 806 F.2d 1393, 1401 (9th Cir. 1986). Thus, leave to amend "is properly denied . . . if amendment would be futile." *Carrico v. City & County of San Francisco*, 656 F.3d 1002, 1008 (9th Cir. 2011).

IV. DISCUSSION

The State moves to dismiss Plaintiffs' Supremacy Clause and extraterritoriality claims on the basis that Plaintiffs lack standing, the claims are not ripe, and Plaintiffs fail to state a claim on which relief can be granted. As it must, the Court begins with the State's arguments that Plaintiffs' claims fail on ripeness and standing grounds. Having found that Plaintiffs only have standing to bring these claims as to SB 261, the Court then turns to the State's Rule 12(b)(6) attack on that claim.

A. Standing and Ripeness

The State argues that Plaintiffs lack standing to pursue their Supremacy Clause and extraterritoriality claims as to SB 261 and as to SB 253's Scope 1 and Scope 2 reporting requirements because Plaintiffs fail to raise an injury in fact. (Mot. 10–12.) At this stage, the State does not contest that Plaintiffs have standing to challenge SB 253's Scope 3 reporting requirement. (*See id.* at 12.) But the State does argue that Plaintiffs' challenges to SB 253, including the Scope 3 reporting requirement, is not ripe for review. (*Id.* at 8–10.)

To establish standing under Article III of the U.S. Constitution, a plaintiff must have "(1) suffered an injury in fact, (2) that is fairly traceable to the challenged conduct of the defendant, and (3) that is likely to be redressed by a favorable judicial decision." *Spokeo, Inc. v. Robins*, 578 U.S. 330, 338 (2016) (citing *Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560–61 (1992)). An injury in fact—the only element at issue here—is "an invasion of a legally protected interest which is (a) concrete and particularized and (b) actual or imminent, not conjectural or hypothetical." *Lujan*, 504 U.S. at 560. "A related doctrine," ripeness, "is designed to 'separate matters that are premature for review because the injury is speculative and may never occur from those cases that are appropriate for federal court action.'" *Thomas v. County of Humboldt*, --- F.4th ---, No. 23-15846, 2024 WL 5243033, at *4 (9th Cir. Dec. 30, 2024) (quoting *Portman v. County of Santa Clara*, 995 F.2d 898, 902 (9th Cir. 1993)). Therefore, "[t]he constitutional component of the ripeness inquiry is often treated under the rubric of standing and, in many cases, ripeness coincides squarely with standing's injury in fact prong." *Id.* (alteration in original) (quoting *Thomas v. Anchorage Equal Rts. Comm'n*, 220 F.3d 1134, 1138 (9th Cir. 2000)).

When "standing is challenged on the basis of the pleadings," courts "accept as true all material allegations of the complaint" and "construe the complaint in favor of the complaining party." *Id.* (quoting *Pennell v. City of San Jose*, 485 U.S. 1, 7 (1988)). "[G]eneral factual allegations of injury resulting from the defendant's conduct may suffice, for on a motion to dismiss" courts "presume that general allegations embrace those specific facts that are necessary to support the claim." *Cal. Rest. Ass'n v. City of Berkeley*, 89 F.4th 1094, 1100 (9th Cir. 2024) (quoting *Lujan*, 504 U.S. at 561).

In the FAC, Plaintiffs allege that their members are subject to SBs 253 and 261's requirements. (*See, e.g.*, FAC ¶ 9 (alleging that "members" of the U.S. Chamber "are subject to" SBs 253 and 261), ¶ 20 (identifying Chevron Corp. and

U-Haul Holding Company as members of the U.S. Chamber, among other Plaintiffs, whose annual revenues exceed $1 billion and would thus be subject to reporting requirements under SBs 253 and 261).) Plaintiffs also allege that "[b]oth laws compel a substantial amount of speech at significant expense" and will require companies spend "significant time and money . . . making public statements regarding climate change." (*Id.* ¶¶ 33, 109.) For example, with respect to SB 253, Plaintiffs allege that "[e]stimating greenhouse-gas emissions is enormously burdensome." (*Id.* ¶ 52.) And they allege that the laws "compel companies" to make statements "that they otherwise would not" make. (*Id.* ¶ 93.)

Taken together, these allegations establish that, at this stage, SBs 253 and 261 would injure at least one of Plaintiffs' members. *See Nat'l Fam. Farm Coal. v. EPA*, 966 F.3d 893, 908 (9th Cir. 2020) (holding that associational standing requires, among other things, that one of an organization's "members would otherwise have standing to sue in their own right").[7] The State challenges this conclusion, arguing that Plaintiffs fail to allege that any of its members would incur costs associated with SBs 253 and 261 that they would not otherwise incur as part of obligations under other reporting requirements. (*See* Mot. 11–12.) But, as noted, Plaintiffs allege that the laws "compel companies" to make statements "that they otherwise would not" make and that the required disclosures are "unduly burdensome." (*Id.* ¶¶ 80, 93.) These general allegations are sufficient at this stage to show that the reporting required by SBs 253 and 261 would injure at least one of Plaintiffs' members. *See Cal. Rest. Ass'n*, 89 F.4th at 1099–100.

This is not the end of the inquiry. A plaintiff bringing a pre-enforcement challenge must also show three things for it to be ripe for review: (1) an "intention to engage in a course of conduct arguably affected with a constitutional interest"; (2) that

[7] The two other requirements—that the interests the organization seeks to protect are germane to its purpose and that neither the claim asserted nor relief requested requires the participation of individual members in the lawsuit—are undisputed and satisfied here. *See Nat'l Fam. Farm Coal.*, 966 F.3d at 908.

the conduct is "proscribed by a statute"; and (3) that there is a "credible threat of prosecution" under that statute. *Arizona v. Yellen*, 34 F.4th 841, 849 (9th Cir. 2022) (citing *Susan B. Anthony List v. Driehaus*, 573 U.S. 149, 159 (2014)).

1. SB 261

Starting with SB 261, Plaintiffs demonstrate that this pre-enforcement challenge is ripe. As to the first factor, Plaintiffs have adequately alleged that their members' current business practices "are presently in conflict with the" statute. *City & County of San Francisco v. Trump*, 897 F.3d 1225, 1237 (9th Cir. 2018); *see also Cal. Trucking Ass'n v. Bonta*, 996 F.3d 644, 653 (9th Cir. 2021) (same). Therefore, Plaintiffs "have 'articulated . . . concrete plan[s]' to violate the law." *City & County of San Francisco*, 897 F.3d at 1237 (alterations in original) (quoting *Anchorage Equal Rts. Comm'n*, 220 F.3d at 1139).

As to the second factor, Plaintiffs' members' conduct—here, not reporting information required by SB 261—will violate the law. SB 261 requires covered entities to, among other things, "prepare a climate-related financial risk report disclosing . . . its climate related-risk" and the measures it "adopted to reduce and adapt to climate-related financial risk." Cal. Health & Safety Code § 38533(b)(1)(A). And SB 261 requires CARB to "adopt regulations that authorize it to seek administrative penalties from a covered entity that fails to make the" required report. *Id.* § 38533(f)(2).

As to the third factor—whether there is a credible threat of enforcement—courts consider (1) "whether the plaintiffs have articulated a 'concrete plan' to violate the law in question," (2) "whether the prosecuting authorities have communicated a specific warning or threat to initiate proceedings," and (3) "the history of past prosecution or enforcement under the challenged statute." *Yellen*, 34 F.4th at 850 (quoting *Anchorage Equal Rts. Comm'n*, 220 F.3d at 1139). As noted, Plaintiffs have shown a concrete plan to violate SB 261. And "a specific threat is [not] necessary to demonstrate standing." *Valle del Sol Inc. v. Whiting*, 732 F.3d 1006, 1015 n.5

(9th Cir. 2013). The State's failure to disavow enforcement of SB 261 favors a finding of credible threat of enforcement. *See, e.g.*, *Cal. Trucking Ass'n*, 996 F.3d at 653 ("[T]he state's refusal to disavow enforcement of AB-5 against motor carriers during this litigation is strong evidence that the state intends to enforce the law and that [plaintiff's] members face a credible threat.") Finally, "[w]here the challenged statute is new, as here, the history of past enforcement carries little, if any weight." *Yellen*, 34 F.4th at 850.

Plaintiffs have thus shown that they have standing to challenge SB 261 and that this challenge is ripe.

2. SB 253

The foregoing analysis largely applies to SB 253. But there is one critical difference: SB 253, on its own, does not mandate any action from any of Plaintiffs' members or any other reporting entity. (*See* Mot. 8–10.) Instead, SB 253 requires CARB to "develop and adopt regulations to require a reporting entity to annually disclose all of the reporting entity's scope 1 emissions, scope 2 emission, and scope 3 emissions" within the framework required in the legislation. Cal. Health & Safety Code § 38532(c)(1). For example, the legislation does not compel reporting entities to disclose Scope 3 emissions; rather, it requires CARB to "ensure that the regulations" it adopts require reporting entities to publicly disclose their Scope 3 emissions starting in 2027. *Id.* § 38532(c)(2)(A)(II). The parties have not made the Court aware of any published CARB regulations imposing any obligation on reporting entities. (*See* Mot. 8 (stating that CARB has not yet adopted any regulations implementing SB 253.)

The absence of implementing regulations may lead a controversy to be unripe where "further development by state officials may reduce or avoid constitutional problems, or change the nature of the issues presented." *Valeria G. v. Wilson*, 12 F. Supp. 2d 1007, 1026 (N.D. Cal. 1998). But this is not always the case. The Ninth Circuit has held that a challenge is ripe where "it is clear that any standard required

would impermissibly burden interstate commerce." *Union Pac. R.R. Co. v. Cal. Pub. Utils. Comm'n,* 346 F.3d 851, 870 n.20, 872 n.22 (9th Cir. 2003).

It is not clear to the Court that any possible regulations CARB issues would impermissibly burden interstate commerce or violate the Supremacy Clause. And while, as Plaintiffs correctly note, SB 253 provides that CARB "shall" issue regulations that require companies to disclose certain emissions, (Opp'n 9 (citing Cal. Health & Safety Code § 38532(c)(1))), the regulations CARB issues may alter the constitutional analysis. For example, Plaintiffs' extraterritoriality claim may depend, in part, on "whether the burden on interstate commerce clearly exceeds the local benefits." *Rosenblatt v. City of Santa Monica*, 940 F.3d 439, 444 (9th Cir. 2019). The regulations CARB adopts may affect the burden on interstate commerce, and thus may determine the outcome of that claim.

Plaintiffs also have failed to show a concrete plan to violate SB 253 where the law, on its own, does not obligate Plaintiffs' members to take any action. Further, unlike with SB 261, the State's failure to disavow enforcement of SB 253 does not constitute a threat of enforcement where SB 253 does not impose any obligations on Plaintiffs' members, and Plaintiffs have not identified some other enforcement threat. The Court's role "is neither to issue advisory opinions nor to declare rights in hypothetical cases." *Anchorage Equal Rts. Comm'n*, 220 F.3d at 1138. The Court thus finds Plaintiffs' Supremacy Clause and extraterritoriality challenges to SB 253 are not ripe for review.

Even if Plaintiffs' SB 253 challenge were constitutionally ripe, the Court would decline to exercise jurisdiction on prudential grounds. In analyzing the prudential components of ripeness, courts consider "the fitness of the issues for judicial decision and the hardship to the parties of withholding court consideration." *Id.* at 1141. For the reasons explained above, the issues are not fit for judicial decision. And Plaintiffs have not identified any hardship to delaying court consideration until after CARB issues regulations actually imposing requirements on Plaintiffs. *Compare County of*

Humboldt, 2024 WL 5243033, at *8 (finding delay in adjudication would cause hardship where plaintiffs "mod[ified] their behavior to avoid future adverse consequences").[8]

In sum, the Court has standing over Plaintiffs' Supremacy Clause and extraterritoriality challenges to SB 261. Conversely, whether labelled as standing or ripeness, the Court finds that Plaintiffs' Supremacy Clause and extraterritoriality challenges to SB 253 are not yet justiciable. Thus, the Court **GRANTS** the State's Motion as to Plaintiffs' Supremacy Clause and extraterritoriality challenges to SB 253 without prejudice.

B. Failure to State a Claim

Having found that Plaintiffs have standing to challenge SB 261 on Supremacy Clause and extraterritorial grounds, and that these claims are ripe, the Court next addresses the merits.

1. Supremacy Clause

In the FAC, Plaintiffs allege that "California lacks the authority to regulate greenhouse-gas emissions outside of its own borders" under the Clean Air Act and "principles of federalism inherent in the structure of" the Constitution. (FAC ¶ 105.) So, they allege, SB 261 violates the Supremacy Clause. (*Id.* ¶ 106.) The State moves to dismiss this claim under Rule 12(b)(6) as insufficiently pleaded. (Mot. 12–16.)

Under the Supremacy Clause, U.S. Const. art. VI, cl. 2, federal law preempts state law when "(1) Congress enacts a statute that explicitly pre-empts state law; (2) state law actually conflicts with federal law; or (3) federal law occupies a legislative field to such an extent that it is reasonable to conclude that Congress left no

[8] The only hardship Plaintiffs identify is that "the Court [would] be forced to rule on an emergency basis." (Opp'n 10 (alteration in original) (quoting *Comm. for Idaho's High Desert v. Collinge*, 148 F. Supp. 2d 1097, 1100 (D. Idaho 2001)).) Even if this were a hardship to the parties—and not just the Court—this harm is not sufficient for the Court to decline to exercise jurisdiction. First, Plaintiffs may have an opportunity to challenge SB 253 and CARB's regulations before the regulations go into effect. Second, the Court is capable of ruling on an emergency basis, if necessary, that would permit "the opportunity for a reasoned presentation and analysis." *Collinge*, 148 F. Supp. 2d at 1100.

room for state regulation in that field." *Chae v. SLM Corp.*, 593 F.3d 936, 941 (9th Cir. 2010). These are known as express, conflict, and field preemption, respectively. *See id.* Regardless of the type of preemption, the "purpose of Congress is the ultimate touchstone of pre-emption analysis." *Cipollone v. Liggett Grp., Inc.*, 505 U.S. 504, 516 (1992) (internal quotation marks omitted).

The parties debate whether Plaintiffs identify a source of federal law that precludes SB 261. (*See* Mot. 14–16; Opp'n 11–18; Reply 4–6.) Plaintiffs point generally to the Clean Air Act and foreign affairs. (Opp'n 11–18.) They also highlight "federalism and comity principles embodied in the Constitution," including that the "basic scheme of the Constitution" permits only the federal government to regulate issues regarding "air and water in their ambient or interstate aspects." (*Id.*) The State notes Plaintiffs' failure to point to specific text in the Constitution or Clean Air Act. (Mot. 14–16; Reply 4–6.)

Before addressing this dispute, the Court must answer a more fundamental question: what does SB 261 regulate? Certainly, as this Court has already found, this law regulates speech. (Order Summ. J. 7–8.) But what, if anything, else? By their own admission, Plaintiffs' claims are premised on the assumption that, through SB 261, the State is "attempt[ing] to *regulate* greenhouse-gas emissions." (Opp'n 12 (emphasis added); *see also id.* ("Applying state law to attempt to regulate these global emissions would necessarily violate the exclusivity of federal law."); *id.* at 14 (arguing that SB 261 is a "regulation[] over global greenhouse gas emissions"); *id.* at 17 ("[T]he Clean Air Act preempts state law to the extent it purports to regulate air pollution originating out of state.").) But in the FAC, Plaintiffs acknowledge that the legislation "do[es] not directly require reductions in greenhouse-gas emissions in other states." (FAC ¶ 88.) Instead, they allege that the State enacted SB 261 "to force actual reductions" through "disclosure." (*Id.*) Specifically, they allege that the law is "aimed at stigmatizing" and "sham[ing]" companies to "pressure[] them to lower their

emissions nation- and even world-wide." (*Id.* ¶¶ 89–90; *see also* Opp'n 13–15 (discussing pressure from "third parties" (emphasis omitted)).)

Taking these allegations as true, as the Court must at this stage, Plaintiffs do not state a claim on which relief can be granted. Plaintiffs fail to cite any relevant authority to support the proposition that a disclosure regime intended to regulate emissions through third-party actions is a de facto regulatory scheme subject to preemption.

Instead, Plaintiffs point to cases concerning infringement of civil liberties under the First and Fourteenth Amendments where third-party actions implicated the law's constitutionality. (*See* Opp'n 14); *NAACP v. Alabama ex rel. Patterson*, 357 U.S. 449, 463 (1958) (freedom of association); *Nat'l Ass'n of Mfrs. v. SEC*, 800 F.3d 518, 530 (D.C. Cir. 2015) (freedom of speech); *Students for Fair Admissions, Inc. v. President & Fellows of Harvard Coll.*, 600 U.S. 181 (2023) (equal protection).[9]

And Plaintiffs cite cases prohibiting a state from regulating emissions through the imposition of damages (rather than through a direct cap). (*See* Opp'n 12–18); *City of New York v. Chevron Corp.*, 993 F.3d 81, 85–86 (2d Cir. 2021) (liability for damages caused by global greenhouse gas emissions); *Int'l Paper Co. v. Ouellette*, 479 U.S. 481, 491, 493 (1987) (liability on an out-of-state point source that would allow states to "impose separate discharge standards"); *see also San Diego Bldg. Trades Council, Millmen's Union, Loc. 2020 v. Garmon*, 359 U.S. 236, 247 (1959) ("obligation to pay compensation" for conduct regulated by National Labor Relations Act "can be . . . a potent method of governing conduct and controlling policy"). In

[9] *National Association of Manufacturers* concerned speech, which, as noted, the Court has found the legislation regulates. (*See* Order Summ. J. 7–8.) Plaintiffs' citation to *Students for Fair Admissions* is further afield. They quote the Supreme Court's admonition that "what cannot be done directly cannot be done indirectly." (Opp'n 13 (quoting *Students for Fair Admissions*, 600 U.S. at 230).) But there, the Supreme Court rejected a potential workaround its ruling that would still result in universities—not indirect third parties—violating the Constitution by considering race in admissions. *Students for Fair Admissions*, 600 U.S. at 230 (permitting universities to consider an applicant's discussion of how race affected his or her life, but prohibiting universities from "simply establish[ing] through application essays or other means the regime" the Court held unlawful).

such cases, if an entity wants to "avoid all liability, then their only solution would be to" follow the de facto regulation restricting emissions. *Chevron Corp.*, 993 F.3d at 93.

SB 261 does not force this choice. It imposes no liability for failure to reduce emissions; only for failure to *disclose* climate-related financial risk and the measures adopted to reduce such risk. (*See* FAC ¶¶ 43, 63); Cal. Health & Safety Code § 38533(e)(2); *cf. Jensen Fam. Farms, Inc. v. Monterey Bay Unified Air Pollution Control Dist.*, 644 F.3d 934, 939 (9th Cir. 2011) (holding that regulation requiring owners of certain engines to register such engines by "provid[ing] information to the [government] about their engines and to pay fees" are not regulations that "involve emissions control" for purposes of preemption analysis). If Plaintiffs want to avoid liability, all they must do is make disclosures in accordance with the legislation, not reduce their emissions. The public pressure of which Plaintiffs complain is not imposed by the statute, even if it provides information that supports such campaigns. Therefore, that California enacted SB 261 "in order to stigmatize . . . companies and shape their behavior," (FAC ¶ 1), is irrelevant to the law's compliance with the Supremacy Clause.

This leaves whether the law's compelled disclosure is preempted by the Constitution or federal law. The Court thus returns to the parties' debate on whether Plaintiffs identify a source of federal law that preempts the disclosure at issue here. (*See* Opp'n 11–15.) And the Court finds that Plaintiffs fail to do so.

As discussed, SB 261 does not regulate greenhouse-gas emissions. Therefore, even if Plaintiffs are right and the "basic scheme of the Constitution" requires "that federal law alone must govern issues concerning air and water in their ambient or interstate aspects," (Opp'n 12 (internal quotation marks omitted)), this does not preempt the legislation.

In pointing to preemption based on foreign affairs, Plaintiffs cite one case tangentially related to informational disclosures. (Opp'n 13 (citing *Zschernig v.*

Miller, 389 U.S. 429 (1968)).) But that case concerned conduct beyond the mere disclosure at issue here. There, the Court invalidated probate legislation that "seems to make unavoidable judicial criticism of nations established on a more authoritarian basis than our own." *Zschernig*, 389 U.S. at 440. In *Zschernig*, the criticism of foreign governments and officials came from the government itself. *See id.* It also concerned criticism of nations, not foreign companies doing business in California. *See id.*

Plaintiffs fare no better by invoking the Clean Air Act. As to field preemption, they cite a host of laws and regulations untethered to disclosure. (*See* Opp'n 15–16 (first citing 42 U.S.C. §§ 7521(a)(1)–(2), 7571(a)(2)(A), 7547(a)(1), (5) (greenhouse-gas emissions standards for vehicles, aircraft, and nonroad engines and vehicles); then citing 42 U.S.C. § 7411(b)(1)(A)–(B), (d) (regulation of emissions from stationary sources); and then citing 42 U.S.C. § 7545(o) (regulation of consumption and use of fossil fuels)).) But they cite no Clean Air Act provision or regulation concerning disclosure of emissions that would support the notion that the field of the Clean Air Act encompasses mere disclosure of climate-related information and, in particular, climate risks and the measures adopted to minimize such risk. (*See* Opp'n 15–17.)

In arguing that SB 261 fails under conflict preemption, Plaintiffs contend that SB 261's requirements conflict with Congress's decision to regulate greenhouse-gas emissions by empowering the EPA to set emissions standards through the Clean Air Act. (Opp'n 18.) Plaintiffs offer that "if the EPA does not set emissions limits for a particular pollutant or source of pollution, California may petition for rulemaking on the matter." (Opp'n 18 (cleaned up) (quoting *Am. Elec. Power Co., Inc. v. Connecticut*, 564 U.S. 410, 425 (2011)).) That may be so. But SB 261 does not set emission limits. (*See generally* FAC); Cal. Health & Safety Code §§ 38532, 38533.

Accordingly, Plaintiffs' Supremacy Clause claim challenging SB 261 cannot survive. Having read SB 261 and the amendments thereto, the Court finds that Plaintiffs are unable to allege facts that could cure the deficiencies noted by the Court.

See Carrico, 656 F.3d at 1008 (holding that leave to amend "is properly denied . . . if amendment would be futile"). The Court thus **GRANTS** the State's Motion and dismisses Plaintiffs' Supremacy Clause claim as to SB 261 **with prejudice**.

2. Extraterritoriality

The State also moves to dismiss Plaintiffs' extraterritoriality cause of action. (Mot. 16–21.) Plaintiffs allege that SB 261 "intrude[s]" on Congress's "authority to regulate interstate and foreign commerce" and "place[s] upon interstate commerce a burden that far outweighs any benefits to" California. (FAC ¶ 108.) In so alleging, Plaintiffs invoke the dormant Commerce Clause. (*See* Opp'n 18–19.)

"The primary purpose of the dormant Commerce Clause is to prohibit statutes that discriminate against interstate commerce by providing benefits to in-state economic interests while burdening out-of-state competitors." *Ass'n des Eleveurs de Canards et d'Oies du Quebec v. Harris*, 729 F.3d 937, 947 (9th Cir. 2013) (internal quotation marks omitted) (quoting *Nat'l Ass'n of Optometrists & Opticians v. Harris*, 682 F.3d 1144, 1147 (9th Cir. 2012)).

To aid courts' review of challenges to state law under the dormant Commerce Clause, the Supreme Court has adopted a "two-tiered approach":

> [1] When a state statute directly regulates or discriminates against interstate commerce, or when its effect is to favor in-state economic interests over out-of-state interests, we have generally struck down the statute without further inquiry. [2] When, however, a statute has only indirect effects on interstate commerce and regulates evenhandedly, we have examined whether the State's interest is legitimate and whether the burden on interstate commerce clearly exceeds the local benefits.

Rosenblatt, 940 F.3d at 444 (quoting *Brown-Forman Distillers Corp. v. N.Y. State Liquor Auth.*, 476 U.S. 573, 579 (1986)). This latter tier is known as the *Pike* test. *Id.* at 451 (citing *Pike v. Bruce Church, Inc.*, 397 U.S. 137 (1970)).

a. First tier approach—direct regulation or discrimination

The Court begins where the parties do: the first-tier approach. (*See* Mot. 18; Opp'n 18.) In their Opposition, for the first time, Plaintiffs assert that the State

enacted SB 261 with a "discriminatory purpose." (Opp'n 19.) Plaintiffs' FAC is devoid of any such allegation. (*See generally* FAC.) On this basis alone, Plaintiffs' late-invocation of the first-tier approach cannot save their claim.

In any event, such a claim would fail here because plaintiffs cannot allege SB 261 discriminates against interstate commerce. *See Carrico*, 656 F.3d at 1008 (holding that leave to amend "is properly denied . . . if amendment would be futile"). SB 261 contains no "differential treatment of in-state and out-of-state economic interests that benefits the former and burdens the latter." *Rosenblatt*, 940 F.3d at 448 (quoting *Or. Waste Sys., Inc. v. Dep't of Env't Quality*, 511 U.S. 93, 99 (1994)). Nor does it "effectively prevent[] the sale" of goods in other states or "erect[] an economic barrier protecting a major local industry against competition from without the state." *Id.* (quoting *Dean Milk Co. v. City of Madison*, 340 U.S. 349, 352, 354 (1951)). And the legislation does not "fix prices in other states, require states to adopt California standards, or attempt to regulate transactions conducted wholly out of state." *Chinatown Neighborhood Ass'n v. Harris*, 794 F.3d 1136, 1146 (9th Cir. 2015). SB 261 merely requires disclosure of information related to climate risk.

Plaintiffs' theory is as follows: the State intended to regulate greenhouse-gas emissions, but if it had tailored SB 261 to California products or businesses—such that only California products or businesses would have to comply with the law—SB 261 would have put the State at a competitive disadvantage. (Opp'n 19.) So the State "tried a workaround" to "impose costs on businesses nationwide." (*Id.*) Now, as Plaintiffs tell it, all applicable businesses would have to comply with the legislation, and California businesses will no longer be at a competitive disadvantage compared to their out-of-state peers. (*See id.*) Plaintiffs contend that, as a result, California, through SB 261, "is depriving businesses and consumers in other states of the competitive advantages they would possess otherwise freed from California's overly burdensome regulatory scheme." (*Id.* (cleaned up).)

However, SB 261 applies to both California and out-of-state businesses doing business in California equally, and as Plaintiffs allege, it imposes new reporting obligations on companies doing business in California, regardless of whether they are California companies. Cal. Health & Safety Code § 38533(a)(4). Therefore, Plaintiffs cannot allege that SB 261 facially discriminates against out-of-state companies. *See Am. Fuel & Petrochemical Mfrs. v. O'Keeffe*, 903 F.3d 903, 911 (9th Cir. 2018) (finding no facial discrimination where there is no differential treatment).

Nor can Plaintiffs allege a discriminatory purpose. Even at the motion to dismiss stage, where allegations are construed in favor of the plaintiff, courts nevertheless "assume that the objectives articulated by the legislature are actual purposes of the statute, unless an examination of the circumstances forces us to conclude that they could not have been a goal of the legislation." *Id.* at 912 (finding no discriminatory purpose based on statements by state officials, "[e]ven construing the allegations in the complaint in the light most favorable" to the plaintiff at the motion to dismiss stage). As alleged, the purpose of the legislation was "to stigmatize . . . companies and shape their behavior." (FAC ¶ 1.) The legislature designed the laws "to create accountability for those" not "doing their part to tackle the climate crisis" and "to fuel pressure campaigns against businesses." (*Id.* ¶¶ 4, 23 (internal quotation marks omitted).) SB 261 states the legislature found that "[f]ailure of economic actors to adequately plan for and adapt to climate-related risks to their businesses and to the economy will result in significant harm to California, residents, and investors." 2023 Cal. Stat. 383 § 1(c). Further, "mandatory and comprehensive risk disclosure requirements" "are needed" "to address the climate crisis." *Id.* § 1(j); (*see* FAC ¶ 89.) Even assuming the purpose Plaintiffs articulate in the Opposition—to impose costs on businesses nationwide so that California companies are not at a competitive disadvantage— would be "discriminatory," neither Plaintiffs' allegations nor the objectives articulated by the legislature support such a purpose. *O'Keeffe*, 903 F.3d at 912. Examining the circumstances of this case, the Court is unable to

conclude that the legislature's avowed purpose could not have been a goal of the legislation. *See id.*

Plaintiffs' cases are inapposite. (*See* Opp'n 19–20 (citing *West Lynn Creamery, Inc. v. Healy*, 512 U.S. 186, 194–96 (1994) and *Brown-Forman*, 476 U.S. at 580).) The legislation in *West Lynn Creamery* had the "avowed purpose" and "undisputed effect . . . to enable higher cost Massachusetts dairy farmers to compete with lower cost dairy farmers in other States." 512 U.S. at 194. It was "[l]ike an ordinary tariff" that "effectively imposed" a "tax . . . only on out-of-state products." *Id.* And "[i]n *Brown-Forman*, New York required liquor distillers to affirm (on a monthly basis) that their in-state prices were no higher than their out-of-state prices." *Nat'l Pork Producers Council v. Ross (NPPC II)*, 598 U.S. 356, 372 (2023) (citing *Brown-Forman*, 476 U.S. at 576). The goal in *Brown-Forman* "was plain: New York sought to force out-of-state distillers to 'surrender' whatever cost advantages they enjoyed against their in-state rivals." *Id.* (quoting *Brown-Forman*, 476 U.S. at 580). Plaintiffs do not (nor could they) allege that the purpose of SB 261 is to benefit California businesses at the expense of out-of-state competitors.

b. Second-tier approach—burden on interstate commerce

Next, the *Pike* test. As noted, this is the second tier of the dormant Commerce Clause analysis concerning indirect regulation whose burden on interstate commerce clearly exceeds the local benefits.

In their Opposition, Plaintiffs appear to rely on the *Pike* test only to the extent that SB 261 has a discriminatory purpose. (*See* Opp'n 18–20.) Plaintiffs' arguments about the burdens and benefits of the legislation concern whether "[t]he 'practical effect[s]' of the laws confirm their 'discriminatory purpose.'" (Opp'n 19–20 (quoting *NPPC II*, 598 U.S. at 378).) Thus, for Plaintiffs' claim to survive, Plaintiffs must have alleged that California enacted SB 261 for a discriminatory purpose. And as discussed, above they have made no such allegation in the FAC.

Even putting aside that Plaintiffs have so limited their claim in the Opposition, they fail to plead a *Pike* claim on which relief can be granted. In the FAC, Plaintiffs allege three "significant burdens on interstate and foreign commerce." (FAC ¶ 109.)

First, they assert that SB 261 "require[s] companies to spend significant time and money . . . making public statements regarding climate change." (*Id.*) This allegation is insufficient because "[t]he mere fact that a firm engaged in interstate commerce will face increased costs as a result of complying with state regulation does not, on its own, suffice to establish a substantial burden on interstate commerce." *Ward v. United Airlines, Inc.*, 986 F.3d 1234, 1241–42 (9th Cir. 2021); *see also Nat'l Pork Producers Council v. Ross (NPPC I)*, 6 F.4th 1021, 1032 (9th Cir. 2021) ("For dormant Commerce Clause purposes, laws that increase compliance costs, without more, do not constitute a significant burden on interstate commerce.").

Second, Plaintiffs allege that the legislation will subject companies, including those that do not business in California, "to significant political and economic pressure." (FAC ¶ 109.) Plaintiffs do not explain how these "pressures" are burdens on interstate commerce. Nor do they show that these indirect pressures are among the derivative burdens courts have considered susceptible to challenge under the dormant Commerce Cause. *See, e.g.*, *Bibb v. Navajo Freight Lines, Inc.*, 359 U.S. 520, 527 (1959) (finding statute susceptible to dormant Commerce Clause challenge where threat of "significant delay in an operation" and requirement of additional and "exceedingly dangerous" labor); *Kassel v. Consol. Freightways Corp. of Del.*, 450 U.S. 662, 674 (1981) (plurality opinion) (finding substantial burden to interstate commerce where "law may aggravate . . . the problem of highway accidents."); *Raymond Motor Transp., Inc. v. Rice*, 434 U.S. 429, 445, & n.21 (1978) (finding substantial burden where "the regulations slow the movement of goods in interstate commerce . . . .").

Third, Plaintiffs allege that the law impermissibly "build[s] up domestic commerce through burdens upon the industry of other States" by requiring disclosure

from companies that "do little business in California," but not requiring disclosure from in-state companies that fall just below the revenue threshold). (FAC ¶ 109 (cleaned up).) While this may be true, Plaintiffs fail to articulate how this independently *burdens* commerce, a showing required to state a *Pike* claim. (*See* Opp'n.)

Thus, Plaintiffs fail to plausibly allege a significant burden on interstate commerce. Absent such an allegation, Plaintiffs, by definition, cannot show that "the burden on interstate commerce clearly exceeds the local benefits." *Rosenblatt*, 940 F.3d at 444. Therefore, Plaintiffs' allegations about the limited, if not nonexistent, benefits of the legislation, (*see* FAC ¶ 109), cannot save its claim. *See Nat'l Ass'n of Optometrists & Opticians*, 682 F.3d at 1156 (holding that "[i]n the absence of . . . [a] substantial burden on interstate commerce, we need not determine if the benefits of a statute are illusory"); *see also id.* ("Because the challenged laws . . . do not impose a significant burden on interstate commerce, it would be inappropriate . . . to determine the constitutionality of the challenged laws based on [the court's] assessment of the benefits of those laws and the State's wisdom in adopting them"). Accordingly, the Court **GRANTS** the State's Motion to Dismiss Plaintiffs' extraterritoriality claim as to SB 261. However, Plaintiffs may be able to raise plausible facts that support a burden on interstate commerce sufficient to state a claim on which relief can be granted. Therefore, the Court's dismissal as to Plaintiffs' extraterritoriality claim is **without prejudice**.

V. CONCLUSION

For the reasons discussed above, the Court **GRANTS** the State's Motion to Dismiss. (ECF No. 38.) The Court lacks jurisdiction over Plaintiffs' Supremacy Clause and extraterritoriality causes of action to the extent they challenge SB 253, and therefore **DISMISSES WITHOUT PREJUDICE** these claims as to SB 253 pursuant to Rule 12(b)(1). Additionally, the Court **DISMISSES WITH PREJUDICE** Plaintiffs' Supremacy Clause cause of action to the extent it challenges SB 261 for

failure to state a claim pursuant to Rule 12(b)(6). The Court also **DISMISSES WITHOUT PREJUDICE** Plaintiffs' extraterritoriality cause of action to the extent it challenges SB 261 for failure to state a claim pursuant to Rule 12(b)(6). Thus, the Court dismisses both Counts II and III from the First Amended Complaint.

If Plaintiffs wish to amend, they must file a Second Amended Complaint no later than **twenty-one days** from the date of this Order, in which case the State shall answer or otherwise respond within **fourteen days** of the filing. If Plaintiffs do not timely amend, the dismissal of the extraterritoriality cause of action as to SB 261 shall be deemed a dismissal with prejudice as of the lapse of the deadline to amend.

IT IS SO ORDERED.

February 3, 2025

OTIS D. WRIGHT, II
UNITED STATES DISTRICT JUDGE

Sophie Ellinghouse
Vice President, General Counsel & Corporate Secretary

March 21, 2025

California Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Submitted via the Workshop Comment Submittal Form and by email to climatedisclosure@arb.ca.gov

Re: WSPA Comments on the Information Solicitation to Inform Implementation of California Climate Disclosure Legislation: Senate Bills 253 and 261

The Western States Petroleum Association (WSPA) appreciates the opportunity to comment on the California Air Resources Board's (CARB) Information Solicitation to Inform Implementation of California Climate-Disclosure Legislation: Senate Bills (SB) 253 and 261 (2023), released on December 16, 2024.[1] WSPA is a non-profit trade association that represents companies involved in various aspects of the energy sector, such as importing and exporting, producing, refining, transporting and marketing petroleum, petroleum products, natural gas and other energy supplies in California and four other western states, and has been an active participant in air quality and climate planning issues for over 30 years.

The U.S. Chamber of Commerce and other groups representing businesses have filed a lawsuit in federal court to have SB 253 and 261 declared unconstitutional.[2] WSPA supports that lawsuit and believes the laws should be declared unconstitutional and their enforcement enjoined.

Because SB 253 and 261 are unconstitutional, CARB should not implement or enforce them. The laws violate core First Amendment rights by compelling speech through blanket disclosure obligations on any companies that satisfy their revenue thresholds, instead of focusing on California-based GHG emissions thresholds, and even if the company has never made advertisements regarding greenhouse-gas emissions, climate change, or being a "green" company, without connections to a commercial transaction.[3] These laws also impose significant burdens on interstate and foreign commerce with slim to non-existent benefits in addressing climate change, and are therefore precluded under the Supremacy Clause by the Clean Air Act. Further, these laws violate constitutional limits on extraterritorial regulation by purporting to subject companies to burdensome reporting requirements for their global emissions, regardless of what proportion of their revenue stems from California or what proportion of their emissions occurred in California. Companies will be caught up in regulated entities' efforts to report Scope 3 emissions, incurring burdensome compliance costs, regardless of their contacts with California, based on their position in the supply chain. No regulation can change the unconstitutional nature of either law. The collection of these extraordinary amounts of data and the implementation of these laws will cost millions of taxpayers' dollars to California, will be costly and detrimental to business prosperity, and will yield a disjointed collection of GHG emissions with no rationale of what the intent or use for such massive and collective reporting of GHG emissions really is.

[1] CARB. Information Solicitation to Inform Implementation of California Climate-Disclosure Legislation: Senate Bills 253 and 261, as amended by SB 219. 2024. Available at: https://ww2.arb.ca.gov/sites/default/files/2025-01/ClimateDisclosureQs_Dec2024_v2.pdf. Accessed: March 2025.
[2] See Chamber of Commerce of the United States of America v. Randolph, No. 2:24-cv-00801-ODW-PVC (C.D. Cal.)
[3] See, e.g., Nat'l Inst. of Family & Life Advocates v. Becerra, 585 U.S. 755, 766 (2018).

WSPA submits these comments to attempt to address some of the serious affordability and competitiveness issues, as well as other adverse impacts posed by these laws apart from their unconstitutionality, but WSPA iterates that the laws' core defects are impervious to any regulatory fixes.

CARB must ensure that its climate-disclosure regulations adequately assess "the potential for adverse economic impact on California business enterprises" and address competitive impacts for existing businesses, in accordance with the Board's rulemaking obligations under Cal. Gov. Code §§ 11346.3(a), (e) and 11340.1(a). California Government Code §11346.2(b)(4) also requires CARB to consider "reasonable alternatives to the regulation that would lessen any adverse impact on small business," and reasonable alternatives that are "less burdensome." To comply with these provisions, WSPA urges CARB to develop a more cost-effective reporting program that attempts to minimize compliance burdens for reporting entities.

As discussed in more detail below, WSPA emphasizes the following principles that must underlie any efforts to implement SB 253 and 261:

- **CARB should determine applicability for reporting requirements** based on a substantial portion of an entity's ordinary business being transacted in California based on the entity's GHG emissions levels, considering only direct emissions from operations within California and that are already being reported.
- **CARB should allow maximum flexibility** both by allowing reporting entities to choose which external standards and protocols to follow and in what methodology the reporting entities use**.**
- **CARB should minimize duplicative reporting requirements** by allowing companies to rely on substantially similar disclosures, consistent with CARB's duty to limit regulatory burdens.
- **CARB should not mandate compliance with the GHG Protocol**, which was not designed for regulatory compliance but rather as a voluntary reporting framework. Its methodologies present significant challenges when applied in a compliance setting.
- **Third-party assurance should function as an independent verification of data** – not a mechanism for determining regulatory compliance, enforcement, or policy interpretation.
- **WSPA believes these bills will be costly to implement and comply with**, which presents heightened legal risks for compliance reporting and will result in negative impacts to California's market competitiveness and economic development.

In response to the December 2024 information solicitation, WSPA offers the following comments:[4]

1. **SB 253 and 261 both require an entity that "does business in California" to provide specified information to CARB. This terminology is not defined in the statutes.**
   a. **Should CARB adopt the interpretation of "doing business in California" found in the Revenue and Tax Code section 23101?**
   No. Using Revenue and Tax Code Section 23101 will likely lead to further overreach and uncertainty for the regulated community – as well as for CARB – in determining scope. As the provision's thresholds are incredibly low and, in some instances, subjective, it is likely to be impossible for CARB to enforce efficiently and will likely lead to inconsistent enforcement.

   WSPA instead recommends that CARB adopt a comprehensive definition for entities based on the entity's GHG emissions levels from direct emissions in California and for entities "doing business in California" that encompass all entities that meet the total annual revenue thresholds specified in the legislation – $1 billion for SB 253 and $0.5

[4] Nothing in this submission should be considered an admission of lawfulness on the part of WSPA or its members. WSPA, and its members, reserve the right to challenge the underlying statute, or implementing regulations, as unconstitutional or otherwise unlawful.

billion for SB 261—and conduct business within the State. This may include a gradual approach, first broadly identifying reporting entities and subsequently phasing in mandatory reporting. Such an approach would align with CARB's mandate to consider alternatives that would limit regulatory burdens for covered entities by clarifying regulatory requirements and avoiding unnecessary reporting.[5]

More specifically, for purposes of SB 253 and 261, "Doing business in California" should be defined to require a substantial portion of an entity's ordinary business to be transacted there. To constitute ordinary business, activities must be indispensable to the business rather than simply incidental, such as mere ownership of real and physical property. Additionally, interstate activities, such as engaging in interstate commerce, should be specifically excluded.

WSPA further believes that GHG reporting applicability should also be based on an entity's direct emissions (Scope 1) stemming from operations within California and that are already reported to the State of California under existing regulations. Such an approach would still capture emissions activities in California, since any indirect emissions (Scope 2) from one entity would be included as direct emissions (Scope 1) from other entities. As such, companies that report GHG emissions to the State of California under existing environmental regulations should be deemed as satisfying SB 253.

b. Should federal and state government entities that generate revenue be included in the definition of a "business entity" that "does business in California?"
No comment.

c. Should SB 253 and 261 cover entities that are owned in part or wholly owned by a foreign government?
WSPA believes that GHG reporting applicability and disclosure requirements should be determined based on an entity's GHG boundary, and associated GHG emissions reports companies are already publicly disclosing that contain such information (e.g., reporting to state and federal environmental agencies), including at a consolidated parent-company level, should be considered as deemed as satisfying SB 253. Such an approach would minimize to some extent competitive disadvantages for businesses that may potentially be subject to California's new reporting rules and disclosures, consistent with CARB's rulemaking obligations pursuant to Cal. Gov. Code §11340.1(a). Such an approach would also minimize to some extent duplicative reporting requirements, which would reduce regulatory burdens for covered entities in accordance with Cal. Gov. Code §11346.2(b)(4). Furthermore, WSPA contends that ownership, including partial or full ownership by foreign governments, should not be a factor in determining applicability.

d. Should entities that sell energy, or other goods and services, into California through a separate market, like the energy imbalance market or extended day ahead market, be covered?
No comment.

2. What are your recommendations on a cost-effective manner to identify all businesses covered by the laws (i.e., that exceed the annual revenue thresholds in the statutes and do business in California)?

a. For private companies, what databases or datasets should CARB rely on to identify reporting entities? What is the frequency by which these data are updated and how is it verified?

[5] *See* Cal. Gov. Code § 11346.2(b)(4). Accessed March 2025. See Attachment A.

WSPA believes that GHG reporting applicability and disclosure requirements should be determined based on an entity's GHG boundary, i.e., direct emissions arising from entity-owned assets in California (Scope 1), and GHG emissions reports companies are already publicly disclosing that contain such information should be considered as a valid proxy submission as satisfying SB 253. As discussed above, this interpretation would help minimize to some extent competitive disadvantages for covered businesses, consistent with Cal. Gov. Code §11340.1(a), and would help to some extent reduce regulatory burdens by minimizing duplicative requirements, consistent with Cal. Gov. Code §11346.2(b)(4). Thus, such database reported to the State should be used to identify reporting entities, frequency by which data is updated, and verification procedures.

b. **In what way(s) should CARB track parent/subsidiary relationships to assure companies doing business in California that report under a parent are clearly identified and included in any reporting requirements?**
WSPA suggests allowing parent companies the option to identify their subsidiaries themselves.

General: Standards in Regulation

3. **CARB is tasked with implementing both SB 253 and 261 in ways that would rely on protocols or standards published by external and potentially non-governmental entities.**
   a. **How do we ensure that CARB's regulations address California-specific needs and are also kept current and stay in alignment with standards incorporated into the statute as these external standards and protocols evolve?**
   As indicated by CARB's question, the external standards and protocols referenced by the statutes are evolving[6] – for example, the GHG Protocol is currently undergoing revisions. If CARB mandates full compliance with the latest version of these external standards and protocols, any future changes made by their respective governing body would automatically affect California's reporting requirements—without legislative action, regulatory rulemaking, or public input. This creates regulatory uncertainty and amounts to unauthorized *de facto* rulemaking by an external organization that is not accountable to California lawmakers, regulators, or citizens. Instead, CARB should allow maximum flexibility by allowing reporting entities to (1) choose which external standards and protocols to follow, including which version thereof, and (2) choose what methodology to use. This approach retains critical reporting flexibility while providing ensuring reporting accuracy.

   CARB should recognize the intentional distinction in SB 253's statutory language regarding conformance with reporting standards. Section 2(c)(1)(A)(ii) requires only "conformance with" the GHG Protocol, whereas Section 2(c)(1)(A)(iii) mandates "full conformance with" any new standard adopted by CARB. This deliberate differentiation indicates that strict adherence to the GHG Protocol is not required for compliance with SB 253.

   b. **How could CARB ensure reporting under the laws minimizes a duplication of effort for entities that are required to report GHG emissions or financial risk under other mandatory programs and under SB 253 or 261 reporting requirements?**

[6] Greenhouse Gas Protocol's "The Greenhouse Gas Protocol, A corporate accounting and reporting standard – Revised edition" (2004); Greenhouse Gas Protocol's "GHG Protocol, Scope 2 guidance, An amendment to the GHG Protocol corporate standard" (2015); Greenhouse Gas Protocol's "GHG Protocol, Corporate value chain (Scope 3) accounting and reporting standard, Supplement to the GHG Protocol corporate accounting and reporting standard" (2013). Accessed March 2025. See Attachment A.

WSPA suggests that CARB accept other documents prepared for corporate GHG reporting, as well as existing global, federal, and state reports, to reduce duplication of efforts. This includes, but is not limited to, documents such as CARB GHG MRR reports, EPA 40 CFR 98 reporting, company annual, sustainability or climate reports. For example, reporting entities should have the option to use GHG disclosures submitted to another regulatory body as a valid proxy for SB 253 compliance, whether reported at the individual entity level or consolidated at the parent level. However, CARB may only reference such reports to the extent they contain relevant disclosures to satisfy SB 253/261's requirements and should not treat external reports as enforceable compliance documents beyond their original purpose. By recognizing these equivalent reports, CARB can meet the requirements under SB 253 and 261 while minimizing to some extent the burden on reporting entities, consistent with its rulemaking obligations pursuant to Cal. Gov. Code §11346.2(b)(4). In contrast, the imposition of unique California reporting procedures would cause the opposite result and require companies to further duplicate efforts.

WSPA suggests that CARB should accept approaches informed by, rather than requiring rigid, full adherence to, the standards incorporated into SB 253 and 261 as compliance:

- CARB should recognize the intentional distinction in SB 253's statutory language regarding conformance with reporting standards. Section 2(c)(1)(A)(ii) requires only "conformance with" the GHG Protocol, whereas Section 2(c)(1)(A)(iii) mandates "full conformance with" any new standard adopted by CARB. This deliberate differentiation indicates that strict adherence to the GHG Protocol is not required for compliance with SB 253. Instead, the statute should be read to allow for flexibility in interpretation and application, ensuring that reporting entities are not bound by rigid GHG Protocol methodologies that may be impractical, unsuitable, or nonapplicable for regulatory compliance. CARB should provide reasonable latitude in how companies achieve conformance with the GHG Protocol, allowing approaches informed by the GHG Protocol rather than imposing rigid, full adherence.

  The GHG Protocol was not designed for regulatory compliance but rather as a voluntary reporting framework, and its methodologies – present significant challenges when applied in a compliance setting. This fundamental limitation makes it unsuitable as a prescriptive regulatory tool.

  For example, one key concern is that Chapter 5 of the GHG Protocol imposes a mandatory ("shall") requirement that companies must recalculate their base year emissions after significant structure changes, such as mergers, acquisitions, or divestitures.

  While SB 253 itself does not explicitly require adherence to Chapter 5, the third party assurance process could effectively impose it if assurance providers default to requiring recalculation of base year emissions as part of their verification criteria. This creates a circular and problematic dynamic where companies are forced to apply the standards of Chapter 5 – not because SB 253 requires it, but because assurance providers do – resulting in an unintended regulatory obligation for information that is irrelevant to SB 253's statutory purpose. CARB should accordingly explicitly clarify that assurance providers are limited to assessing the accuracy and consistency of reported data within the scope of SB 253, without requiring full adherence to all aspects of the GHG Protocol.

  Moreover, the mandatory requirement of Chapter 5 is self-contradictory with the guidance in Chapter 11, which clearly denotes that updating a base year is not required if a company uses intensity goals, further exemplifying the impracticality of requiring strict adherence to the GHG Protocol for compliance purposes. CARB

could mitigate such discrepancies by explicitly authorizing conformance with either GHG Protocol guidance OR standards, rather than both. The GHG Protocol is especially fundamentally inappropriate as a prescriptive corporate reporting tool beyond Scope 1 emissions, i.e., emissions outside of a company's direct control, due to double counting of emissions and accountability distortions. A particularly flawed application of the Protocol is holding suppliers accountable for their customers' choices and their resulting absolute emissions (Scope 3). WSPA reiterates here that the GHG Protocol was *not* designed for regulatory compliance, which would present significant challenges when applied in a *compliance* setting.

Moreover, with particular reference to Scope 3 emissions, the GHG Protocol relies heavily on modeled and estimated data that often requires companies to use third-party information, industry averages, and proxy data that lack the verifiability and auditability necessary for regulatory enforcement. If CARB mandates strict adherence to the GHG Protocol, entities may be forced to report emissions using highly uncertain or unverifiable methodologies, increasing compliance risk and creating potential liability for reporting entities despite best efforts to provide accurate data. Such a requirement would be arbitrary and capricious, in contravention of rulemaking requirements.

In view of the above challenges, CARB should allow flexibility in reporting methodologies, permitting the use of alternative, compliance-focused protocols that provide more verifiable and jurisdictionally relevant emissions data, as well as permitting maximum flexibility in the application of, and deviations from, the GHG Protocol itself. This includes allowing methodology changes to enable reporting entities to continuously improve their reporting processes and select the most suitable methods for accurate and efficient reporting. This will also streamline compliance and ensure effective reporting without imposing unwarranted expenses. Additionally, CARB should establish safe harbor provisions to protect entities from enforcement risks when reporting emissions under inherently uncertain methodologies. A more pragmatic and compliance-ready approach will improve reporting integrity, and minimize regulatory uncertainty.

The above approach permitting methodology-flexibility is consistent with the principles of the GHG Protocol. For example, GHG Protocol guidance on "Identifying and Calculating GHG Emissions"[7] states that reporting companies "should use the more accurate calculation approach available to them and that is appropriate to their reporting context."

- Despite the flaws of the GHG Protocol guidance as a reporting mechanism, even if it classifies Scope 3 emissions as "an optional reporting category" since "Scope 3 emissions are a consequence of the activities of the company, but occur from sources not owned or controlled by the company." If the implementation of SB 253 cherry picks alignment with the GHG Protocol and yet also requires companies to disclose Scope 3 emissions, then at least CARB should allow companies to follow guidance from the GHG Protocol when it describes that in the disclosure of Scope 3 "[C]ompanies may want to focus on accounting for and reporting those activities that are relevant to their business and goals, and for which they have reliable information." As also noted in the GHG Protocol, "since companies have discretion over which categories they choose to report," Scope 3 may include material or

[7] https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf, Chapter 6, p. 40. Accessed March 2025. See Attachment A.

relevant emissions only.[8] Therefore, CARB should also allow reporting companies to use existing disclosures of Scope 3 or indirect emissions (such as the GHG emissions from the use of products) under voluntary frameworks as well as existing federal and state reporting as substituted compliance for Scope 3 reporting. In any case, reporting entities should not be required to report all 15 categories of Scope 3 emissions recognized by the GHG Protocol.

- Regarding alternative compliance in the case of SB 261, CARB should also allow reporting companies to use disclosures that comply with securities, environmental, and/or corporate governance laws and regulations.

- The disclosure requirements for climate-related financial risks under SB 261 should be aligned with SEC requirements and Supreme Court case law regarding *financial materiality*. Specifically, CARB should adopt SEC's long-standing financial materiality standard, i.e., a matter is material if there is a substantial likelihood that a reasonable investor would consider it important when determining whether to buy or sell securities.

c. To the extent the standards and protocols incorporated into the statute provide flexibility in reporting methods, should reporting entities be required to pick a specific reporting method and consistently use it year-to-year?
WSPA recommends that CARB permit entities the flexibility to select and modify their reporting methods over time. This adaptability is crucial for entities to respond to evolving circumstances and new processes, and be consistent with reporting in different jurisdictions, while avoiding unnecessary administrative burdens. This is especially true for entities that may report under international standards, where cross-referencing could become uniquely challenging when external standards and/or guidelines evolve over time. By allowing method changes, CARB will enable reporting entities to continuously improve their reporting processes and select the most suitable methods for accurate and efficient reporting. This flexibility will streamline compliance and facilitate effective reporting without imposing unwarranted expenses.

General: Data Reporting

4. To inform CARB's regulatory processes, are there any public datasets that identify the costs for voluntary reporting already being submitted by companies? What factors affect the cost or anticipated cost for entities to comply with either legislation? What data should CARB rely on when assessing the fiscal impacts of either regulation?
WSPA is unaware of any public datasets that detail the costs associated with voluntary reporting currently submitted by companies. We do, however, encourage CARB to review the published comments submitted by individual registrants to the SEC's rulemaking proposal on climate-related disclosures. These comments provide a clear indication of the enormity of the above-anticipated compliance costs for climate-related disclosures akin to those required by California's SB 253 and 261.

Key cost drivers include the reporting of duplicative and irrelevant metrics, including costs of hiring and training of employees for reporting tasks, reviewing and consulting on technical standards, software development / purchase costs, use of external consultants to assist with ensuring compliance, as well as third-party assurance requirements, including costs of engaging a third-party auditor and allocating employee resources to assist with the audit. These factors can significantly increase the financial burden on entities required to comply

[8] https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf, Chapter 4, p. 24. Accessed March 2025. See Attachment A.

with the legislation. WSPA recommends that CARB maintain flexibility in report type, assurance provider, and timeline to streamline compliance and reduce unnecessary expenses. CARB is required to account for potential adverse economic impacts on California business enterprises and competitive impacts for existing businesses.[9]

WSPA believes that these bills will be costly to implement and to comply with, which will result in negative impacts to California's market competitiveness and economic development:

- The SEC has acknowledged the potential harm the proliferation of climate disclosure rules can cause, describing the final SEC climate rule as "deeply flawed" with the potential to "inflict significant harm on the capital markets and our economy." Furthermore, we believe that the SEC's cost estimates were significantly understated, especially for large entities, which require substantial time and millions of dollars in costs for data and information collection, IT system solutions, services provided and other related tools, techniques, and expertise.

- WSPA believes that CARB should avoid an outcome in which the implementation of SB 253 and 261 will lead to additional inefficiencies and unnecessary costs incurred by multiple parties across the value chain, without necessarily yielding useful information to investors and other stakeholders. This implementation will be costly and will necessitate widespread changes in accounting and reporting, including costs associated with staffing, auditing, legal and verification expenses. Systems, processes, and controls will need to be implemented, yet in the end companies will be left to guess or generalize basic estimates and assumptions, particularly in the case of a mandatory disclosure of Scope 3. The challenge for companies to report new metrics, for which there are no well-established and vetted precedents will be extraordinarily expensive for all, with costs ultimately being passed through to end-consumers and with likely impacts on contracts and arrangements with suppliers and business partners, and other third-party companies that will likely be forced to collect and provide data to reporting companies in an attempt to support complying entities. For instance, Scope 3 GHG emissions accounting will require intensely detailed accounting and considerable speculation, all the while being incredibly costly to implement. One example underscoring the impracticality, if not downright impossibility, of this task is that reporting entities may very well be tasked with trying to obtain consistent and reliable data from smaller supply-chain participants who are not themselves subject to the disclosure rules at issue. As a result, in-state projects will likely have increased overall costs. In fact, as SB 253 was being negotiated last year, CARB's recommendation and draft amendments to SB 253 proposed removing requirements for businesses to report Scope 3 emissions in light of implementation costs. CARB should reconsider the merits of these comments regarding the cost of compliance and lack of data reliability and take them into consideration in developing the GHG emissions reporting under the proposed program.

WSPA further believes that there will be heightened legal risks for companies reporting under SB 253 and 261, which will be an additional cost of implementation. CARB's decisions on the implementation of SB 253 and 261 most likely will create liability risk arising for the use of, or reliance on, any data or information provided under its contemplated approach potentially attracting alleged and unfounded greenwashing, consumer fraud and/or human rights claims in the United States and also from other jurisdictions in the world.[10] For instance, Scope 3 GHG emissions data is often imprecise and difficult to

[9] *See* Cal. Gov. Code §§ 11346.3(a), (e) and 11340.1(a). Accessed March 2025. See Attachment A.

[10] Canada's Bill C-59 (which amended Canada's Competition Act by improving, among others, deceptive marketing practices provisions such as environmental claims and benefits of products and business activities) and European directives such as CSRD and CSDDD, among others. Accessed March 2025. See Attachment A.

meaningfully quantify due to estimation uncertainties and data limitations. The resulting Scope 3 disclosures would expose companies to undue second-guessing and liability associated with providing such information without any considerable liability protections. As mentioned above, companies would need to share value chain GHG emissions, including Scope 3 GHG emissions that result from assets and/or operations not controlled or owned by them. Calculating Scope 3 GHG emissions involves many different judgment calls, all with competing advantages and disadvantages. The verification of Scope 3 GHG emissions further depends on the level of transparency of companies in the value chain. And due to limited and/or the inconsistent disclosure of Scope 1 and 2 GHG emissions from certain value chain partners, it may not always be possible to fully calculate value chain GHG emissions in a manner that is comparable, consistent, and reliable across companies.

5. **Should the state require reporting directly to CARB or contract out to an "emissions" and/or "climate" reporting organization?**
   WSPA strongly recommends that the state mandate direct reporting to CARB rather than outsourcing to third-party organizations. This recommendation stems from significant concerns about data security and the potential complications associated with third-party involvement. Direct reporting to CARB increases the likelihood, as compared to reporting to third-party organizations that sensitive data is consistently handled in an appropriate and consistent manner, allowing maximum oversight from stakeholders, while limiting the potential introduction of partiality by third party organizations. Additionally, CARB is uniquely positioned to develop a reporting program and directly receive reports from entities given its extensive expertise and experience in monitoring and reducing GHG emissions. By leveraging this expertise, CARB can streamline the process for reporting entities and increase the usefulness of the reporting program to interested stakeholders much more effectively than a third-party organization.

   To further ensure data security, WSPA urges CARB to develop clear guidance on how it will organize and use the data provided by entities, while protecting the confidentiality of proprietary information. This approach will clarify data requirements and prevent reporting entities from submitting extraneous information, thereby reducing unnecessary administration costs for both CARB and the reporting entity involved.

6. **If contracting out for reporting services, are there non-profits or private companies that already provide these services?**
   For the reasons stated in the response to Question 5, WSPA strongly recommends direct reporting to CARB.

SB 253: Climate Corporate Data Accountability Act

7. **Entities must measure and report their emissions of greenhouse gases in conformance with the GHG Protocol[11], which allows for flexibility in some areas (i.e. boundary setting, apportioning emissions in multiple ownerships, GHGs subject to reporting, reporting by sector vs business unit, or others). Are there specific aspects of scopes 1, 2, or 3 reporting that CARB should consider standardizing?**
   As noted above, the GHG Protocol was designed to be a voluntary framework and not for regulatory compliance. CARB should therefore not only permit maximum flexibility in application of the GHG Protocol, but also permit entities to fulfill SB 253 reporting obligations with approaches informed by, rather than requiring strict adherence to, the Protocol.

   WSPA further advises against standardizing or restricting the methods for any specific aspects of reporting beyond what the GHG Protocol already standardizes. Flexibility allows

[11] https://ghgprotocol.org/

corporate reporters to align their GHG accounting and reporting practices with the context of their business models and reporting practices. It also classifies Scope 3 emissions as an "optional reporting category." This approach maintains the necessary flexibility for reporting entities, allowing them to adapt to evolving circumstances and new processes, while avoiding some unnecessary administrative burdens, consistent with CARB's rulemaking obligations pursuant to Cal. Gov. Code §11346.2(b)(4). For example, with respect to organizational boundary setting, entities should have flexibility in any consolidation approach selected. Specifically, if parent companies elect to report on a consolidated approach, they should have the option to report only on entities over which they have operational control, rather than financial or equity control. This flexibility would help avoid the significant reporting burden for non-operators of collecting data from operators and mitigates challenges related to the quality, accuracy, and integrity of the reported information.

Additionally, minimizing standardization for Scope 3 emissions is essential due to the inherent complexity and variability in what these emissions encompass for individual reporting entities and how those are calculated. Unlike Scope 1 and 2 emissions, which are somewhat within a company's control, Scope 3 emissions depend on numerous external factors, including supply chain operations and end-user behavior. The ability to calculate them depends on data availability, which is outside the reporting entities' control, such as from smaller supply-chain participants who are not themselves subject to the disclosure rules at issue. Given these factors, strict standardization could lead to significant compliance costs without improving the accuracy or usefulness of reported emissions. As such, companies should have no reporting obligations for Scope 3 emissions whatsoever. Should companies voluntarily elect to disclose Scope 3 emissions, they should further have discretion to only report for the categories that are most relevant to their business enterprises, including those that are already reported externally. In any case, reporting entities should not be required to report all 15 categories of Scope 3 emissions recognized by the GHG Protocol.

For those entities that choose to disclose Scope 3 emissions, WSPA believes that CARB should allow those reporting companies to use existing disclosures of Scope 3 emissions (such as the GHG emissions from the use of products) under voluntary frameworks as well as existing federal and state regulatory reporting as described above. Otherwise, any CARB-required deviation from, or addition to, voluntary reporting frameworks such as ISSB Standards could lead to divergent reporting practices and undermine the usefulness of an entity's disclosures. Further, any such deviations may impact the modified disclosure standard's interoperability with other jurisdictional requirements to which multinational companies may be subject. The justification for CARB deviating from voluntary reporting frameworks such as the ISSB Standards must therefore meet a high degree of scrutiny, based on a clear, specific, and transparent rationale.

8. **SB 253 requires that reporting entities obtain "assurance providers." An assurance provider is required to be third-party, independent, and have significant experience in measuring, analyzing, reporting, or attesting in accordance with professional standards and applicable legal and regulatory requirements.**
   a. **For entities required to report under SB 253, what options exist for third-party verification or assurance for scope 3 emissions?**
      The assurance requirements for Scope 3 emissions in 2030 are subject to review by CARB on or before January 1, 2027, regarding the feasibility of obtaining such an assurance. No level of third-party assurance should be required for Scope 3 emissions due to existing uncertainties regarding these emissions.

b. For purposes of implementing SB 253, what standards should be used to define limited assurance and reasonable level of assurance? Should the existing definition for "reasonable assurance[12]" in MRR be utilized, and if not why?
CARB should explicitly authorize use of ISO 14064-3:2019 for purposes of obtaining assurance, noting that this GHG-specific attestation standard is the most predominantly used in the United States. However, CARB should maintain flexibility for reporting entities to use other standards, such as applicable GHG emissions reporting standards.

To support the need for process flexibility and efficiency, widespread application of the MRR verification process for out-of-state emissions reporting would prove to be an excessive administrative and capital burden on a program that does not have the critical financial underpinnings of a Cap-and-Trade program.

While reporting entities should retain flexibility to utilize the MRR program's 'reasonable assurance' standards in order to limit duplicative reporting requirements, since these standards currently apply to Scope 1, 2, and 3 emissions reporting for California-based emissions activities, the MRR standards should not be required for all reported emissions, particularly out-of-state emissions that do not already meet these requirements. The MRR emphasizes *compliance* obligations,[13,14] where facility-level emissions are subject to an emissions cap and tied to an entity's compliance obligation under the Cap-and-Trade program – thereby incentivizing investments and/or credit market participation.[15] The definition of "reasonable assurance" in the MRR is effectuated through the verification process, which "must establish reasonable assurance of conformance with measurement accuracy requirements in §95103(k) for measurements used to calculate covered emissions and covered product data." These requirements impose meter accuracy, calibration, and inspection obligations that potentially require removal from service, incurring unit downtime and lost operational opportunity. Verification requirements also extend to CARB's Low Carbon Fuel Standard,[16] to "ensure integrity in the LCFS credit market" as was proposed to a standard of reasonable assurance.[17] In contrast, SB 253 is primarily for disclosure purposes, rather than specific compliance obligations. The State has clarified that MRR assurance is distinct from California's other GHG programs and SB 253 disclosure objectives. In any case, it is justified and appropriate for CARB to limit the extent to which any reporting entity would need to provide emissions information at all and, if any reporting is required, that reporting should be limited to an entity's direct GHG emissions from entity-owned assets in California.

CARB should develop clear definitions for 'reasonable assurance' and 'limited assurance' that align with existing corporate reporting standards. Specifically,

[12] "Reasonable Assurance" under MRR means a "high degree of confidence that submitted data and statements are valid."
[13] See CARB 2019 Annual Enforcement Report, June 2020, at page 44: "CARB's Mandatory Reporting Program requires companies to report greenhouse gas emissions to support the implementation of the Cap-and-Trade Program and AB 32 GHG Inventory. When emission reports are inaccurate, the Cap-and-Trade program may be impacted, as a result, CARB penalties in this program can be substantial.": https://ww2.arb.ca.gov/sites/default/files/2020-06/2019_Annual_Enforcement_Report.pdf. Accessed March 2025.
[14] AB 32 explicitly supported verification under CARB's Cap-and-Trade Program, calling for CARB to "adopt regulations to require the reporting and verification of statewide greenhouse gas emissions and to monitor and enforce compliance…" HSC §38530(a). Accessed March 2025. See Attachment A.
[15] See CARB Appendix C, Staff Report: Initial Statement of Reasons, Proposed Amendments to the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms Regulations, Revised Standardized Regulatory Impact Assessment (SRIA), dated August 2, 2016, "Benefits to Typical Businesses" at page 13: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2016/capandtrade16/appc.pdf. Accessed March 2025.
[16] See CARB Staff Report: Initial Statement of Reasons at Public Hearing to Consider Proposed Amendments to the Low Carbon Fuel Standard Regulation, dated March 6, 2018, "Addition of Third-party Verification" at page EX-6: https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2018/lcfs18/isor.pdf?_ga=2.89110427.125262710.1742331596-2090891991.1736186241. Accessed March 2025.
[17] See CARB Staff White Paper, "Framework for Development of a Low Carbon Fuel Standard Verification Program" dated October 21, 2016: https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/lcfs_meetings/verification_whitepaper_102116.pdf. Accessed March 2025.

reasonable assurance verification should be allowed to be based on analytical reviews, proxy data, inquiries, and limited sampling efforts. Similarly, 'limited assurance' should be designed as a less extensive verification process than reasonable assurance.

CARB should also clearly define the scope of third-party assurance to ensure that assurance providers are limited to verifying the accuracy of reported emissions data and are not tasked with assessing compliance with SB 253's regulatory requirements. Allowing assurance providers to act as compliance auditors would improperly delegate regulatory authority to private entities, resulting in arbitrary and fragmented enforcement based on the interpretations of individual assurance firms.

Third-party assurance should function as an independent verification of data. It should not function as a mechanism for making determinations on regulatory compliance, enforcement, or policy interpretation. Compliance assessments should remain solely within CARB's jurisdiction to preserve regulatory uniformity and avoid the risk of inconsistent enforcement across entities based on which assurance provider they engage.

9. **How should voluntary emissions reporting inform CARB's approach to implementing SB 253 requirements? For those parties currently reporting scopes 1 and 2 emissions on a voluntary basis:**
   a. **What frequency (annual or other) and time period (1 year or more) are currently used for reporting?**
   While annual reporting is used by some entities who currently report greenhouse gas emissions under certain reporting programs, other reporting programs may operate on a multi-year rotation basis. WSPA recommends that CARB also consider a reporting period longer than one year.

   b. **When are data available from the prior year to support reporting?**
   Data from the prior year is generally not available for external reporting purposes until the third or fourth quarter of the following year, with Scope 3 emissions data often taking even longer given the need to acquire and verify information from external parties. As CARB develops reporting timelines, WSPA recommends that CARB take these factors into account, as sufficient time is essential for reporting entities to compile, verify, and ensure the accuracy of their data to the extent feasible. In particular, WSPA encourages that CARB should consider implementing a later deadline for Scope 3 emissions reporting, as more flexibility is required due to the complex and inherently uncertain nature of the data. The timelines proposed by CARB should not conflict with those for MRR timelines for mandatory reporting requirements based on the jurisdiction(s) applicable to the parent company reports.

   c. **What software systems are commonly used for voluntary reporting?**
   Companies often use a variety of reporting tools for tracking, measuring, and managing their GHG emissions. Traditional methods range from spreadsheet programs like Microsoft Excel or Google Sheets, which are highly manual, time-consuming, and resource-intensive processes, to specialized emissions software systems designed to streamline and enhance reporting processes. Although specialized software systems offer advantages over manual methods, they require sustained and substantial investment by reporting companies. This includes initial system design, configuration, and ongoing maintenance by information technology and emissions subject matter experts to ensure emission reporting compliance. These more specialized solutions may therefore not be appropriate or feasible to implement for all companies and could needlessly drive up the cost of compliance for companies that prefer to use more traditional methods. Accordingly, CARB should not prescribe a specific emissions

reporting tool or software, allowing companies to select the most appropriate reporting solution for their unique situations and needs.

SB 261: Climate Related Financial Risk Disclosure

10. **For SB 261, if the data needed to develop each biennial report are the prior year's data, what is the appropriate timeframe within a reporting year to ensure data are available, reporting is complete, and the necessary assurance review is completed?**
Consistent with the response to Question 9, WSPA identifies the earliest appropriate time that this data can be made available to be the third or fourth quarter of the following year, as data from the prior year are generally not available until then.

11. **Should CARB require a standardized reporting year (i.e., 2027, 2029, 2031, etc.), or allow for reporting any time in a two-year period (2026-2027, 2028-2029, etc.)?**
WSPA recommends that CARB allow flexibility within a two-year reporting period to accommodate varying company needs and operational cycles. This approach would provide companies with the necessary flexibility to meet reporting requirements in a manner that aligns with their specific operational timelines. This approach will likely help ease the use of external resources within the same period – especially given that there are limited number of consultants available.

12. **SB 261 requires entities to prepare a climate-related financial risk report biennially. What, if any, disclosures should be required by an entity that qualifies as a reporting entity (because it exceeds the revenue threshold) for the first time during the two years before a reporting year?**
WSPA supports a phased approach for entities newly qualifying under SB 261. For those exceeding the revenue threshold for the first time within the two years before a reporting year, WSPA recommends instituting a staggered approach with a reasonable lead-time allowance such that initial disclosures should focus on governance of climate risks and publicly available targets, as appropriate for the entity. More complex elements should be introduced later, as needed. This phased approach helps make the reporting burden more manageable, and allows entities more time to develop disclosures.

13. **Many entities that are potentially subject to reporting requirements under SB 261 are already providing other types of climate financial risk disclosures.**
    a. **What other types of existing climate financial risk disclosures are entities already preparing?**
    WSPA is aware of entities providing disclosures in sustainability reports, climate reports, and annual reports on Forms 10-K or international equivalents (i.e., with CDP) if required. In addition to the TCFD recommendations per UK Listing Rules, some entities are also subject to and reporting against the climate-related disclosure requirements in the European Sustainability Reporting Standards (ESRS) E1 Climate Change per the EU Corporate Sustainability Reporting Directive (CSRD) for the first time this year (FY2024). However, the EU CSRD should not be looked to as a model regulation. In particular, WSPA notes here that the European Commission is considering an "Omnibus" legislative package[18] to simplify their sustainability reporting requirements and make significant changes to sustainability reports, recognizing that to boost competitiveness and growth, the European Union needs "to foster a favourable business environment and ensure that companies are not stifled by excessive regulatory burdens."

[18] See "Commission simplifies rules on sustainability and EU investments, delivering over €6 billion in administrative relief" dated February 26, 2025 at https://finance.ec.europa.eu/publications/commission-simplifies-rules-sustainability-and-eu-investments-delivering-over-eu6-billion_en. Accessed March 2025. See Attachment A.

b. **For covered entities that already report climate related financial risk, what approaches do entities use?**
WSPA is aware of approaches using a financial materiality standard aligned with U.S. SEC requirements and Supreme Court case laws as a way to determine if a risk is significant and relevant for disclosure to stakeholders. CARB should adopt SEC's long-standing financial materiality standard for SB 261 disclosures, i.e., a matter is material if there is a substantial likelihood that a reasonable investor would consider it important when determining whether to buy or sell securities.

Adopting a financial materiality standard would help limit reporting burdens while still ensuring that reports disclose material risks, and would be consistent with existing SEC requirements that reporting entities are already familiar with. Other materiality standards, such as the EU Corporate Sustainability Reporting Directive's double materiality standard, would impose an undue burden on reporting entities, and would conflict with CARB's obligation to reduce regulatory burdens for covered entities, pursuant to Cal. Gov. Code §11346.2(b)(4).

c. **In what areas, if any, is current reporting typically different than the guidance provided by the Final Report of Recommendations of the Task Force on Climate-related Financial Disclosures?**
WSPA notes here that not all areas identified by the Task Force on Climate-Related Financial Disclosures may be relevant to a business entity, informative to users of the report, or appropriate for disclosure. For example, a company may opt not to disclose their transition plans in detail because of the confidential nature of their business strategy.

d. **If not consistent with the Final Report of Recommendations of the Task Force on Climate-related Financial Disclosures, are there other laws, regulations, or listing requirements issued by any regulated exchange, national government, or other governmental entity that is guiding the development of these reports?**
Again, there may not be specific reports but rather disclosures within financial or annual reports, such as those in Forms 10-K. As discussed above, reporting thresholds should align with existing SEC financial materiality thresholds and existing Supreme Court precedent.

Thank you for considering our comments. We would welcome the opportunity to discuss these concerns in more detail. If you have any immediate questions, please feel free to contact me at sellinghouse@wspa.org. We look forward to working with you on these important issues.

Sincerely,

Sophie Ellinghouse
Vice President, General Counsel & Corporate Secretary

Tanya DeRivi
Senior Director, California Climate and Fuels

October 27, 2025

California Corporate Greenhouse Gas (GHG) Reporting
and Climate Related Financial Risk Disclosure Programs
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Uploaded to Public Comment Portal and submitted by email to: climatedisclosure@arb.ca.gov

Re: WSPA Comments on Draft Reporting Template for Scopes 1 and 2 GHG Emissions

The Western States Petroleum Association (WSPA) appreciates the opportunity to comment on the draft reporting template for Scope 1 and Scope 2 GHG emissions (Draft Reporting Template) issued by the California Air Resources Board (CARB or Agency) to implement the Climate Corporate Data Accountability Act (Senate Bill (SB) 253).

CARB published the Draft Reporting Template to assist covered entities with the submission of information.[1] While use of the template for the 2026 reporting cycle is voluntary,[2] WSPA believes that substantive changes and clarifications are needed to ensure it is minimally burdensome for covered entities to use. WSPA is a non-profit trade association representing companies that import and export, produce, refine, transport, and market petroleum, petroleum products, alternative fuels, natural gas, and other energy supplies in California and four other western states, and has actively participated in air quality planning issues for over 30 years.

WSPA notes that the U.S. Chamber of Commerce, along with other business organizations, has filed a federal lawsuit seeking to have SB 253 and the Climate-Related Financial Risk Act (SB 261) declared unconstitutional.[3] WSPA supports this legal challenge and maintains that these statutes should be invalidated and their enforcement enjoined. Accordingly, CARB should refrain from further implementation actions related to these laws and, at a minimum, defer any such actions until the pending litigation is fully resolved.

In the meantime, WSPA submits the following comments in response to the proposed Draft Reporting Template.[4]

1. The Draft Reporting Template is overly complex and may result in inconsistent and inaccurate reporting.

WSPA appreciates CARB's intent "to streamline reporting, especially for entities disclosing GHG emissions for the very first time."[5] However, there are concerns that use of the Draft Reporting Template, which contains nearly 200 spreadsheet rows,[6] is likely to result in over-reporting, impose undue administrative burdens, and compromise the accuracy and consistency of reported information. Rather than serving to facilitate reporting, the spreadsheet appears to collect an excessive volume of

[1] *See* CARB, *California Corporate Greenhouse Gas Reporting Program: Scope 1 and Scope 2 Emissions Draft Reporting Template* (Oct. 10, 2025), https://ww2.arb.ca.gov/sites/default/files/2025-10/Draft%20Memo_Scope1%262TemplatePublicRelease.pdf (hereinafter *CARB Memo*).
[2] *See* CARB, "Posted for Public Comment: Draft Reporting Template for Scope 1 and Scope 2 Greenhouse Gas Emissions Pursuant to Health and Safety Code § 38532" (Oct. 10, 2025), https://content.govdelivery.com/accounts/CARB/bulletins/3f5f953.
[3] *See Chamber of Com. of the U.S. v. Randolph*, No. 24-00801(C.D. Cal., Jan. 30, 2024).
[4] Nothing in this submission should be construed as an admission of the lawfulness of SB 253 or SB 261 by WSPA or its members. WSPA and its members reserve all rights to challenge the underlying statute or any implementing regulations as unconstitutional or otherwise unlawful.
[5] *See CARB Memo*, at 1.
[6] Unless otherwise indicated, all references to row numbers refer to the second tab of the Draft Reporting Template, titled "Form."

information, much of which exceeds the requirements of SB 253.[7] Although WSPA appreciates CARB's efforts to provide optionality for certain inputs, the inclusion of 97 "Optional Fields" risks creating compliance ambiguity, regardless of the good faith effort by covered entities to comply, and extends beyond the statutory scope of what is contemplated by the statute. Furthermore, some of the inputs are likely seeking confidential business information, which raises significant concerns in a highly competitive business environment.

Additionally, WSPA continues to encourage CARB to allow the use of third-party auditor statements as a sufficient means to report emissions, methodology, and key assumptions. Even though the Draft Reporting Template requires third-party verification only for total Scope 1 and Scope 2 emissions, WSPA requests explicit confirmation from CARB that more granular, disaggregated data reported for Scopes 1 and 2 emissions under the Draft Reporting Template are not subject to separate third-party verification requirements. WSPA urges CARB to confirm that third-party verification statement is limited to attesting to the total Scope 1 and Scope 2 emissions only.

Accordingly, WSPA recommends that CARB limit required disclosures to Scopes 1 and 2 emissions of the reporting entity, and permit disaggregated reporting only for material emission sources. To the extent CARB seeks any disaggregated reporting, such reporting should be restricted to GHGs only where an individual gas emissions are determined to bede minimis.[8] Alternatively, if CARB requires full disaggregation of GHG emissions, de minimis GHGs should be permitted to be grouped under a single "Other Gases" line item to maintain transparency without unnecessary complexity. Further, CARB should revise its treatment of de minimis sources (e.g., spreadsheet row 70) to allow qualitative references in lieu of requiring quantitative estimates. These changes would help reduce administrative reporting burdens and enhance the clarity and usability of reported information.

Finally, CARB should confirm that any data disclosed at a more granular level for Scope 1 and Scope 2 emissions, pursuant to the voluntary use of this draft form, will *not* be subject to separate third-party verification requirements.

2. The proposed definition of "materiality threshold" is vague and may lead to unnecessary over-reporting.

The Draft Reporting Template defines a materiality threshold as "a rule you set to decide which emission sources are so small (immaterial) that they do not need to be included in the inventory because their exclusion will not significantly affect the accuracy of the report." While WSPA appreciates CARB's efforts to provide guidance, this definition is overly vague. The Draft Reporting Template includes certain categories, such as on-site mobile sources, that covered entities would reasonably determine to be immaterial and therefore would not report. For example, WSPA recommends that CARB remove spreadsheet row 48, which states "Scope 1: Enter your total direct emissions from Mobile Combustion (in $mtCO_2e$)" given that portable internal combustion engines are excluded under the Mandatory GHG Reporting Regulation.

3. WSPA strongly supports optionality for the reporting of boundaries.

WSPA supports the flexibility offered under the GHG Protocol, which allows reporting entities to select their preferred reporting approach for boundaries and reporting standards. WSPA strongly recommends that CARB retain flexibility by allowing entities to select from any of the three boundary approaches defined by the GHG Protocol: equity share, financial control, or operational control. Allowing reporting entities to align with established sustainability and investor reporting practices, including industry best practices (e.g., sustainability reporting guidance for the oil and gas industry released by International Petroleum Industry Environmental Conservation Association, the American Petroleum Institute, and the

[7] California Health & Safety Code § 38532(c)(2)(A)(i)(I)) requires reporting entities to "publicly disclose … all of the reporting entity's [S]cope 1 emissions and [S]cope 2 emissions for the reporting entity's prior fiscal year." This statutory language suggests a focused disclosure of total Scopes 1 and 2 emissions.

[8] As used throughout this document, the term "material" refers to any matter for which there is a substantial likelihood that a reasonable investor would consider it important when making an investment decision.

International Association of Oil and Gas Producers) would mitigate confusion arising from inconsistent presentations and enhance the usefulness of reported information by recognizing diverse corporate structures. Limiting the reporting boundary to a single approach would undermine flexibility and compromise the ability to refine future reporting in alignment with the GHG Protocol as it and entity operations evolve over time. In sum, CARB should explicitly allow covered entities to select the boundary methodology most appropriate for their respective operations and disclosures.

WSPA respectfully submits the following comments regarding specific sections of the Draft Reporting Template and accompanying memorandum:

- **Disclosing emissions by source versus gas.** CARB should not adopt any disaggregation requirement. Should disaggregation be required, the Draft Reporting Template introduces unnecessary complexity by requiring Scopes 1 and 2 emissions to be reported by *both* source and individual GHG species. This complexity is compounded by the inherent differences between source-based Scope 1 emissions and Scope 2 emissions. For example, the Draft Reporting Template requests Scope 1 emissions by stationary, mobile, process, and fugitive sources; while Scope 2 emissions are requested by electricity, heating, steaming and cooling sources. These differences impose additional reporting burdens and diminish stakeholders' ability to understand the information reported. Adopting an approach focused on aggregated reporting by material GHG, consistent with the GHG Protocol, would avoid the complexities associated with source-based disaggregation and enable a unified reporting bases for both Scopes 1 and 2 emissions.
    - *CARB should use a simplified approach focused on aggregated emissions reporting by material GHG species.*

- **Reporting emission reduction initiatives.** While WSPA supports the recognition of emission reduction initiatives, CARB should ensure that reporting requirements remain flexible, technology-agnostic, aligned with primary reporting objectives. Reporting criteria should be clearly defined to avoid confusion to encourage transparency and innovation.
    - *CARB should designate emissions reduction reporting fields as voluntary and ensure that all criteria are clear and defined.*
    - *CARB should align its reporting requirements with established global frameworks, such as the GHG Protocol's market-based accounting and Energy Attribute Certificates guidance.*
    - *CARB should allow the optional disclosure of emissions reduction goals and progress.*

- **Inconsistent or incomplete industry-specific data.** The Draft Reporting Template references the U.S. Environmental Protection Agency's (EPA's) Corporate Climate Leadership Simplified GHG Emissions Calculator, which is intended only for entities beginning to develop an inventory. While this tool may be suitable for generalized reporting, it would not completely capture refinery process emissions (*see* 40 C.F.R. Part 98 Subpart Y).

- **Reporting nitrogen trifluoride (NF_3).** NF_3 is one of the seven GHGs recognized under the GHG Protocol and is widely included in global reporting frameworks. Its omission from the draft template may hinder alignment with international standards.
    - *If CARB elects to retain optional reporting of emissions by CO_2e gases, it should add NF_3 in the Scope 1 reporting section.*

- **Reporting emission reductions from renewable contracts**. Spreadsheet rows 74 and 75 request reductions in carbon dioxide (CO_2) only. However, renewable electricity and gas reduce multiple GHGs, including methane (CH_4).
    - *CARB should revise these rows to request reporting in metric tons of CO_2 equivalent ($mtCO_2e$).*

- **Addition for Scope 1 reporting – stationary combustion sources.** Should CARB proceed with allowing voluntary reporting of Scope 1 emissions by source, WSPA notes that stationary combustion can be a significant source of direct emissions but is not explicitly included in the draft template.
    - *CARB should add a dedicated row for reporting Scope 1 emissions from stationary combustion*

sources, immediately following spreadsheet row 47. For example, spreadsheet row 48 could state: "Scope 1: Enter your total direct emissions from Stationary Combustion (in $mtCO_2e$)."

- **Addition for Scope 2 reporting – purchased electricity.** Should CARB proceed with allowing voluntary reporting of Scope 2 emissions by source, WSPA notes that purchased electricity is a primary source of Scope 2 emissions and should be distinctly reported.
  - *CARB should add a dedicated row for Scope 2 emissions from purchased or acquired electricity immediately following spreadsheet row 54. For example: "Scope 2: Enter your total indirect emissions from Purchased/Acquired Electricity (in $mtCO_2e$)."*

- **Reporting volumetric vs. revenue-based emissions intensity.** Spreadsheet rows 51 and 58 (e.g., emissions per million dollars in revenue) do not consistently reflect emissions performance across industries and may distort performance comparisons, especially in sectors with volatile pricing. Additionally, these metrics may seek disclosure of confidential business information (CBI). CARB should replace the revenue-based metric with a volumetric alternative, such as emissions per unit of production or throughput. If CARB determines that a performance metric of this type remains necessary, it should instead adopt a volumetric alternative (e.g., emissions per unit of production or throughput) and relocate these questions to the optional section.
  - *CARB should remove spreadsheet row 51, which states, "Enter Scope 1 emission intensity per million dollars in revenue (in $mtCO_2e$/millions of dollars)" and spreadsheet row 58, "Enter Scope 2 emission intensity per million dollars in revenue (in $mtCO_2e$/millions of dollars)," due to potential CBI concerns and exposure.*
  - *CARB should make intensity metrics optional to reduce reporting burdens and to accommodate entities that do not have existing systems for such calculations.*

- **Reporting Global Warming Potential (GWP).** The Draft Reporting Template specifies the use of GWP values from the Intergovernmental Panel on Climate Change's (IPCC's) Fourth Assessment Report (AR4). However, many reporting entities use GWP values from IPCC's Fifth Assessment Report (AR5) or Sixth Assessment Report (AR6) in their internal and external reporting, depending on jurisdictional or investor requirements. Additionally, EPA's Greenhouse Gas Reporting Rule has already transitioned away from AR4 values and adopted GWP values that reflect those from AR5 and AR6.[9] Furthermore, EPA's GHG Reporting Program *requires* the use of AR5 values, beginning January 1, 2024.
  - *CARB should allow flexibility for entities to report using the GWP factor (AR4, AR5, or AR6) that aligns with their current reporting practices.*
  - *CARB should also require reporting entities to disclose the specific GWP version used to ensure transparency and comparability.*

- **Emissions Factors.** Because the Draft Reporting Template references EPA's emissions factors, and CARB's GWP, reporting entities in California would also likely need to provide their CARB electronic GHG Reporting Tool (Cal e-GGRT) reporting identification to enable the Agency to reconcile reported data. The Draft Reporting Template also seeks identification of the source of emissions factors and the reporting years used for Scope 2 emissions. WSPA urges CARB to explicitly recognize the use of average annual emissions factors as an acceptable method for Scope 2 reporting. Requiring real-time data reporting would be significantly more burdensome, if not completely infeasible, to implement, and may not yield greater accuracy given the dynamic nature of the electric grid.
  - *CARB should explicitly allow flexibility for entities to report Scope 2 emissions using average annual emissions factors.*
  - *CARB should provide clear guidance to reporting entities to follow the GHG Protocol for Scope 2 emission calculations by deleting the phrase "(using emission factor derived from contractual instruments)" at spreadsheet row 48 in the Draft Reporting Template's "Read Me First" tab. This language is inconsistent with the GHG Protocol's Scope 2 Guidance, which allows a tiered*

[9] *See* 90 Fed. Reg. 31,802, 31,809 (Apr. 25, 2024).

approach to emission factor selection.

- **Need to provide clear options for parent-company level reporting.** As SB 253 does not specify which entity is responsible for submitting the required disclosures, if using consolidated parent-company level reporting, WSPA recommends the following reporting approach:
  - *If in-scope entities use consolidated parent-company level reporting, the parent company may submit a single consolidated report at the parent-company level to improve efficiency and alleviate administrative burdens. CARB should further clarify that for in-scope entities with a foreign parent, the top parent company in the United States may submit such consolidated report. CARB should note that this approach may require further clarification regarding whether the U.S. parent company could be subject to possible yet-to-be-determined administrative penalties under California law if the submitted information is deficient or inaccurate, particularly when the U.S. parent company is not otherwise subject to the reporting requirements.*

- **Need to define "trade secret" designations and provide non-disclosure pathway.** The Draft Reporting Template includes a "Yes/No" designation for whether a report contains trade secret information, but does not provide a definition or a clearly articulated process for protecting information designated as such.
  - *CARB should provide a clear definition of "trade secret" within the reporting guidance.*
  - *CARB should clarify that emissions data qualifying as trade secrets are eligible for exclusion from reporting requirements.*
  - *CARB should establish a formal process for the confidential treatment of emissions data that constitute a "trade secret," allowing such data to be submitted confidentially and protected from public disclosure.*

Finally, WSPA seeks clarification regarding the timing and payment of any initial compliance fees. While existing law requires in-scope entities to pay an annualized fee for both SB 253 and SB 261 reporting, SB 253 does not specify the payment deadline, whereas SB 261 requires a reporting entity pay a fee to CARB "on or before January 1, 2026." Given that CARB has not yet determined or approved the fee amount by regulatory action, it is unclear how entities could comply with a January 1, 2026, payment deadline.[10] WSPA requests that CARB clarify whether the Agency would exercise enforcement discretion for entities unable to pay an undetermined fee by January 1, 2026. Additionally, WSPA requests confirmation that reporting entities would be permitted to pay the fee within 30 to 45 days following CARB's approval of final regulations, and that such payment will be deemed retroactively effective as of January 1, 2026, without penalty.

WSPA appreciates the opportunity to provide these recommendations, which are intended to support the effective implementation of SB 253 while ensuring continued alignment with global best practices. WSPA thanks CARB for its ongoing engagement with stakeholders and for the Agency's consideration of these comments.

Sincerely,

Tanya DeRivi
Senior Director, California Climate and Fuels

[10] *See* CARB, "California Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs: Resources," https://ww2.arb.ca.gov/our-work/programs/corporate-ghg-reporting/resources ("Given the large volume of public comments staff have received, and given ongoing input related to identifying the range of covered entities, CARB is proposing an updated timeline for bringing the initial rulemaking (including the fee-related provisions) to the board in Q1 2026") (last visited Oct. 24, 2025).

CALIFORNIA AIR RESOURCES BOARD

Gavin Newsom, Governor
Yana Garcia, CalEPA Secretary
Lauren Sanchez, CARB Chair

California Corporate Greenhouse Gas Reporting Program: Scope 1 and Scope 2 Emissions Draft Reporting Template

Posted October 10, 2025

The Climate Corporate Data Accountability Act authorized by Senate Bill (SB) 253 (Wiener, Stats. 2023, Ch. 382; Health and Safety Code § 38532) applies to U.S. companies that do business in California with annual revenues in excess of $1 billion. The California Air Resources Board (CARB) is seeking feedback from the public on draft reporting templates for Scope 1 and Scope 2 greenhouse gas (GHG) emissions, published along with this document.

The template is intended to streamline reporting, especially for entities disclosing GHG emissions for the very first time. Reporting entities are not currently required to use the template; its use is voluntary for the 2026 reporting cycle.[1] CARB will provide guidance on later reporting cycles as part of its regulatory process. CARB is seeking input on this draft template to help CARB further refine the template.

CARB invites reporting entities and other stakeholders to review the draft template and provide feedback on its structure, substance, and alignment with SB 253's overarching objectives.

The template is organized into the following sections:

- Organization Information
- Third-Party Verification
- Inventory Boundary
- Scope 1 and Scope 2 Disclosure
- Methodology

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[1] *Disclaimer*: The Template is provided to assist entities in submission of information. The template does not modify, replace, or supersede the statutes and does not impose requirements on anyone. It does not constitute legal advice and does not define any legal relationships, is not a policy, and does not create, expand, limit, waive, or interpret any legal rights or obligations. It is the regulated entity's responsibility to understand and comply with the legal requirements. The definitions are provided as courtesy to help guide regulated entities but do not have the force of law. CARB reserves the right to revise this template at any time.

- De Minimis / Minor Sources
- California MRR Fields (if applicable)
- Emission Reductions (if applicable)

The template also includes optional fields for future reporting years as CARB further develops the program. These optional fields include base year emissions to support intraorganizational comparison, providing more transparency to investors and stakeholders.

The template includes the following decision-useful fields for reporting entities and users:

- **Intensity/Efficiency Ratio:** The template includes fields for reporting entities to provide at least one intensity metric (e.g., emissions per million dollars in revenue). Intensity measures help stakeholders compare performance across firms of different sizes, especially across industries where absolute emissions alone may not be comparable.
- **Industry Classification:** The template allows the classification of GHG emissions by sector by using the North American Industry Classification System (NAICS) at the 2-digit level.
- **Transparency in Methods:** The template includes fields for the source and year of Global Warming Potential (GWP) values and emission factors. Reporting entities may report the calculation approach that is used (e.g., activity data x emission factor).
- **Alignment with California MRR:** The template includes a field for California Mandatory Reporting Regulation (MRR) facility identification (ID) numbers. This helps align reported data with other regulatory databases at CARB.

Highlights for Stakeholder Feedback

CARB is particularly interested in stakeholder input on the following elements:

1. **Disclosure by Source vs. by Gas**

   The template proposes Scope 1 and Scope 2 emissions disclosure by emission source (e.g., electricity, fuel use, refrigerants), with fields for disclosure by types of GHGs, if data is available.

2. **Organizational Boundaries**

   The template asks reporting entities to specify whether they use the equity share, financial control, or operational control approach to define organizational boundaries. These three approaches reflect guidance in the Greenhouse Gas Protocol. However, there may be value in choosing one approach to support public transparency and improve comparability across entities. CARB is evaluating whether to limit the approach to identify organizational boundaries for all reporting entities or retain flexibility to accommodate diverse corporate structures.

3. **Emissions Reduction Initiatives**

   At the August 2025 workshop, staff discussed including an option for reporting entities to include other actions that reduce GHG emissions. The draft template includes a field for emission reductions associated with direct contracts for renewable electricity and renewable gas. Staff are seeking public input on this field and other types of emission reduction initiatives or targets that should be included in the Scope 1 and 2 reporting template.

CARB welcomes written comments on the draft template and this public memo. Please submit your feedback to our public docket, which will remain open through October 27, 2025, or via the climatedisclosure@arb.ca.gov email.

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Posted for Public Comment: Draft Reporting Template for Scope 1 and Scope 2 Greenhouse Gas Emissions Pursuant to Health and Safety Code § 38532

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CALIFORNIA AIR RESOURCES BOARD

October 10, 2025

Posted for Public Comment:

Draft Reporting Template for Scope 1 and Scope 2 Greenhouse Gas Emissions Pursuant to Health and Safety Code § 38532

As discussed at the August 21, 2025, workshop, the California Air Resources Board (CARB) is seeking public comment on a draft reporting template for Scope 1 and Scope 2 greenhouse gas (GHG) emissions. CARB is also seeking public comment on a memo containing guidance on using the template under the Corporate Greenhouse Gas Reporting Program authorized by Senate Bill (SB) 253 (Wiener, Stats. 2023, Ch. 382; Health & Saf. Code § 38532), as amended by SB 219 (Wiener, 2024, Ch. 766; Health & Saf. Code § 38532).

Draft Template

We invite stakeholders to review the draft template and provide feedback on its structure, substance, and alignment with SB 253's overarching objectives. Stakeholders may submit comments to CARB's public docket, which will remain open through October 27, 2025.

This draft template is intended to provide guidance that entities may choose to follow on submitting data in compliance with the Scope 1 and Scope 2 emissions reporting requirement in 2026 for reporting entities subject to SB 253. Use of this template is voluntary for the 2026 reporting cycle. CARB will provide guidance on later reporting cycles as part of its regulatory process. CARB is seeking input on this draft template to help CARB further refine the template.

Memo

To help staff develop more comprehensive and accessible reporting guidance, CARB is seeking stakeholder feedback particularly on the topics highlighted in the memo accompanying the template.

View Draft Template

View Memo

For additional information, please visit the California Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs webpage and CARB's Resources. CARB continues to seek feedback on these programs, which can be submitted to climatedisclosure@arb.ca.gov.

Background

The California Corporate Greenhouse Gas Reporting Program, authorized by SB 253 is being developed by CARB and will require business entities formed under the laws of California, the laws of any other state of the United States or the District of Columbia, or under an act of the Congress of the United States, with total annual

revenues in excess of one billion dollars ($1,000,000,000) that do business in California ("reporting entities") to annually disclose their Scope 1, 2 and 3 emissions for the prior fiscal year. The initial annual emissions disclosures are required to address Scope 1 and 2 emissions with third-party limited assurance requirements, subject to the CARB Enforcement Notice issued in December 2024; emissions disclosures in 2027 and later must also include Scope 3 emissions. The Climate Related Financial Risk Disclosure Program authorized by SB 261 (Stern, Stats. 2023, Ch. 383; Health & Saf. Code § 38533) also applies to both public and private U.S. companies that do business in California with total annual revenues in excess of $500 million. This program is also currently under development by CARB and will require companies to publish biennial climate-related financial risk reports. SB 219 introduced amendments to parts of SB 253 and SB 261, including adjustments to regulatory timelines, the timing for reporting Scope 3 emissions, fee payments, and other provisions.

More Information

Real and Increasing Costs of Climate Change Impacts for Californians

The science behind climate change is irrefutable. With the increasing severity and frequency of drought, wildfire, extreme heat, and other impacts, Californians just have to look out their windows to know that climate change is real and rapidly getting worse. The impacts once thought decades away are happening now. Recent reports detail some of the impacts to the state:

- A 2024 national report ranked California the worst state for natural disasters fueled by a changing climate, with expected annual losses totaling more than $16 billion statewide.
- Home insurance is harder and more expensive to get. Seven of California's largest property insurers, State Farm, Allstate, Farmers, USAA, Travelers, Nationwide and Chubb recently limited new homeowners policies in the Golden State — raising questions about the stability of the California home insurance market.
- During an 11-year period, exposure to wildfire smoke caused more than 50,000 deaths in California and more than $400 billion in economic impacts.
- During seven extreme heat events over the past decade, California experienced $7.7 billion in losses.

Clearing California Skies for Over 50 Years

CARB is the lead agency for California's fight against climate change, and oversees all air pollution control efforts in the state to attain and maintain health-based air quality standards.

More Information

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IN THE UNITED STATES DISTRICT COURT

FOR THE CENTRAL DISTRICT OF CALIFORNIA,

WESTERN DIVISION

CHAMBER OF COMMERCE OF THE UNITED STATES OF AMERICA, CALIFORNIA CHAMBER OF COMMERCE, AMERICAN FARM BUREAU FEDERATION, LOS ANGELES COUNTY BUSINESS FEDERATION, CENTRAL VALLEY BUSINESS FEDERATION, and WESTERN GROWERS ASSOCIATION,

Plaintiffs,

v.

LIANE M. RANDOLPH, in her official capacity as Chair of the California Air Resources Board, STEVEN S. CLIFF, in his official capacity as the Executive Officer of the California Air Resources Board, and ROBERT A. BONTA, in his official capacity as Attorney General of California.

Defendants.

CASE NO. 2:24-cv-00801-KS

AMENDED COMPLAINT FOR DECLARATORY AND INJUNCTIVE RELIEF

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INTRODUCTION

1. This lawsuit challenges two novel California laws that unlawfully attempt to regulate speech related to climate change. Senate Bills 253 and 261 impermissibly compel thousands of businesses to make costly, burdensome, and politically fraught statements about "their operations, not just in California, but around the world," Assembly Comm. on Nat'l Res., Analysis of SB. 261 (2023–2024 Reg. Sess.) July 7, 2023 at 6, in order to stigmatize those companies and shape their behavior. Both laws unconstitutionally compel speech in violation of the First Amendment and seek to regulate an area that is outside California's jurisdiction and subject to exclusive federal control by virtue of the Clean Air Act and the federalism principles embodied in our federal Constitution. These laws stand in conflict with existing federal law and the Constitution's delegation to Congress of the power to regulate interstate commerce. This Court should enjoin the Defendants from carrying out the State's plan.

2. Plaintiffs support policies that reduce greenhouse-gas emissions as much and as quickly as reasonably possible, consistent with the pace of innovation and the feasibility of implementing large-scale technical change. Plaintiffs likewise support policies that provide for the disclosure of material information, including climate-related information, as necessary to protect investors. At the same time, policies must be informed by the best science, a careful analysis of available alternatives, and attention to legal rights and requirements. Further, neither businesses nor consumers benefit from a patchwork of inconsistent state-by-state regulatory regimes, under which multiple states attempt to regulate emissions nationally through conflicting means. The laws at issue here run roughshod over those considerations, in violation of the Constitution.

3. On October 7, 2023, Governor Gavin Newsom signed into law S.B. 253 and 261.

4. The laws were designed to "create accountability" for those that are not, in the Legislature's opinion, "doing their part to tackle the climate crisis." Statement

of Sen. Scott Wiener (Sept. 17, 2023), http://tinyurl.com/27up3ded (discussing S.B. 253). They will force every covered "entity," as a consequence of merely entering the California market, to publicly state its opinions regarding the risks associated with climate change, post those opinions to its own website, and then disclose an inexact, misleading calculation of the "entity's" greenhouse-gas emissions. *E.g.*, S.B. 253 § 2(c)(1)(A)(i)(I); S.B. 261 § 2(b)(1)(A). The purpose of this compelled speech is to fuel pressure campaigns against businesses: "For companies, the knowledge" that their compelled statements "will be publicly available might encourage them to take meaningful steps" to support the policy goals of the State. Sen. Judiciary Comm., Analysis of S.B. 253 (2023–2024 Reg. Sess.) Apr. 14, 2023 at 12. By the Governor's own reckoning, the legislation will have a negative "financial impact" on the more than 10,000 businesses covered, will impose deadlines that are "likely infeasible," and will deluge the public with "inconsistent" information. Signing Statement of Gov. Newsom, S.B. 253 (Oct. 7, 2023), http://tinyurl.com/4mz6by3p.

5. The State's plan for compelling speech to combat climate change is unconstitutional—twice over.

6. The plan violates the First Amendment. It forces thousands of companies to engage in controversial speech that they do not wish to make, untethered to any commercial purpose or transaction. And it does all this for the explicit purpose of placing political and economic pressure on companies to "encourage" them to conform their behavior to the political wishes of the State.

7. To make matters worse, the State's stated objective in enacting S.B. 253 and 261 is to regulate conduct, "not just in California, but around the world." Assembly Comm. on Nat'l Res., Analysis of SB. 261 (2023–2024 Reg. Sess.) July 7, 2023 at 6. For example, one legislator specifically noted that S.B. 253 had been described as "groundbreaking legislation with the potential to reach far beyond California's borders." Remarks of Assemblymember Rick Chavez Zbur, Debate on S.B. 253 (Sept. 11, 2023), http://tinyurl.com/taajvam8 (at 5:17:52–5:18:16). The State

does not have that authority. While federal law may permit California to regulate greenhouse-gas emissions *within* the State's own borders, California has no right to regulate emissions in other states or in other parts of the world, let alone to do so through a novel program of speech regulation.

8. S.B. 253 and 261 violate the First Amendment. Both laws are also precluded by federal law and run headlong into the Dormant Commerce Clause and broader federalism principles. This Court should bar the Defendants from enforcing the laws.

PARTIES

9. Plaintiff Chamber of Commerce of the United States of America ("the U.S. Chamber") is the world's largest business federation. The U.S. Chamber represents 300,000 direct members and indirectly represents the interests of more than three million businesses and organizations. Its members include many companies doing business in California that are subject to S.B. 253 and 261. An important function of the U.S. Chamber is to represent the interests of its members in matters before Congress, the Executive Branch, and the courts. To that end, the U.S. Chamber regularly participates in cases that raise issues of vital concern to America's business community.

10. Plaintiff California Chamber of Commerce ("CalChamber") is the largest broad-based business advocate to government in California. CalChamber represents more than 13,000 members that employ one quarter of the private sector workforce in California. Many of CalChamber's members are subject to S.B. 253 and 261. CalChamber works at both the state and federal levels to advocate for its members, and CalChamber actively tracks legislation in the California State Legislature. Like the U.S. Chamber, CalChamber regularly participates in cases that raise issues of vital concern to California's business community.

11. Plaintiff American Farm Bureau Federation ("AFBF") was formed in 1919 and is the largest non-profit general farm organization in the United States.

Representing about six million member families in all fifty States and Puerto Rico, AFBF's members grow and raise every type of agricultural crop and commodity produced in the United States. Its mission is to protect, promote, and represent the business, economic, social, and educational interests of American farmers and ranchers. To that end, AFBF regularly participates in litigation. While AFBF's members will not be directly regulated by the challenged laws, its members will bear much of the burden. Nearly every farmer touches the value chain of those that will be directly regulated by the laws and thus will be caught up in those companies' efforts to report Scope 3 emissions, incurring burdensome compliance costs, regardless of their contacts with California. Moreover, some regulated companies may favor larger farms that can more easily supply the information, to the detriment of smaller operations, leading to increased consolidation and integration.

12. Plaintiff Los Angeles County Business Federation ("BizFed") is a grassroots alliance of over 240 diverse business groups who represent 420,000 employers with over five million employees in the Los Angeles region. As a united federation, BizFed advocates for policies and projects that strengthen the regional economy at the local, state and federal level. A number of BizFed members are impacted by S.B. 253 and 261.

13. Plaintiff Central Valley Business Federation ("BizFed CV") is a grassroots alliance of over 75 diverse business groups who represent 30,000 employers with over 400,000 employees in the Central Valley. As a united federation, BizFed CV advocates for policies and projects that strengthen the regional economy at the local, state and federal level. A number of BizFed CV members are impacted by S.B. 253 and 261.

14. Plaintiff Western Growers Association ("WGA"), founded in 1926, represents local and regional family farmers growing fresh produce in California, Arizona, Colorado, and New Mexico. Western Growers' members and their workers provide over half of the nation's fresh fruits, vegetables, and tree nuts, including half

of America's fresh organic produce. S.B. 253 and 261 will impact many family farms that are members of WGA.

15. Defendant Liane M. Randolph is sued in her official capacity as the Chair of the California Air Resources Board ("CARB").

16. Defendant Steven S. Cliff is sued in his official capacity as the Executive Officer of CARB.

17. Defendant Robert A. Bonta is sued in his official capacity as the Attorney General of California. Under S.B. 253, CARB "shall consult with . . . [t]he Attorney General" "[i]n developing the regulations" under the statute. S.B. 253 § 2(c)(4)(A). Additionally, "the Attorney General [is] the chief law officer of the State" of California and has "the duty . . . to see that the laws of [California] are uniformly and adequately enforced." Cal. Const. art. 5, § 13.

JURISDICTION AND VENUE

18. This Court has subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1343. This action arises under the United States Constitution.

19. Because Plaintiffs seek an "injunction[] to protect rights safeguarded by the Constitution," they have presented a federal question that the federal courts have jurisdiction to resolve under 28 U.S.C. § 1331. *Free Enter. Fund v. Pub. Co. Accounting Oversight Bd.*, 561 U.S. 477, 489, 491 n.2 (2010) (quoting *Bell v. Hood*, 327 U.S. 678, 684 (1946)).

20. Each of the Plaintiffs has standing to bring this lawsuit because at least one of its members would have standing to sue in its own right, the interests it seeks to protect are germane to its purpose, and neither the claim asserted nor the relief requested requires an individual member to participate in this suit. *See California Rest. Ass'n v. City of Berkeley*, 89 F.4th 1094, 1099–1100 (9th Cir. 2024). For example, Plaintiffs' members that are affected and injured by the challenged laws include: Chevron Corp., a member of the U.S. Chamber, CalChamber, BizFed, and BizFed CV, whose annual

revenues exceed $1 billion and whose headquarters is located in San Ramon, California; Triple H Farm, a family-owned and operated farm that is a member of AFBF and in the supply chain of many companies that will be subject to Scope 3 reporting under S.B. 253; U-Haul Holding Company, a member of the U.S. Chamber whose annual revenues exceed $1 billion and whose operations in California include "do-it-yourself" moving and storage; and White Farms and Cattle, a family-owned and operated farm that is a member of AFBF and in the supply chain of many companies that will be subject to Scope 3 reporting under S.B. 253.

21. Venue is proper in this District under 28 U.S.C. § 1391 because all Defendants maintain an office and conduct their official duties within this judicial district.

22. Venue is further proper in this District under 28 U.S.C § 1391 because a substantial part of the events or omissions giving rise to this action occurred within this judicial district; to wit, Plaintiff BizFed resides within this judicial district at 1150 South Olive Street, Los Angeles, California, 90015.

BACKGROUND

A. California Seeks to Hold Corporations "Accountable" for Climate Change Through Senate Bills 253 and 261.

23. S.B. 253 and 261 were designed to "create accountability for those that aren't" "doing their part to tackle the climate crisis." Statement of Sen. Scott Wiener (Sept. 17, 2023), http://tinyurl.com/27up3ded. "Californians," one of the bill's authors wrote, "have a right to know who" is "destroying [their] planet" by "causing" climate change. Sen. Judiciary Comm., Analysis of S.B. 253 (2023–2024 Reg. Sess.) Apr. 14, 2023 at 7.

24. These laws were supported by scores of "environmental organizations," Sen. Judiciary Comm., Analysis of S.B. 253 (2023–2024 Reg. Sess.) Apr. 14, 2023 at 2, "including groups dedicated to minimizing the effects of climate change," Sen. Judiciary Comm., Analysis of S.B. 261 (2023–2024 Reg. Sess.) Apr. 14, 2023 at 2.

25. As one supporter explained, "[f]ighting the climate crisis requires bold, strategic regulations," and the bills offered "California regulators and communities just that." *California Passes First-in-the-Nation Bill to Expand Transparency in California Emissions*, SIERRA CLUB CALIFORNIA (Sept. 12, 2023), http://tinyurl.com/4v8z34fk. Other supporters have claimed that the laws will help "check the climate crisis" by letting the public "hold [companies] accountable," *California Lawmakers Approve Groundbreaking Climate Disclosure Bill*, PUBLIC CITIZEN (Sept. 12, 2023), http://tinyurl.com/36svd2t3, and by "ensuring accountability for those emitting greenhouse gasses," *Sacramento Rally to Unite for Climate Transparency & Passage of SB 253 & SB 261*, CERES (Aug. 22, 2023), http://tinyurl.com/wz8tzcac.

26. The laws seek this "accountability" through an unconstitutional mechanism: regulation of speech. S.B. 261 requires each covered entity to prepare a detailed report opining on the risks of climate change and to post that report to its own website. S.B. 253, in turn, requires each covered entity to estimate, and then publicly disclose, that "entity's" greenhouse-gas emissions, including the emissions of *others* that it does business with, such as customers, suppliers, and contractors.

27. As supporters of the bills explained, the purpose of these speech compulsions is to "encourage" companies to conform their behavior to the policy preferences of the State. Sen. Judiciary Comm., Analysis of S.B. 253 (2023–2024 Reg. Sess.) Apr. 14, 2023 at 12.

28. As one legislative report explained, "the knowledge that" companies' compelled statements "will be publicly available might encourage them to take meaningful steps to reduce [greenhouse-gas] emissions." *Id.* And the goal of S.B. 253 was to compel companies to release information even though "they don't want to do the disclosure" because (in the State's view) "they think they're going to be embarrassed by it." Remarks of Sen. Wiener, Sen. Env'l Quality Comm. Hearing on S.B. 253 (Mar. 25, 2023) http://tinyurl.com/yf66mbdn (at 2:30:33–2:23:50).

29. While the bills were pending, numerous business-organization representatives noted the significant costs of the bills and the difficulties associated with compliance, including Plaintiffs CalChamber, BizFed, BizFed CV, and WGA.

30. For example, a "coalition of over 60 [business] organizations" explained that estimating certain greenhouse-gas emissions with "any degree of accuracy [was] not yet possible." Sen. Judiciary Comm., Analysis of S.B. 253 (2023–2024 Reg. Sess.) Apr. 14, 2023 at 14–15. Estimation methods were (and are) "still in [their] infancy stage" and, for that reason, any reporting would be "more of an art" than "a science." *Id.* at 15.

31. Business-organization representatives further explained that the burdens of the bills would fall disproportionately on small and medium businesses. For example, many small and medium businesses, including family farms, "struggle to accurately measure their greenhouse gas emissions." *Id.* at 14. These difficulties, the representatives warned, could force "large businesses [to] stop doing business with small and medium businesses" that lack the resources to comprehensively report emissions to supply chain partners. *Id.* If a large business must publicly report, for instance, the "emissions associated with [its] entire supply chain," including the emissions of its suppliers, that business may have no choice but to cease its relationship with any small-to-medium suppliers that struggle to measure and report their own emissions. *Id.*

32. Governor Newsom expressly acknowledged many of these concerns in signing the bills into law. For S.B. 253, for instance, the Governor stated that "the implementation deadlines in this bill are likely infeasible, and the reporting protocol specified could result in inconsistent reporting across businesses subject to the measure." Signing Statement of Gov. Newsom, S.B. 253 (Oct. 7, 2023), http://tinyurl.com/4mz6by3p. And for S.B. 261, he noted his "concern[s] about the overall financial impact of this bill on business" and that "the implementation deadlines fall short in providing the California Air Resources Board (CARB) with

sufficient time to adequately carry out the requirements in this bill." Signing Statement of Gov. Newsom, S.B. 261 (Oct. 7, 2023), http://tinyurl.com/ycy7vk2w. The Governor signed both laws anyway.

B. The New Laws Impose Massive Costs on Business.

33. Both laws compel a substantial amount of speech at significant expense.

Senate Bill 261

34. S.B. 261 is expected to apply to more than 10,000 businesses. Sen. Rules Comm., Analysis of S.B. 261 (2023–2024 Reg. Sess.) Sept. 12, 2023 at 5. It reaches any company with revenues exceeding $500 million that does *any* business in California. S.B. 261 § 2(a). There is no de minimis exception. That means that if an entity exceeds the revenue threshold, it is subject to S.B. 261 even if it conducts an immaterial amount of business in the State and even if the business it conducts in California lacks any plausible connection to activity related to climate change.

35. S.B. 261 compels subjective speech on a topic, climate change, that the Supreme Court has deemed "controversial." *Janus v. Am. Fed'n of State, Cnty. & Mun. Emps., Council 31*, 138 S. Ct. 2448, 2476 (2018).

36. The law requires any covered entity to publicly state its opinion regarding various "climate-related financial risk[s]" and to post that opinion to the entity's website. S.B. 261 § 2(b)(1)(A), (c)(1). Under the law, companies must opine on any "material risk of harm to immediate and long-term financial outcomes due to physical and transition risks, including, but not limited to, risks to corporate operations, provision of goods and services, supply chains, employee health and safety, capital and financial investments, institutional investments, financial standing of loan recipients and borrowers, shareholder value, consumer demand, and financial markets and economic health." *Id.* § 2(a)(2).

37. Companies must then provide a report discussing any "measures adopted to reduce and adapt to" any of the above climate-related risks. *Id.* § 2(b)(1)(A)(ii).

38. Unless a company certifies that it has prepared an "equivalent" report for other reasons (*e.g.*, it was required by federal law or the law of another "government entity") the law requires companies to conform their reports to the "recommended framework" contained in the "Final Report of Recommendations of the Task Force on Climate-Related Financial Disclosures (June 2017) published by the Task Force on Climate-Related Financial Disclosures, or any successor thereto." *Id.* § 2(b)(1)(A), (4). Those recommendations provide detailed instructions on the content that reporting companies must include.

39. Companies must publicly post their first disclosure on their "own internet website[s]" by January 1, 2026. *Id.* § 2(c)(1).

40. S.B. 261 expressly acknowledges the political, and thus controversial, nature of the speech it requires companies to make, as it proclaims that addressing the risks of climate change is an important political issue and the subject of robust public debate. *See Id.* § 1(b) ("Global economic and climate policy leaders have conclusively established that the long-term strength of global and local economies will depend on their ability to withstand climate-related risks, including physical impacts, economic transitions, and policy and legal responses.").

41. On the other hand, this speech is not commercial speech because S.B. 261 compels companies to post statements that are unconnected to proposing any commercial transaction.

42. S.B. 261 also requires CARB to contract with a climate reporting organization to prepare its own report on disclosures. *Id.* § 2(b)(3). The organization must be a nonprofit that currently operates as a climate reporting organization for entities operating in the United States and must have experience with climate-related financial risk disclosure by entities operating in California. *Id.* § 2(a)(1). The report must include both a review of climate-related financial risk in various industries as well as an "[a]nalysis of the systemic and sectorwide climate-related financial risks facing the state based on the contents of climate-related financial risk reports,

including, but not limited to, potential impacts on economically vulnerable communities." *Id.* § 2(d)(1)(A)–(B). The climate reporting organization is also responsible for regularly gathering stakeholder input on "current best practices regarding the disclosure of financial risks." *Id.* § 2(d)(2).

43. CARB is authorized to impose administrative penalties of $50,000 per reporting year for violations of S.B. 261. *Id.* § 2(e)(2). The law requires covered entities to pay for the law themselves, with an annual fee being assessed on covered entities to defray CARB's costs in administering and implementing the law. *Id.* § 2(c)(2)(A), (e)(2). These fees will be deposited into the newly created "Climate-Related Financial Risk Disclosure Fund." *Id.* § 2(c)(2)(C).

Senate Bill 253

44. As with S.B. 261, S.B. 253 applies to any company exceeding a certain revenue threshold (in this case, $1 billion) that does any business in California. S.B. 253 § 2(b)(2). The law is expected to directly cover more than 5,300 companies, Assembly Floor Analysis of S.B. 253 (2023–2024 Reg. Sess.) Sept. 7, 2023 at 2, although its impact will extend to many more companies, including small and primarily out-of-state businesses, as explained below.

45. S.B. 253 also compels noncommercial speech because the speech it requires is not connected to proposing any commercial transaction.

46. In addition to S.B. 261's requirement that companies opine on climate-related risks, S.B. 253 requires each covered entity to publicly state the "entity's" greenhouse-gas emissions. S.B. 253 § 2(c)(1).

47. S.B. 253 requires covered entities to publicly report three categories of greenhouse-gas emissions—Scope 1, Scope 2 and Scope 3:

a. ***"'Scope 1 emissions'*** means all direct greenhouse gas emissions that stem from sources the reporting entity owns or directly controls, regardless of location." *Id.* § 2(b)(3).

b. ***"'Scope 2 emissions'*** means indirect greenhouse gas emissions from consumed electricity, steam, heating, or cooling purchased or acquired by a reporting entity, regardless of location." *Id.* § 2(b)(4).

c. ***"'Scope 3 emissions'*** means indirect upstream and downstream greenhouse gas emissions, other than Scope 2 emissions, from sources that the reporting entity does not own or directly control and may include" the emissions of upstream suppliers or downstream customers. *Id.* § 2(b)(5).

48. The law requires each covered entity to "measure and report its emissions of greenhouse gases in conformance with the Greenhouse Gas Protocol standards and guidance, including the Greenhouse Gas Protocol Corporate Accounting and Reporting Standard and the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard developed by the World Resources Institute and the World Business Council for Sustainable Development." *Id.* § 2(c)(1)(A)(ii).

49. Although the law purports to require each company to report "its emissions," *id.*, the reported emissions actually include emissions from utility providers, upstream suppliers, downstream customers, and others. *Id.* § 2(c)(1). Thus, S.B. 253 requires a company to falsely state that the emissions of other entities are its own.

50. Moreover, by requiring reporting "in conformance with the Greenhouse Gas Protocol," the law requires materially misleading emissions reports because the Greenhouse Gas Protocol does not factor in "Scope 4" emissions—emissions that companies avoid, and which should therefore be deducted from Scope 1, 2, and/or 3 emissions, as appropriate. For example, a company's Scope 4 emissions may include those avoided through purchases of energy-efficient equipment or reduction of mileage driven. Thus, to the extent the law's purpose is to provide customers with clear and comprehensive information about companies' alleged contribution to global emissions,

it fails because the disclosures will exclude any evidence of steps companies have taken to avoid emissions.

51. The reported emissions are not purely factual. To the contrary, the proper calculation of the scope of a company's emissions—including, but not limited to, the need to include Scope 4 emissions—is subject to significant debate. Emissions calculations necessarily turn on subjective judgments concerning the "advantages and disadvantages" of various approaches to estimation. GREENHOUSE GAS PROTOCOL, TECHNICAL GUIDANCE FOR CALCULATING SCOPE 3 EMISSIONS 18 (version 1.0) (2013), http://tinyurl.com/2f9n52k2. For Scope 3 emissions, moreover, those subjective judgments are not only those of the reporting entity, but also of *other* entities, both downstream and upstream in the supply chain. *Id.* at 6.

52. Estimating greenhouse-gas emissions is enormously burdensome. The requirement to estimate and report Scope 3 emissions alone will cost many companies more than $1 million per year. *See, e.g.*, Comment of the Williams Companies, Inc. 14, SEC File No. S7-10-22 (June 17, 2022), http://tinyurl.com/y99amdcd. And as even the Securities and Exchange Commission acknowledges, the estimate in many instances may be inaccurate. *See Enhancement and Standardization of Climate-Related Disclosures for Investors*, 87 Fed. Reg. 21,334, 21,387 (proposed Apr. 11, 2022) (acknowledging that, "in many instances, direct measurement of [greenhouse-gas] emissions at the sources, which would provide the most accurate measurement, may not be possible").

53. The burden of estimating Scope 3 emissions flows up and down the supply chain. Small businesses nationwide will incur significant costs monitoring and reporting emissions to suppliers and customers swept within the law's reach. For example, scores of family farm members of AFBF will need to report emissions to business partners that do business with entities covered by S.B. 253.

54. One small business owner so affected is Garrett Hawkins. Mr. Hawkins is a third-generation farmer based in Appleton City, Missouri. His farm, Triple H Farm,

which he operates with his father and brother, raises beef cattle and markets them in local family-owned livestock auctions. Mr. Hawkins is the President of the Missouri Farm Bureau Federation and is a member of AFBF.

55. While Mr. Hawkins does not operate in California and does not sell directly to California companies, his cattle is in the supply chain of many companies that will be subject to Scope 3 reporting under S.B. 253. For example, Mr. Hawkins' cattle will ultimately be bought by packers (slaughter-houses) that are subject to Scope 3 reporting under S.B. 253. And the grocery stores that the packers sell beef to similarly consist of companies that will be subject to Scope 3 reporting under S.B. 253.

56. S.B. 253 will require those companies to report on Scope 3 emissions, which include Mr. Hawkins' farm. Mr. Hawkins is concerned that the documentation and recordkeeping required to supply his greenhouse gas emissions will be incredibly onerous and burdensome for his operation and farms like his. Mr. Hawkins fears that the requirements of S.B. 253 will have the potential to force rapid consolidation across agriculture, such that only the largest operations will survive.

57. A similarly affected small business owner is Michael White. Mr. White is a fourth-generation farmer based in Wilbarger County, Texas. Mr. White and his brother and nephew raise wheat, cotton, hay and cattle on their family farm, White Farms and Cattle, which has been in operation for over one hundred years. Mr. White is a member of AFBF.

58. Mr. White's farm is in the supply chain of many companies that will be subject to Scope 3 reporting under S.B. 253. For example, Mr. White retains ownership in his cattle up to the point they are sold to packers, most or all of which will be subject to Scope 3 reporting under S.B. 253. And the grocery stores that the packers sell beef to similarly consist of companies that will be subject to Scope 3 reporting under S.B. 253. The wheat, cotton, and hay Mr. White produces will also likely end up in the Scope 3 value chain of companies subject to S.B. 253.

59. S.B. 253 will require those companies to report on "their" Scope 3 emissions, which includes Mr. White's farm. Like Mr. Hawkins, Mr. White is concerned that the documentation and recordkeeping required to supply his greenhouse emissions will be incredibly onerous and burdensome for his operation and farms like his. Mr. White, like Mr. Hawkins, fears that the requirements of S.B. 253 will have the potential to force rapid consolidation across agriculture, such that only the largest operations will survive.

60. S.B. 253 requires all covered entities not only to publicly report their emissions calculation, but also to file those reports with a newly established statewide reporting organization. S.B. 253 § 2(c)(1). The mandatory reports that companies are compelled to produce will be made publicly available by CARB. *Id.* § 2(c)(2). S.B. 253 also requires each reporting entity's disclosures to be independently verified by a third-party assurance provider, approved by CARB, that has expertise in greenhouse-gas emissions accounting. *Id.* § 2(c)(1). Assurance of Scope 1 and Scope 2 greenhouse-gas emissions will be required at a "limited assurance" level beginning in 2026 and at a "reasonable assurance" level beginning in 2030. Scope 3 greenhouse-gas emissions may require assurance at a "limited assurance" level beginning in 2030. *Id.* § 2(c)(1)(F)(iii).

61. CARB is required to contract with an "academic institution," such as the University of California, "to prepare a report on the public disclosures made by reporting entities to the emissions reporting organization." *Id.* § 2(d)(1). That report will be posted to a digital platform created by the new emissions reporting organization, regardless of whether a given reporting entity wishes to have its reports shared with the public. *Id.* § 2(d)(2), (e)(1)(A)–(B).

62. Reporting entities are also forced to pay for their own compelled disclosures—the law requires them to pay a filing fee to cover the costs of administration and implementation of the new reporting requirements. *Id.*

§ 2(c)(1)(G)(i). These fees will be deposited in the newly created "Climate Accountability and Emissions Disclosure Fund." *Id.* § 2(c)(1)(G)(iii).

63. S.B. 253 authorizes CARB to assess administrative penalties of up to $500,000 for noncompliance. *Id.* § 2(f)(2)(A). It includes a safe harbor for Scope 3 emissions, which provides that penalties will not apply to Scope 3 misstatements made "with a reasonable basis and disclosed in good faith" and that, until 2030, Scope 3 penalties will be assessed only for failures to disclose. *Id.* § 2(f)(2).

C. The Laws Violate the First Amendment.

64. The First Amendment protects "both the right to speak freely and the right to refrain from speaking at all," *Wooley v. Maynard*, 430 U.S. 705, 714 (1977), and "applies not only to expressions of value, opinion, or endorsement, but equally to statements of fact the speaker would rather avoid," *Hurley v. Irish-Am. Gay, Lesbian & Bisexual Grp. of Bos.*, 515 U.S. 557, 573 (1995). S.B. 253 and 261 violate this right by compelling companies to engage in costly speech on "climate change," an issue the Supreme Court has acknowledged is "controversial." *Janus*, 138 S. Ct. at 2476.

65. Courts apply different tiers of scrutiny to different types of compelled speech. Where a state seeks to compel a business to speak *noncommercially* on *controversial political matters*, strict scrutiny applies. *See Nat'l Inst. of Family & Life Advocates v. Becerra* ("*NIFLA*"), 138 S. Ct. 2361, 2372–74 (2018). "[S]uch speech occupies the highest rung of the hierarchy of First Amendment values and merits special protection." *Janus*, 138 S. Ct. at 2476 (citations and quotation marks omitted). Courts therefore apply "the most exacting form of review." *IMDB.com Inc. v. Becerra*, 962 F.3d 1111, 1121 (9th Cir. 2020). Laws subject to strict scrutiny "are presumptively unconstitutional and may be justified only if the government proves that they are narrowly tailored to serve compelling state interests." *NIFLA*, 138 S. Ct. at 2371 (citations and quotation marks omitted).

66. Strict scrutiny applies to S.B. 253 and 261 because both laws compel speech concerning the "controversial subject[]" of "climate change." *Janus*, 138 S. Ct.

at 2476. They do not compel "purely factual and uncontroversial information" that could be subject to a lower standard than strict scrutiny. *NIFLA*, 138 S. Ct. at 2372 (quoting *Zauderer v. Office of Disciplinary Counsel*, 471 U.S. 626, 651 (1985)).

67. The compelled speech is controversial on two levels. First, the laws require companies to speak about the effects of, and proper response to, climate change, anything but uncontroversial topics. *See Janus*, 138 S. Ct. at 2476. And second, the specific speech compelled by S.B. 261 is controversial. Whether, for example, a particular "wildfire[ ]," "sea level rise," "extreme weather event[ ]," or "extreme drought[ ]," S.B. 261 § 1(a), has anything to do with climate change, or to what extent, is a matter of significant debate and controversy. Yet S.B. 261 requires companies to opine on the risks that will be specifically caused by climate change.

68. The speech compelled by S.B. 253 and 261 also is not "factual." *NIFLA*, 138 S. Ct. at 2372. A company's compelled assessment of the "risk of harm to immediate and long-term financial outcomes" from a variety of events whose connection to climate change, if any, is subject to reasonable debate, S.B. 261 § 2(a)(2), is far from the recitation of a pure, rote "fact."

69. Even the estimation of emissions is a matter of opinion. The law's requirements do not provide for a readily verifiable way to calculate a company's total net emissions. Many companies, for instance, believe that emissions that they helped avoid ("Scope 4" emissions) are relevant, and that simply disclosing Scope 1, Scope 2, and Scope 3 emissions will necessarily provide an incomplete and misleading picture about their emissions. But the laws require companies to disclose emissions without considering avoided emissions. Even within a particular scope of emissions, the calculation is anything but factual, especially for Scope 3 emissions by companies, individuals, and others who use or contribute to the provision of a good or service; any reported emissions require a subjective assessment (by the reporting entity and/or outside suppliers), based on numerous assumptions and estimations.

70. Additionally, strict scrutiny applies because the speech compelled by S.B. 253 and 261 is not commercial. Not all speech made by a business is "commercial speech." *See, e.g.*, *NIFLA*, 138 S. Ct. at 2374. Rather, commercial speech is "'usually defined as speech that does no more than propose a commercial transaction.'" *Ariix, LLC v. NutriSearch Corp.*, 985 F.3d 1107, 1115 (9th Cir. 2021) (quoting *United States v. United Foods, Inc.*, 533 U.S. 405, 409 (2001)).

71. The speech that S.B. 253 and 261 mandate is required regardless of whether it is connected to proposing a commercial transaction.

72. Because the speech compelled by S.B. 253 and 261 is noncommercial, not purely factual, and concerns a controversial political matter, strict scrutiny applies three times over. Accordingly, the burden is on the State to prove that the laws "are narrowly tailored to serve compelling state interests." *NIFLA*, 138 S. Ct. at 2371 (citations and quotation marks omitted).

73. Both S.B. 253 and 261 fail to satisfy strict scrutiny.

74. The speech compelled by S.B. 253 and 261 does not further any legitimate government interest of the State of California, let alone a compelling one. The legislation cites no evidence, for example, that the public's response to the disclosures would result in material changes in companies' emissions, or that any such changes would have a material impact on climate change, much less the climate of California.

75. The legislation also makes no meaningful effort to restrict its scope to information that is needed to achieve any legitimate governmental purpose. S.B. 253 and 261 apply to *any* "business entity" satisfying the revenue threshold, whether or not the entity is publicly traded or has outside investors, and regardless of the extent of its California operations. S.B. 253 § 2(b)(2); S.B. 261 § 2(a)(4). Nor does either law exempt companies that have low greenhouse-gas emissions or face negligible risks from climate change.

76. The legislation is also not "narrowly tailored" because it "burden[s] substantially more speech than is necessary to further the government's legitimate interests." *McCullen v. Coakley*, 573 U.S. 464, 486 (2014). As noted above, S.B. 253's requirement to report Scope 3 emissions alone will cost many companies more than $1 million per year. *See* Comment of the Williams Companies, Inc. 14, SEC File No. S7-10-22 (June 17, 2022) http://tinyurl.com/y99amdcd.

77. The legislation is also not "narrowly tailored" because it unduly burdens the speech and threatens the business viability of small businesses far beyond California's borders, including Mr. Hawkins' farm, Mr. White's farm, and thousands of similarly situated members of AFBF and WGA.

78. Even if a lower level of scrutiny were to apply, the laws are nonetheless unconstitutional. Under any form of scrutiny, required disclosures cannot be "unjustified or "unduly burdensome." *NIFLA*, 138 S. Ct. at 2377 (citing *Zauderer*, 471 U.S. at 651). S.B. 253 and 261 are both unjustified and unduly burdensome.

79. For government-mandated speech to be justified, the State must show that "the harm" it seeks "to remedy" is "more than 'purely hypothetical,'" *NIFLA*, 138 S. Ct. at 2377, and that the required disclosures "will in fact alleviate [that harm] to a material degree," *Ibanez v. Fla. Dep't of Bus. & Prof'l Reg.*, 512 U.S. 136, 146 (1994). But the State has not connected the disclosures required by S.B. 253 and 261 to any concrete, direct, and immediate interests, instead relying on vague, generalized statements, such as "stakeholders deserv[ing] transparency." S.B. 253 § 1(e).

80. The disclosures that S.B. 253 and 261 require are also unduly burdensome. The requirement to disclose Scope 3 emissions will cost companies more than $1 million per year, and those disclosures are mandated for any "business entity," S.B. 261 § 2(a)(4), which is broader than the State's supposed interest in providing "investors" with certain climate-related information, *id.* § 1(c).

81. The problems with these speech compulsions are compounded by the laws' vagueness. Vague laws "allow arbitrary and discriminatory enforcement."

O'Brien v. Welty, 818 F.3d 920, 930 (9th Cir. 2016). And "[w]hen speech is involved, rigorous adherence to [the] requirement[]'" that "parties should know what is required of them" "is necessary to ensure that ambiguity does not chill protected speech." *FCC v. Fox Television Stations*, 567 U.S. 239, 253–54 (2012).

82. The definition of "climate-related financial risk" under S.B. 261, in particular, is broad and vague: any "material risk of harm to immediate and long-term financial outcomes due to physical and transition risks, including, but not limited to, risks to corporate operations, provision of goods and services, supply chains, employee health and safety, capital and financial investments, institutional investments, financial standing of loan recipients and borrowers, shareholder value, consumer demand, and financial markets and economic health." S.B. 261 § 2(a)(2).

83. On that expansive definition, the State is likely to be able to find something to fault in the disclosure (or lack of disclosure) of *any* company the State disfavors. This creates a risk that, among other things, companies whose climate-related practices do not conform to California's policy preferences will be subject to heightened investigation and enforcement. And because the laws authorize the imposition of substantial penalties, companies will be pressured to conform their risk assessments to the State's policy preferences.

D. Senate Bills 253 and 261 Operate as Impermissible *De Facto* Regulations on Nationwide Greenhouse-Gas Emissions.

84. Because the new disclosure requirements of S.B. 253 and 261 operate as *de facto* regulations of greenhouse-gas emissions nationwide, they are precluded by the Clean Air Act and are invalid under the Dormant Commerce Clause and principles of federalism. *See* Clean Air Act Amendments of 1970, Pub. L. No. 91-604, 84 Stat. 1676; *see also Nat'l Pork Producers Council v. Ross*, 598 U.S. 356, 403-10 (2023) (Kavanaugh, J., concurring). Under the Supremacy Clause, the Clean Air Act displaces state regulation of interstate greenhouse-gas emissions. Further, "[e]ach State's equal dignity and sovereignty under the Constitution implies certain

constitutional limitation[s] on the sovereignty of all of its sister States." *Franchise Tax Bd. of Cal. v. Hyatt*, 139 S. Ct. 1485, 1497 (2019). One such limitation, which stems from each State's equal sovereignty, is that one State cannot project its laws into another State.

85. Under the Supremacy Clause, U.S. Const., art. VI, cl. 2, "when Congress enacts a valid statute pursuant to its Article I powers, state law is naturally preempted to the extent of any conflict with a federal statute. End of story." *Haaland v. Brackeen*, 599 U.S. 255, 287 (2023) (citation and quotation marks omitted). In particular, "where the scheme of federal regulation is so pervasive as to make reasonable the inference that Congress left no room for the States to supplement it," a state law attempting to regulate the same field is preempted. *Gade v. Nat'l Solid Wastes Mgmt. Ass'n*, 505 U.S. 88, 98 (1992) (quotation marks omitted). The Clean Air Act is "'an intricate regulatory regime intended to protect and enhance the quality of the nation's air resources so as to promote the public health and welfare and the productive capacity of its population.'" *City of N.Y. v. Chevron Corp.*, 993 F.3d 81, 87 (2d Cir. 2021) (quoting *N.Y. Pub. Int. Rsch. Grp. v. Whitman*, 321 F.3d 316, 319–20 (2d Cir. 2003)).

86. Under the Clean Air Act, the federal government is empowered to implement programs to regulate pollution, including greenhouse gases. *Chevron Corp.*, 993 F.3d at 87–88 Although the Act "envisions extensive cooperation between federal and state authorities," *id.* at 87 (citing 42 U.S.C. §§ 7401, 7411(c)(1), (d)(1)–(2)), when it comes to "regulating pollution sources beyond their borders," states are limited to "commenting on proposed [Environmental Protection Agency] rules or on another state's emission plan," *id* at 88.

87. The legislation here does not limit reporting requirements to emissions produced in California or to companies' expected climate change financial risks in California—rather, both laws require companies to make sweeping reports about their emissions and risks everywhere they operate, whether in California, in other states, or

even abroad. States may not regulate out-of-state emissions by requiring disclosure of data about such emissions in this manner.

88. Nor, for that matter, may states enact measures to force actual reductions in out-of-state emissions, whether by disclosure or by any other legal tools. While the laws do not directly require reductions in greenhouse-gas emissions in other states, "'[w]hat cannot be done directly cannot be done indirectly'" because "'[t]he Constitution deals with substance, not shadows.'" *Students for Fair Admissions, Inc. v. President & Fellows of Harvard Coll.*, 600 U.S. 181, 230 (2023) (quoting *Cummings v. Missouri*, 71 U.S. 277, 325 (1867)).

89. Although framed in terms of disclosure, these requirements are aimed at stigmatizing companies for the purpose of pressuring them to lower their emissions nation- and even world-wide. *See, e.g.*, S.B. 253 § 1(f) ("United States companies that have access to California's tremendously valuable consumer market by virtue of exercising their corporate franchise in the state also share responsibility for disclosing their contributions to global [greenhouse-gas] emissions."); *id.* § 1(f), (h), (l) (claiming a need to encourage "investments in decarbonization strategies," to "develop means to reduce" emissions, and to "activate companies to improve risk management in order to move toward a net-zero carbon economy"); S.B. 261 § 1(j) (explaining that "mandatory and comprehensive" disclosures are needed to "address the climate crisis").

90. In fact, activists and policymakers have repeatedly stated that they intend to use the compelled reporting to identify companies whose emissions they deem to be unsuitable, and to shame those companies into reducing their emissions. As one sponsor noted, S.B. 253 "ensure[s] that corporate actors in [California] are aligned with [the Legislature's] goals and are working as diligently as [legislators] need them to be." Remarks of Sen. Wiener, Debate on S.B. 253, Sen. Floor Sess. (May 30, 2023) http://tinyurl.com/225dekr5 (at 4:21:17–4:23:02). A main function of the laws,

although framed in terms of reporting, is to facilitate public-pressure campaigns to coerce companies into reducing their emissions of greenhouse gases.

91. It is immaterial whether such a policy is sound—under the Clean Air Act, the regulation of nationwide greenhouse-gas emissions is exclusively the domain of the federal government. States may not engage in de facto regulation of greenhouse-gas emissions nationwide, running afoul of Congress's exclusive authority to regulate interstate commerce. This legislation is therefore beyond the limits of what state law is allowed to do.

FIRST CLAIM FOR RELIEF

(Violation of the First Amendment Under 42 U.S.C. § 1983)

92. Plaintiffs reallege and incorporate herein by reference Paragraphs 1 through 91 above.

93. S.B. 253 and 261 compel companies to publicly express a speculative, noncommercial, controversial, and politically-charged message that they otherwise would not express, and in the case of S.B. 261, expressly requires companies to communicate that message on their own websites.

94. S.B. 261 requires companies to make public statements estimating their future risk from climate change. This speech is necessarily speculative because it requires companies to estimate not only their risk of damage from future events like natural disasters, but also to speculate about whether those events will occur and will do so as a result of climate change. And it is a politically controversial topic about which significant uncertainty is inevitable.

95. S.B. 261 also fails to describe its key term—"climate-related financial risk"—with enough specificity to enable companies to comply. The term is so ambiguous that companies will be forced to make high-stakes, public guesses about their future—with the aim, on the part of the State, to discourage investors and consumers from doing business with the companies based on that speculation.

96. S.B. 253 requires companies to make public statements not only about their greenhouse-gas emissions, but also about the emissions of up- and downstream entities with which they do business. Because companies must report these Scope 3 emissions as their *own* emissions, the law necessarily requires that a company falsely and inaccurately represent the provenance of these emissions.

97. Moreover, this compelled speech requires companies to speculate about Scope 3 emissions. Calculating Scope 3 emissions is a subjective undertaking, requiring myriad judgment calls about how to identify and quantify another entity's emissions. Alternatively, companies will be forced to demand information from their non-covered partners in the supply chain. Reporting companies under S.B. 253 might disagree with how upstream and downstream entities calculated their emissions, and thus may be forced to convey speech with which they disagree.

98. Under S.B. 253, companies risk enormous penalties and public opprobrium should they happen to guess incorrectly. The compelled reports of Scope 3 emissions are not purely factual but rather are full of subjectivity and guesswork.

99. The laws violate the First Amendment to the United States Constitution, which protects both the freedom from being compelled to speak and the freedom to engage in speech.

SECOND CLAIM FOR RELIEF

(Violation of the Supremacy Clause Under 42 U.S.C. § 1983)

100. Plaintiffs reallege and incorporate herein by reference Paragraphs 1 through 91 above.

101. S.B. 253 and 261 require companies to make sweeping reports about their emissions and risks everywhere they operate.

102. The laws are not limited to companies that are headquartered or incorporated in the State of California; rather, they reach any company above a certain revenue threshold that does any business in California.

103. Nor are the laws limited to reporting of emissions or risks within the State of California; rather, both S.B. 253 and 261 require companies to publicly speak about emissions and risks *wherever* they do business, and wherever their partners in the supply chain also do business—including other states or countries.

104. By requiring companies to make speculative public statements about emissions and climate-related financial risk, the legislation enables activists and policymakers to single out companies for stigmatization, criticism, investigation, and boycotts. It therefore functions to pressure companies to reduce their emissions of greenhouse gases, within the State of California and outside of it.

105. Under the Clean Air Act and principles of federalism inherent in the structure of our federal Constitution, however, California lacks the authority to regulate greenhouse-gas emissions outside of its own borders. Yet that is precisely what this legislation intentionally accomplishes, using a legal mechanism (requiring extensive disclosure of information about out-of-state emissions) that is itself precluded by the Clean Air Act and the Constitution, as part of a calculated program for mobilizing public pressure.

106. Accordingly, this legislation violates the federal Constitution's Supremacy Clause.

THIRD CLAIM FOR RELIEF

(Violation of Constitutional Limits on Extraterritorial Regulation Under 42 U.S.C. § 1983)

107. Plaintiffs reallege and incorporate herein by reference Paragraphs 1 through 91 above.

108. The Constitution vests Congress, not each of the fifty states, with authority to regulate interstate and foreign commerce. The laws here intrude on that congressional authority and place upon interstate commerce a burden that far outweighs any benefits to the State of California.

109. S.B. 253 and 261 impose significant burdens on interstate and foreign commerce. The laws require companies to spend significant time and money, up to millions of dollars per company, making public statements regarding climate change. The laws will also subject companies, including those in the supply chain that have no intention of doing business in California, to significant political and economic pressure to conform their conduct to the policy preferences of the State of California. And the laws "offend the Commerce Clause" by "'build[ing] up . . . domestic commerce' through 'burdens upon the industry of other States.'" *Pork Producers*, 598 U.S. at 369 (quoting *Guy v. Baltimore*, 100 U.S. 434, 443 (1880)). S.B. 253 and 261 apply to any company that meets their respective revenue thresholds, regardless of what proportion of that revenue stems from California. So out-of-state companies that do little business in California will be subject to the laws, even though in-state companies that have their entire business in California (but fall just below the revenue threshold) will not be.

110. The benefits to California from the laws are slim to non-existent. The State does not (and cannot reasonably) maintain that the laws will have a meaningful impact on climate change, a *global* phenomenon. Nor does the State explain, let alone demonstrate, how the compelled speech would benefit anyone. The State does not identify any risk of fraud or danger associated with any particular transaction and does not (and cannot) establish that the compelled speech (which applies to private as well as public companies) will be material to investors.

111. Even if some of the compelled speech could theoretically be useful in some instances, the laws are so overbroad that their burden on interstate and foreign commerce eclipses any benefit to the State of California. For example, so long as a company exceeds certain revenue thresholds, it, and all of its worldwide operations, is subject to S.B. 253 and 261 if it does *any* business in the State of California, even if that business is de minimis and is unlikely to have any impact in the State. The State does not explain how it has a legitimate interest in compelling speech about activities outside of California that will often have no articulable connection to the State.

112. Because the laws so heavily intrude on Congress's authority to regulate interstate and foreign commerce, and because the benefits to California are so limited, the laws are invalid under the Constitution's limitations on extraterritorial regulation, including the Dormant Commerce Clause.

FOURTH CLAIM FOR RELIEF

(Attorneys' Fees and Costs Under 42 U.S.C. § 1988 and All Other Applicable Statutes)

113. Plaintiffs reallege and incorporate herein by reference Paragraphs 1 through 91 above.

114. Under 42 U.S.C. § 1988(b), "[i]n any proceeding to enforce" 42 U.S.C. § 1983, "the court, in its discretion, may allow the prevailing party . . . a reasonable attorney's fee as part of its costs." Additionally, the court "may include expert fees as part of the attorney's fee." 42 U.S.C. § 1988(c).

115. Plaintiffs are entitled to reasonable attorneys' fees, including expert fees and other costs, in this action and request that the Court award such fees under 42 U.S.C. § 1988 and all other applicable statutes.

PRAYER FOR RELIEF

116. WHEREFORE, Plaintiffs pray for an order and judgment:

a. Declaring that S.B. 253 violates the First Amendment of the U.S. Constitution and is null, void, and with no force or effect;

b. Declaring that S.B. 261 violates the First Amendment of the U.S. Constitution and is null, void, and with no force or effect;

c. Declaring that S.B. 253 is precluded by federal law and is null, void, and with no force or effect;

d. Declaring that S.B. 261 is precluded by federal law and is null, void, and with no force or effect;

e. Declaring that S.B. 253 is invalid under the Constitution's limitations on extraterritorial regulation, including the Dormant Commerce Clause, and is null, void, and with no force or effect;

f. Declaring that S.B. 261 is invalid under the Constitution's limitations on extraterritorial regulation, including the Dormant Commerce Clause, and is null, void, and with no force or effect;

g. Enjoining the Defendants from implementing, applying, or taking any action whatsoever to enforce S.B. 253;

h. Enjoining the Defendants from implementing, applying, or taking any action whatsoever to enforce S.B. 261;

i. Awarding Plaintiffs their reasonable attorneys' and experts' fees incurred in bringing this action under 42 U.S.C. § 1988 and all other applicable statutes; and

j. Granting such other and further relief as this Court deems just and proper.

DATED: February 22, 2024

Respectfully submitted,

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Determine Organizational Boundaries

The GHG Protocol defines methods for setting boundaries for a greenhouse gas (GHG) inventory in its Corporate Accounting and Reporting Standard <https://ghgprotocol.org/corporate-standard> and Corporate Value Chain (Scope 3) Accounting and Reporting Standard <https://ghgprotocol.org/standards/scope-3-standard>.

Note that this page focuses on organizational boundaries: these determine which entities (e.g., subsidiaries, joint ventures, partnerships) and assets (e.g., facilities, vehicles) will be included in the scope 1 and scope 2 GHG emissions inventory. Operational boundaries, on the other hand, define the specific emissions sources (e.g., natural gas boilers or purchased electricity) that are included in an organization's scope 1 and 2 inventory. The GHG inventory guidance <https://epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance> documents provide information on defining operational boundaries.

In setting organizational boundaries, an organization chooses an approach for consolidating GHG emissions and then consistently applies that approach to define the entities and assets included in scope 1 and scope 2. The GHG Protocol defines three consolidation approaches: equity share, financial control, and operational control (Table 1 below).

Table 1: Consolidation Approaches for Setting Organizational Boundaries

Consolidation Approach	Description

Consolidation Approach	Description
Equity share	An organization accounts for GHG emissions from operations and assets according to its share of equity in the operation. The equity share reflects economic interest, which is the extent of rights an organization has to the risks and rewards flowing from an operation.
Financial control	An organization accounts for 100 percent of the GHG emissions over which it has financial control. It does not account for GHG emissions from operations it owns equity in but does not have financial control over. The organization has financial control over the operation if it can direct the operation's financial and operating policies with a view to gaining economic benefits from the operation's activities. The organization may have financial control over the operation even if it has less than a 50 percent equity in that operation.
Operational control	An organization accounts for 100 percent of the GHG emissions over which it has operational control. It does not account for GHG emissions from operations it owns equity in but does not have operational control over. An organization accounts for 100 percent of emissions from operations over which it or one of its subsidiaries has operational control. Generally, if the organization is the operator of a facility, it will have the full authority to introduce and implement its operating policies and thus has operational control.

Table 2 below shows several types of entities and assets and how they are included in the scope 1 and scope 2 inventory under the three different approaches. Each box represents the percent of emissions included in the boundary.

Table 2. Percent of Scope 1 and 2 Emissions for Entities or Assets Included Under Each Consolidation Approach

Entity or Asset	Equity Share	Financial Control	Operational Control
Wholly owned asset	100%	100%	100%
Group company/subsidiary/ franchise	Equity share	100% if controlled; 0% if not	100% if controlled; 0% if not
Joint venture/partnership	Equity share	Equity share	100% if controlled; 0% if not
Associated/affiliated company	Equity share	100% if controlled; 0% if not	0%
Leased asset—finance/capital lease	100%	100%	100%
Leased asset—operating lease	0%	0%	100% if controlled; 0% if not

In practice, these three approaches differ most for leased facilities or vehicles where there is an operating lease. These assets are not included in the inventory under the equity share or financial control approaches, but they are generally included in the inventory under the operational control approach. For more information on treatment of leased assets, see GHG Protocol, Appendix F, Categorizing GHG Emissions Associated

with Leased Assets (pdf) <https://ghgprotocol.org/sites/default/files/standards_supporting/categorizing%20ghg%20emissions%20from%20leased%20assets.pdf> (105 KB).

The equity share and financial control approaches are similar with nuanced differences, as explained in detail in the GHG Protocol's Corporate Standard <https://ghgprotocol.org/corporate-standard> and Corporate Value Chain Standard <https://ghgprotocol.org/standards/scope-3-standard>.

The operational control approach is the most common: it typically aligns best with what an organization feels it is responsible for, and it also often leads to the most comprehensive inclusion of assets in the inventory. Industries with complex ownership structures may be more likely to follow the equity share approach to align the reporting boundary with stakeholder interests. An organization may choose the equity share or financial control approach to align its GHG reporting with the assets included in its financial reporting.

Once an organizational boundary is chosen, all levels of the organization and its subsidiaries need to follow the same approach to allow for consistent reporting. For example, if the parent organization uses the operational control approach, it is not appropriate to use the equity share approach for a subsidiary. Internal financial, accounting, or facilities staff may need to be consulted to define the entities and assets that fall within the boundary.

Organizational Boundaries and Scope 3 Emissions

After setting the organizational boundary to identify the entities and assets that are included in scopes 1 and 2, an organization can determine which activities fall into scope 3. This affects scope 3 emissions in several different ways.

- **Assets (e.g., facilities, vehicles).** For example, under the operational control approach, emissions from operating leases for facilities or vehicles are typically included in scope 1 and scope 2. Under the equity share approach, these emissions would be included in scope 3, category 8 (upstream leased assets).

- **Entities (e.g., subsidiaries, joint ventures, partnerships).** Scope 3 includes the value chain emissions of the entities included in scope 1 and scope 2 and does not include value chain emissions of entities outside the organizational boundary. For example, if a subsidiary is included in the scope 1 and 2 boundary and a joint venture is not, upstream scope 3 categories will include emissions associated with the purchases of the subsidiary but not the purchases of the joint venture. Likewise, downstream scope 3 categories will include emissions from the subsidiary's products, but not from the joint venture's products. When a joint venture is excluded from the scope 1 and 2 boundary, its emissions will be included in scope 3, category 15 (investments).
- **Emissions calculation.** Two scope 3 categories are based on the boundaries of the assets included in scope 1 and scope 2:
  - Category 3 (fuel- and energy-related activities) includes emissions associated with the fuels and electricity consumed only in facilities and vehicles included in scope 1 and scope 2.
  - Category 5 (waste generated in operations) includes emissions associated with waste generated only in facilities or vehicles included scope 1 and scope 2.

Last updated on March 3, 2025

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 9 and 98

[EPA–HQ–OAR–2019–0424; FRL–7230–01–OAR]

RIN 2060–AU35

Revisions and Confidentiality Determinations for Data Elements Under the Greenhouse Gas Reporting Rule

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: The EPA is amending specific provisions in the Greenhouse Gas Reporting Rule to improve data quality and consistency. This action updates the General Provisions to reflect revised global warming potentials; expands reporting to additional sectors; improves the calculation, recordkeeping, and reporting requirements by updating existing methodologies; improves data verifications; and provides for collection of additional data to better inform and be relevant to a wide variety of Clean Air Act provisions that the EPA carries out. This action adds greenhouse gas monitoring and reporting for five source categories including coke calcining; ceramics manufacturing; calcium carbide production; caprolactam, glyoxal, and glyoxylic acid production; and facilities conducting geologic sequestration of carbon dioxide with enhanced oil recovery. These revisions also include changes that will improve implementation of the rule such as updates to applicability estimation methodologies, simplifying calculation and monitoring methodologies, streamlining recordkeeping and reporting, and other minor technical corrections or clarifications. This action also establishes and amends confidentiality determinations for the reporting of certain data elements to be added or substantially revised in these amendments.

DATES: This rule is effective January 1, 2025. The incorporation by reference of certain material listed in this final rule is approved by the Director of the Federal Register beginning January 1, 2025. The incorporation by reference of certain other material listed in the rule was approved by the Director of the Federal Register as of January 1, 2018.

ADDRESSES: The EPA has established a docket for this action under Docket ID No. EPA–HQ–OAR–2019–0424. All documents in the docket are listed in the *www.regulations.gov* index. Although listed in the index, some information is not publicly available, *e.g.,* confidential business information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the internet and will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *www.regulations.gov* or in hard copy at the EPA Docket Center, WJC West Building, Room 3334, 1301 Constitution Ave. NW, Washington, DC. This Docket Facility is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744 and the telephone number for the Air Docket is (202) 566–1742.

FOR FURTHER INFORMATION CONTACT: Jennifer Bohman, Climate Change Division, Office of Atmospheric Programs (MC–6207A), Environmental Protection Agency, 1200 Pennsylvania Ave., NW, Washington, DC 20460; telephone number: (202) 343–9548; email address: *GHGReporting@epa.gov.* For technical information, please go to the Greenhouse Gas Reporting Program (GHGRP) website, *www.epa.gov/ghgreporting.* To submit a question, select Help Center, followed by ''Contact Us.''

World Wide Web (WWW). In addition to being available in the docket, an electronic copy of this final rule will also be available through the WWW. Following the Administrator's signature, a copy of this final rule will be posted on the EPA's GHGRP website at *www.epa.gov/ghgreporting.*

SUPPLEMENTARY INFORMATION:

Regulated entities. These final revisions affect certain entities that must submit annual greenhouse gas (GHG) reports under the GHGRP (codified at 40 CFR part 98). These are amendments to existing regulations and will affect owners or operators of certain industry sectors that are suppliers and direct emitters of GHGs. Regulated categories and entities include, but are not limited to, those listed in table 1 of this preamble:

TABLE 1—EXAMPLES OF AFFECTED ENTITIES BY CATEGORY

Category	North American Industry Classification System (NAICS)	Examples of facilities that may be subject to part 98:+
General Stationary Fuel Combustion Sources	.....	Facilities operating boilers, process heaters, incinerators,
	211	turbines, and internal combustion engines.
		Extractors of crude petroleum and natural gas.
	321	Manufacturers of lumber and wood products.
	322	Pulp and paper mills.
	325	Chemical manufacturers.
	324	Petroleum refineries, and manufacturers of coal products.
	316, 326, 339	Manufacturers of rubber and miscellaneous plastic products.
	331	Steel works, blast furnaces.
	332	Electroplating, plating, polishing, anodizing, and coloring.
	336	Manufacturers of motor vehicle parts and accessories.
	221	Electric, gas, and sanitary services.
	622	Health services.
	611	Educational services.
Electric Power Generation	2211	Generation facilities that produce electric energy.
Adipic Acid Production	325199	All other basic organic chemical manufacturing: Adipic acid manufacturing.
Aluminum Production	331313	Primary aluminum production facilities.
Ammonia Manufacturing	325311	Anhydrous ammonia manufacturing facilities.
Calcium Carbide Production	325180	Other basic inorganic chemical manufacturing: calcium carbide manufacturing.

TABLE 1—EXAMPLES OF AFFECTED ENTITIES BY CATEGORY—Continued

Category	North American Industry Classification System (NAICS)	Examples of facilities that may be subject to part 98:+
Carbon Dioxide Enhanced Oil Recovery Projects	211120	Oil and gas extraction projects using carbon dioxide enhanced oil recovery.
Caprolactam, Glyoxal, and Glyoxylic Acid Production	325199	All other basic organic chemical manufacturing.
Cement Production	327310	Cement manufacturing.
Ceramics Manufacturing	327110	Pottery, ceramics, and plumbing fixture manufacturing.
	327120	Clay building material and refractories manufacturing.
Coke Calcining	299901	Coke; coke, petroleum; coke, calcined petroleum.
Electronics Manufacturing	334111	Microcomputers manufacturing facilities.
	334413	Semiconductor, photovoltaic (PV) (solid-state) device manufacturing facilities.
	334419	Liquid crystal display (LCD) unit screens manufacturing facilities; Microelectromechanical (MEMS) manufacturing facilities.
Electrical Equipment Manufacture or Refurbishment	33531	Power transmission and distribution switchgear and specialty transformers manufacturing facilities.
Electricity generation units that report through 40 CFR part 75.	221112	Electric power generation, fossil fuel (*e.g.,* coal, oil, gas).
Electrical Equipment Use	221121	Electric bulk power transmission and control facilities.
Electrical transmission and distribution equipment manufacture or refurbishment.	33361	Engine, Turbine, and Power Transmission Equipment Manufacturing.
Ferroalloy Production	331110	Ferroalloys manufacturing.
Fluorinated Greenhouse Gas Production	325120	Industrial gases manufacturing facilities.
Geologic Sequestration	NA	CO_2 geologic sequestration sites.
Glass Production	327211	Flat glass manufacturing facilities.
	327213	Glass container manufacturing facilities.
	327212	Other pressed and blown glass and glassware manufacturing facilities.
HCFC–22 Production	325120	Industrial gas manufacturing: Hydrochlorofluorocarbon (HCFC) gases manufacturing.
HFC–23 destruction processes that are not collocated with a HCFC–22 production facility and that destroy more than 2.14 metric tons of HFC–23 per year.	325120	Industrial gas manufacturing: Hydrofluorocarbon (HFC) gases manufacturing.
Hydrogen Production	325120	Hydrogen manufacturing facilities.
Industrial Waste Landfill	562212	Solid waste landfills.
Industrial Wastewater Treatment	221310	Water treatment plants.
Injection of Carbon Dioxide	211	Oil and gas extraction.
Iron and Steel Production	333110	Integrated iron and steel mills, steel companies, sinter plants, blast furnaces, basic oxygen process furnace (BOPF) shops.
Lead Production	331	Primary metal manufacturing.
Lime Manufacturing	327410	Lime production.
Magnesium Production	331410	Nonferrous metal (except aluminum) smelting and refining: Magnesium refining, primary.
Nitric Acid Production	325311	Nitrogenous fertilizer manufacturing: Nitric acid manufacturing.
Petroleum and Natural Gas Systems	486210	Pipeline transportation of natural gas.
	221210	Natural gas distribution facilities.
	211120	Crude petroleum extraction.
	211130	Natural gas extraction.
Petrochemical Production	324110	Petrochemicals made in petroleum refineries.
Petroleum Refineries	324110	Petroleum refineries.
Phosphoric Acid Production	325312	Phosphatic fertilizer manufacturing.
Pulp and Paper Manufacturing	322110	Pulp mills.
	322120	Paper mills.
	322130	Paperboard mills.
Miscellaneous Uses of Carbonate	Facilities included elsewhere.	
Municipal Solid Waste Landfills	562212	Solid waste landfills.
	221320	Sewage treatment facilities.
Silicon Carbide Production	327910	Silicon carbide abrasives manufacturing.
Soda Ash Production	325180	Other basic inorganic chemical manufacturing: Soda ash manufacturing.
Suppliers of Carbon Dioxide	325120	Industrial gas manufacturing facilities.
Suppliers of Industrial Greenhouse Gases	325120	Industrial greenhouse gas manufacturing facilities.
Titanium Dioxide Production	325180	Other basic inorganic chemical manufacturing: Titanium dioxide manufacturing.
Underground Coal Mines	212115	Underground coal mining.

TABLE 1—EXAMPLES OF AFFECTED ENTITIES BY CATEGORY—Continued

Category	North American Industry Classification System (NAICS)	Examples of facilities that may be subject to part 98:+
Zinc Production	331410	Nonferrous metal (except aluminum) smelting and refining: Zinc refining, primary.
Suppliers of Coal-based Liquid Fuels	211130	Coal liquefaction at mine sites.
Suppliers of Natural Gas and Natural Gas Liquids	221210	Natural gas distribution facilities.
	211112	Natural gas liquid extraction facilities.
Suppliers of Petroleum Products	324110	Petroleum refineries.
Suppliers of Carbon Dioxide	325120	Industrial gas manufacturing facilities.
Suppliers of Industrial Greenhouse Gases	325120	Industrial greenhouse gas manufacturing facilities.
Importers and Exporters of Pre-charged Equipment and Closed-Cell Foams.	423730	Air-conditioning equipment (except room units) merchant wholesalers.
	333415	Air-conditioning equipment (except motor vehicle) manufacturing.
	423620	Air-conditioners, room, merchant wholesalers.
	449210	Electronics and appliance retailers.
	326150	Polyurethane foam products manufacturing.
	335313	Circuit breakers, power, manufacturing.
	423610	Circuit breakers and related equipment merchant wholesalers.

Table 1 of this preamble is not intended to be exhaustive, but rather provides a guide for readers regarding facilities likely to be affected by this action. This table lists the types of facilities that the EPA is now aware could potentially be affected by this action. Other types of facilities than those listed in the table could also be subject to reporting requirements. To determine whether you will be affected by this action, you should carefully examine the applicability criteria found in 40 CFR part 98, subpart A (General Provisions) and each source category. Many facilities that are affected by 40 CFR part 98 have greenhouse gas emissions from multiple source categories listed in table 1 of this preamble. If you have questions regarding the applicability of this action to a particular facility, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

Acronyms and abbreviations. The following acronyms and abbreviations are used in this document.

ACE Automated Commercial Environment
AIM American Innovation and Manufacturing Act of 2020
ANSI American National Standards Institute
API American Petroleum Institute
ASME American Society of Mechanical Engineers
ASTM ASTM, International
BAMM best available monitoring methods
BCFCs bromochlorofluorocarbons
BEF byproduct emission factor
BFCs bromofluorocarbons
CAA Clean Air Act
CaO calcium oxide (lime)
CARB California Air Resources Board
CAS Chemical Abstracts Service
CBI confidential business information
CBP U.S. Customs and Border Protection
CCS carbon capture and sequestration
CECS combustion emissions control system
CEMS continuous emissions monitoring system
CFC chlorofluorocarbon
CFR Code of Federal Regulations
CF_4 perfluoromethane
CGA cylinder gas audit
CHP combined heat and power
CH_4 methane
CKD cement kiln dust
CO_2 carbon dioxide
CO_2e carbon dioxide equivalent
COF_2 carbonic difluoride
CRA Congressional Review Act
CSA CSA Group
DAC direct air capture
DCU delayed coking unit
DOC degradable organic carbon
DOE U.S. Department of Energy
DRE destruction or removal efficiency
EAF electric arc furnace
EDC ethylene dichloride
EF emission factor
EGU electricity generating unit
e-GGRT electronic Greenhouse Gas Reporting Tool
EG emission guidelines
EOR enhanced oil recovery
EPA U.S. Environmental Protection Agency
EREF Environmental Research and Education Foundation
F–GHG fluorinated greenhouse gas
F–HTF fluorinated heat transfer fluids
FLIGHT Facility Level Information on Greenhouse Gases Tool
FR Federal Register
FTIR Fourier Transform Infrared
GCCS gas collection and capture system
GHG greenhouse gas
GHGRP Greenhouse Gas Reporting Program
GIE gas-insulated equipment
GWP global warming potential
HBCFC hydrobromochlorofluorocarbon
HBFC hydrobromofluorocarbon
HC hydrocarbon
HCFC hydrochlorofluorocarbon
HCFE hydrochlorofluoroether
HFC hydrofluorocarbon
HFE hydrofluoroether
HHV high heating value
HTF heat transfer fluid
HTS Harmonized Tariff System
ICR Information Collection Request
IPCC Intergovernmental Panel on Climate Change
ISO International Standards Organization
IVT Inputs Verification Tool
k first order decay rate
kg kilogram
kV kilovolt
LCD liquid crystal display
LDC local distribution company
LMOP Landfill Methane Outreach Program
MEMS Microelectromechanical systems
MgO magnesium oxide
mmBtu million British thermal units
MRV monitoring, reporting, and verification plan
MW molecular weight
MSW municipal solid waste
mt metric tons
$mtCO_2e$ metric tons carbon dioxide equivalent
MTBS Mean Time Between Service
NAICS North American Industry Classification System
NIST National Institute of Standards and Technology
NSPS new source performance standards
N_2O nitrous oxide
OAR Office of Air and Radiation
OMB Office of Management and Budget
OMP operations management plan
PFC perfluorocarbon
POU point of use
POX partial oxidation
ppmv parts per million volume
PRA Paperwork Reduction Act
PSA pressure swing absorption
psi pounds per square inch
psia pounds per square inch, absolute
PV photovoltaic
QA/QC quality assurance/quality control

RFA Regulatory Flexibility Act
RPC remote plasma cleaning
RY reporting year
scf standard cubic feet
SEM surface-emissions monitoring
SF_6 sulfur hexafluoride
SMR steam methane reforming
SSM startup, shutdown, and malfunction
TSD technical support document
UMRA Unfunded Mandates Reform Act of 1995
UNFCCC United Nations Framework Convention on Climate Change
U.S. United States
VCM vinyl chloride monomer
WGS water gas shift
WMO World Meteorological Organization
WWW World Wide Web

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I. Background

A. How is this preamble organized?

Section I. of this preamble contains background information on the June 21, 2022 proposed rule (87 FR 36920, hereafter referred to as ''2022 Data Quality Improvements Proposal'') and the May 22, 2023 supplemental proposed rule (88 FR 32852, hereafter referred to as ''2023 Supplemental Proposal''). This section also discusses the EPA's legal authority under the CAA to promulgate (including subsequent amendments to) the GHG Reporting Rule, codified at 40 CFR part 98 (hereinafter referred to as ''part 98''), and the EPA's legal authority to make confidentiality determinations for new or revised data elements corresponding to these amendments or for existing data elements for which the EPA is finalizing a new determination. Section II. of this preamble describes the types of amendments included in this final rule. Section III. of this preamble is organized by part 98 subpart and contains detailed information on the final new requirements for, or revisions to, each subpart. Section IV. of this preamble describes the final revisions to 40 CFR part 9. Section V. of this preamble explains the effective date of the final revisions and how the revisions are required to be implemented in reporting year (RY) 2024 and RY2025 reports. Section VI. of this preamble discusses the final confidentiality determinations for new or substantially revised (*i.e.,* requiring additional or different data to be reported) data reporting elements, as well as for certain existing data elements for which the EPA is finalizing a new determination. Section VII. of this preamble discusses the impacts of the final amendments. Finally, section VIII. of this preamble describes the statutory and Executive order requirements applicable to this action.

B. Executive Summary

The EPA is finalizing certain proposed revisions to part 98 included in the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal, with some changes made after consideration of public comments. The final amendments include improvements to requirements that, broadly, will enhance the quality and the scope of information collected, clarify elements of the rule, and streamline elements of reporting and recordkeeping. These final revisions include a comprehensive update to the global warming potentials (GWPs) in table A–1 to subpart A of part 98; updates to provide for collection of additional data to understand new source categories or new emission sources for specific sectors; updates to emission factors to more accurately reflect industry emissions; refinements to existing emissions calculation methodologies to reflect an improved understanding of emissions sources and end uses of GHGs; additions or modifications to reporting requirements in order to eliminate data gaps and improve verification of reported emissions; revisions that address prior commenter concerns or clarify requirements; and editorial corrections that are intended to improve the public's understanding of the rule. The final amendments also include streamlining measures such as revisions to applicability for certain industry sectors to account for changes in usage of certain GHGs or instances where the current applicability estimation methodology may overestimate emissions; revisions that provide flexibility for or simplify monitoring and calculation methods; and revisions to streamline reported data elements or recordkeeping where the current requirements are redundant, where reported data are not currently useful for verification or analysis, or for which continued collection of the data at the same frequency would not likely

provide new insights or knowledge of the industry sector, emissions, or trends at this time. This action also finalizes confidentiality determinations for the reporting of data elements added or substantially revised in these final amendments, and for certain existing data elements for which no confidentiality determination has been made previously or for which the EPA proposed to revise the existing determination.

In some cases, and as further described in section III. of this preamble, the EPA is not taking final action in this final rule on certain proposed revisions included in the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal. For example, after review of comments received in response to the proposed requirements to report purchased electricity and thermal energy consumption information under the proposed subpart B (Energy Consumption), the EPA is not taking action at this time on those proposed provisions. The EPA believes additional time is needed to consider the comments received before taking final action. Similarly, the EPA is not taking final action at this time on certain proposed changes for some subparts. In some cases, *e.g.,* for subparts G (Ammonia Production), P (Hydrogen Production), S (Lime Production), and HH (Municipal Solid Waste Landfills), we are not taking final action at this time on certain revisions to the calculation or monitoring methodologies that would have revised how data are collected and reported in the EPA's electronic greenhouse gas reporting tool (e-GGRT). In several cases, we are also not taking final action at this time on proposed revisions to add reporting requirements. For example, under subpart C (General Stationary Fuel Combustion), we are not taking final action at this time on proposed revisions to the requirements for units in either an aggregation of units or common pipe configuration that would have required reporters to provide additional information such as the unit type, maximum rated heat input capacity, and fraction of the actual total heat input for each unit in the aggregation or the common pipe configuration. Also under subpart C, we are not taking final action at this time on proposed requirements that would have required reporters to identify, for any configuration, whether the unit is an electricity generating unit, and, for group configurations (*i.e.,* common stack/duct, common pipe, and aggregation of units) that contain an electricity generating unit, the estimated decimal fraction of total emissions attributable to the electricity generating unit. Similarly, we are not taking final action at this time on certain data elements that were proposed to be added to subparts A (General Provisions), F (Aluminum Production), G, H (Cement Production), P, S, HH, OO (Suppliers of Industrial Greenhouse Gases), and QQ (Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged Equipment and Closed-Cell Foams). Additional proposed revisions that EPA is not taking final action on at this time are discussed in section III. of this preamble.

This final rule also includes an amendment to 40 CFR part 9 to include the Office of Management and Budget (OMB) control number issued under the Paperwork Reduction Act (PRA) for the information collection request for the GHGRP.

The final amendments will become effective on January 1, 2025. As provided under the existing regulations in subpart A of part 98, the GWP amendments to table A–1 to subpart A will apply to reports submitted by current reporters that are submitted in calendar year 2025 and subsequent years (*i.e.,* starting with reports submitted for RY2024 on March 31, 2025). All other final revisions, which apply to both existing and new reporters, will be implemented for reports prepared for RY2025 and submitted March 31, 2026. Reporters who are newly subject to the rule will be required to implement all requirements to collect data, including any required monitoring and recordkeeping, on January 1, 2025.

These final amendments are anticipated to result in an overall increase in burden for part 98 reporters in cases where the amendments expand current applicability, add or revise reporting requirements, or require additional emissions data to be reported. The primary burden associated with the final rule is due to revisions to applicability, including revisions to the global warming potentials in table A–1 to subpart A of part 98, that will change the number of reporters currently at or near the 25,000 metric tons carbon dioxide equivalent ($mtCO_2e$) threshold; revisions to establish requirements for new source categories for coke calcining, calcium carbide, caprolactam, glyoxal, and glyoxylic acid production, ceramics manufacturing, and facilities conducting geologic sequestration of carbon dioxide with enhanced oil recovery; and revisions to expand reporting to include new emission sources for specific sectors, such as the addition of captive (non-merchant) hydrogen production facilities. The final revisions will affect approximately 254 new reporters across 13 source categories, including the hydrogen production, petroleum and natural gas systems, petroleum refineries, electrical transmission and distribution systems, industrial wastewater treatment, municipal solid waste landfills, fluorinated GHG suppliers, and industrial waste landfills source categories, as well as the new source categories added in these final revisions. The EPA anticipates some decrease in burden where the final revisions will adjust or improve the estimation methodologies for determining applicability, simplify calculation methodologies or monitoring requirements, or simplify the data that must be reported. In several cases, we are also finalizing changes where we anticipate increased clarity or more flexibility for reporters that could result in a potential decrease in burden. The incremental implementation labor costs for all subparts include $2,684,681 in RY2025, and $2,671,831 in each subsequent year (RY2026 and RY2027). The incremental implementation labor costs over the next three years (RY2025 through RY2027) total $8,028,343. There is an additional incremental burden of $2,733,937 for capital and operation and maintenance (O&M) costs in RY2025 and in each subsequent year (RY2026 and RY2027), which reflects changes to applicability and monitoring for subparts with new or additional reporters. The incremental non-labor costs for RY2025 through RY2027 total $8,201,812 over the next three years.

C. Background on This Final Rule

The GHGRP requires annual reporting of GHG data and other relevant information from large facilities and suppliers in the United States. In its 2022 Data Quality Improvements Proposal, the EPA proposed amendments to specific provisions of part 98 where we identified opportunities to improve the quality of the data collected under the rule. This included revisions that would provide for the collection of additional data that may be necessary to better understand emissions from specific sectors or inform future policy decisions under the CAA; update emission factors; and refine emissions estimation methodologies. The proposed rule also included revisions that provided for the collection of additional data that would be useful to improve verification of collected data and complement or

inform other EPA programs. These proposed revisions included the incorporation of a new source category to add calculation and reporting requirements for quantifying geologic sequestration of CO_2 in association with enhanced oil recovery (EOR) operations. In several cases, the 2022 Data Quality Improvements Proposal included revisions that would resolve gaps in the current coverage of the GHGRP that leave out potentially significant sources of GHG emissions or end uses. The EPA also proposed revisions that clarified or updated provisions that may be unclear, and that would streamline calculation, monitoring, or reporting in specific provisions in part 98 to provide flexibility or increase the efficiency of data collection. The EPA included a request for comment on expanding the GHGRP to include several new source categories (see section IV. of the preamble to the 2022 Data Quality Improvements Proposal at 87 FR 37016) and requested comment on potential future amendments to add new calculation, monitoring, and reporting requirements for these categories. The EPA also proposed confidentiality determinations for new or substantially revised data reporting elements that would be amended under the proposed rule, as well as for certain existing data elements for which the EPA proposed a new or revised determination. The EPA received comments on the 2022 Data Quality Improvements Proposal from June 21, 2022, through October 6, 2022.

The EPA subsequently proposed additional amendments to part 98 where the Agency had received or identified new information to further improve the data collected under the GHGRP. The 2023 Supplemental Proposal included amendments that were informed by a review of comments and information provided by stakeholders on the 2022 Data Quality Improvements Proposal, as well as newly proposed amendments that the EPA had identified from program implementation, *e.g.,* where additional data would improve verification of data reported to the GHGRP or would further aid our understanding of changing industry emission trends. The 2023 Supplemental Proposal included a proposed comprehensive update to the GWPs in table A–1 to subpart A of part 98; proposed amendments to establish new subparts with specific reporting provisions under part 98 for five new source categories; and several proposed revisions where the EPA had identified new data supporting improvements to the calculation, monitoring, and recordkeeping requirements. The 2023 Supplemental Proposal also clarified or corrected specific proposed provisions of the 2022 Data Quality Improvements Proposal. The amendments included in the 2023 Supplemental Proposal were proposed as part of the EPA's continued efforts to address potential data gaps and improve the quality of the data collected in the GHGRP. The EPA also proposed confidentiality determinations for new or substantially revised data reporting elements that would be revised under the supplemental proposed amendments. The EPA received comments on the 2023 Supplemental Proposal from May 22, 2023, through July 21, 2023.

The revisions included in the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal were based on the EPA's assessment of advances in scientific understanding of GHG emissions sources, updated guidance on GHG estimation methods, and a review of the data collected and emissions trends established following more than 10 years of implementation of the program. The EPA is finalizing amendments and confidentiality determinations in this action, with certain changes from the proposed rules following consideration of comments submitted and based on the EPA's updated assessment. The revisions reflect the EPA's efforts to update and improve the GHGRP by better capturing the changing landscape of GHG emissions, providing for more complete coverage of U.S. GHG emission sources, and providing a more comprehensive approach to understanding GHG emissions. Responses to major comments submitted on the proposed amendments from the 2022 Data Quality Improvement Proposal and the 2023 Supplemental Proposal considered in the development of this final rule can be found in sections III. and VI. of this preamble. Documentation of all comments received as well as the EPA's responses can be found in the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule,'' available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424.

This final rule does not address implementation of provisions of the Inflation Reduction Act, which was signed into law on August 16, 2022. Section 60113 of the Inflation Reduction Act amended the CAA by adding section 136, ''Methane Emissions and Waste Reduction Incentive Program for Petroleum and Natural Gas Systems.'' Although the EPA proposed amendments to subpart W of part 98 (Petroleum and Natural Gas Systems) in the 2022 Data Quality Improvements Proposal, these were developed prior to the Congressional direction provided in CAA section 136. The EPA noted in the preamble to the 2023 Supplemental Proposal (see section I.B., 88 FR 32855) that we intend to issue one or more separate actions to implement the requirements of CAA section 136, including revisions to certain requirements of subpart W. Subsequently, the EPA published a proposed rule for subpart W on August 1, 2023 (88 FR 50282, hereinafter referred to as the ''2023 Subpart W Proposal''), as well as a proposed rule to implement CAA section 136(c), ''Waste Emissions Charge,'' that was signed by the Administrator on January 12, 2024 and published on January 26, 2024 (89 FR 5318),[1] to comply with CAA section 136. As discussed in the 2023 Subpart W Proposal, the EPA considered the 2022 Data Quality Improvements Proposal as well as additional proposed revisions in the development of the 2023 Subpart W Proposal. Accordingly, the EPA is not taking final action on the revisions to subpart W, including harmonizing revisions to subparts A (General Provisions) and C (General Stationary Fuel Combustion Sources) related to subpart W, that were proposed in the 2022 Data Quality Improvements Proposal in this final rule.

D. Legal Authority

The EPA is finalizing these rule amendments under its existing CAA authority provided in CAA section 114. As stated in the preamble to the *Mandatory Reporting of Greenhouse Gase*s final rule (74 FR 56260, October 30, 2009), CAA section 114(a)(1) provides the EPA authority to require the information gathered by this rule because such data will inform and are relevant to the EPA's carrying out of a variety of CAA provisions. Thus, when promulgating amendments to the GHGRP, the EPA has assessed the reasonableness of requiring the information to be provided and explained how the data are relevant to the EPA's ability to carry out the provisions of the CAA. See the preambles to the proposed GHG

[1] CAA section 136(c), ''Waste Emissions Charge,'' directs the Administrator to impose and collect a charge on methane (CH_4) emissions that exceed statutorily specified waste emissions thresholds from an owner or operator of an applicable facility that reports more than 25,000 metric tons carbon dioxide equivalent pursuant to the Greenhouse Gas Reporting Rule's requirements for the petroleum and natural gas systems source category (codified as subpart W in EPA's Greenhouse Gas Reporting Rule regulations).

Reporting Rule (74 FR 16448, April 10, 2009) and the final GHG Reporting Rule (74 FR 56260, October 30, 2009) for further discussion of this authority. Additionally, in enacting CAA section 136 (discussed above in preamble section I.C.), Congress implicitly recognized EPA's appropriate use of CAA authority in promulgating the GHGRP. The provisions of CAA section 136 reference and are in part based on the Greenhouse Gas Reporting Rule requirements under subpart W for the petroleum and natural gas systems source category and require further revisions to subpart W for purposes of supporting implementation of section 136.

The Administrator has determined that this action is subject to the provisions of section 307(d) of the CAA (see also section VIII.L. of this preamble). Section 307(d) contains a set of procedures relating to the issuance and review of certain CAA rules.

In addition, pursuant to sections 114, 301, and 307 of the CAA, the EPA is publishing final confidentiality determinations for the new or substantially revised data elements required by these amendments. Section 114(c) requires that the EPA make information obtained under section 114 available to the public, except for information (excluding emission data) that qualifies for confidential treatment.

II. Overview of Final Revisions to 40 CFR Part 98 and 40 CFR Part 9

Relevant to this final rule, the EPA previously proposed revisions to part 98 in two separate documents: the 2022 Data Quality Improvements Proposal (June 21, 2022, 87 FR 36920) and the 2023 Supplemental Proposal (May 22, 2023, 88 FR 32852). In the proposed rules, the EPA identified two primary categories of revisions that we are finalizing in this rule. First, the EPA identified revisions that would modify the rule to improve the quality of the data collected and better inform the EPA's understanding of U.S. GHG emissions sources. Specifically, the EPA identified six types of revisions to improve the quality of the data collected under part 98 that we are finalizing in this rule, as follows:

- Revisions to table A–1 to the General Provisions of part 98 to update GWPs to reflect advances in scientific knowledge and better characterize the climate impacts of certain GHGs, by including values agreed to under the United Nations Framework Convention on Climate Change, and to maintain comparability and consistency with the Inventory of U.S. Greenhouse Gas Emissions and Sinks (hereafter referred to as ''the Inventory'') and other analyses produced by the EPA;
- Revisions to expand source categories or add new source categories to address potential gaps in reporting of data on U.S. GHG emissions or supply in order to improve the accuracy and completeness of the data provided by the GHGRP;
- Amendments to update emission factors to incorporate new measurement data that more accurately reflect industry emissions;
- Revisions to refine existing emissions calculation methodologies to reflect an improved understanding of emissions sources and end uses of GHGs, or to incorporate more recent research on GHG emissions or formation;
- Additions or modifications to reporting requirements to eliminate data gaps and improve verification of emissions estimates; and
- Revisions that clarify requirements that reporters have previously found vague to ensure that accurate data are being collected, and editorial corrections or harmonizing changes that will improve the public's understanding of the rule.

Second, the EPA identified revisions that would streamline the calculation, monitoring, or reporting requirements of part 98 to provide flexibility or increase the efficiency of data collection. In the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Notice, the EPA identified several streamlining revisions that we are finalizing in this rule, as follows:

- Revisions to applicability criteria for certain industry sectors without the 25,000 $mtCO_2e$ per year reporting threshold to account for changes in usage of certain GHGs, or where the current applicability estimation methodology may overestimate emissions;
- Revisions that provide flexibility for and simplify monitoring and calculation methods where further monitoring and data collection will not likely significantly improve our understanding of emission sources at this time, or where we currently allow similar less burdensome methodologies for other sources; and
- Revisions to reported data elements or recordkeeping where the current requirements are redundant or where reported data are not currently useful for verification or analysis, or for which continued collection of the data at the same frequency will not likely provide new insights or knowledge of the industry sector, emissions, or trends at this time.

The revisions included in this final rule will advance the EPA's goal of updating the GHGRP to reflect advances in scientific knowledge, better reflect the EPA's current understanding of U.S. GHG emissions and trends and improve data collection and reporting to better understand emissions from specific sectors or inform future policy decisions under the CAA. The types of streamlining revisions we are finalizing will simplify requirements while maintaining the quality of the data collected under part 98, where continued collection of information assists in evaluation and support of EPA programs and policies.

The EPA has frequently considered and relied on data collected under the GHGRP to carry out provisions of the CAA; to inform policy options; and to support regulatory and non-regulatory actions. For example, GHGRP landfill data from subpart HH of part 98 (Municipal Solid Waste Landfills) were previously analyzed to inform the development of the 2016 new source performance standards (NSPS) and emission guidelines (EG) for landfills (89 FR 59322; August 29, 2016). Specifically, the EPA used data from part 98 reporting to update the characteristics and technical attributes of over 1,200 landfills in the EPA's landfills data set, as well as to estimate emission reductions and costs, to inform the revised performance standards. Most recently, the EPA used GHGRP data collected under subparts RR (Geologic Sequestration of Carbon Dioxide) and UU (Injection of Carbon Dioxide) of part 98 to inform the development of the proposed NSPS and EG for GHG emissions from fossil fuel-fired electric generating units (EGUs) (88 FR 33240, May 23, 2023, hereafter ''EGU NSPS/EG proposed rule''), including to assess the geographic availability of geologic sequestration and enhanced oil recovery. These final revisions to the GHGRP will, as discussed herein, improve the GHG emissions data and supplier data that is collected under the GHGRP to better inform the EPA in carrying out provisions of the CAA (such as providing a better understanding of upstream production, downstream emissions, and potential impacts) and otherwise supporting the continued development of climate and air quality standards under the CAA.

As the EPA has explained since the GHGRP was first promulgated, the data also will inform the EPA's implementation of CAA section 103(g) regarding improvements in nonregulatory strategies and technologies for preventing or reducing air pollutants (*e.g.,* EPA's voluntary

GHG reduction programs such as the non-CO_2 partnership programs and ENERGY STAR) (74 FR 56265). The final rule will support the overall goals of the GHGRP to collect high-quality GHG data and to incorporate metrics and methodologies that reflect scientific updates. For example, we are finalizing revisions to table A–1 to subpart A of part 98 to update the chemical-specific GWP values of certain GHGs to (1) reflect GWPs from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (hereinafter referred to as ''AR5''); [2] (2) for certain GHGs that do not have chemical-specific GWPs listed in AR5, to adopt GWP values from the IPCC Sixth Assessment Report (hereinafter referred to as ''AR6''); [3] and (3) to revise and expand the set of default GWPs which are applied to GHGs for which peer-reviewed chemical-specific GWPs are not available.

In several cases, we are finalizing updates to emissions and default factors where we have received or identified updated measurement data. For example, we are finalizing updates to the default biogenic fraction for tire combustion in subpart C of part 98 (General Stationary Fuel Combustion) based on updated data obtained by the EPA on the weighted average composition of natural rubber in tires, allowing for the estimation of an emission factor that is more representative of these sources. Similarly, we are finalizing updates to the emission factors and default destruction and removal efficiency values in subpart I of part 98 (Electronics Manufacturing). The updated emission factors are based on newly submitted data from the 2017 and 2020 technology assessment reports submitted under the GHGRP with RY2016 and RY2019 annual reports, as well as consideration of new emission factors available in the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereafter ''2019 Refinement''). [4]

In other cases, we are finalizing updates to calculation methodologies to incorporate updates that are based on an improved understanding of emission sources. For example, for subpart I of part 98 (Electronics Manufacturing), the EPA is implementing emissions estimation improvements from the 2019 Refinement such as updates to the method used to calculate the fraction of fluorinated input gases and byproducts exhausted from tools with abatement systems during stack tests; revising equations that calculate the weighted average DREs for individual fluorinated greenhouse gases (F–GHGs) across process types; requiring that all stack systems be tested if the stack test method is used; and updating a set of equations that will more accurately account for emissions when pre-control emissions of a F–GHG approach or exceed the consumption of that gas during the test period. For subpart Y (Petroleum Refineries), we are amending the calculation methodology for delayed coking units to more accurately reflect the activities conducted at certain facilities that were not captured by the current emissions estimation methodology, which relies on a steam generation model. The incorporation of updated metrics and methodologies will improve the quality and accuracy of the data collected under the GHGRP, increase the Agency's understanding of the relative distribution of GHGs that are emitted, and better inform EPA policy and programs under the CAA.

The improvements to part 98 will further provide a more comprehensive, nationwide GHG emissions profile reflective of the origin and distribution of GHG emissions in the United States and will more accurately inform EPA policy options for potential regulatory or non-regulatory CAA programs. The EPA is finalizing several amendments that will reduce gaps in the reporting of GHG emissions and supply from specific sectors, including the broadening of existing source categories; and establishing new source categories that will add calculation, monitoring, reporting, and recordkeeping requirements for certain sectors of the economy. The final revisions add five new source categories, including coke calcining; ceramics manufacturing; calcium carbide production; caprolactam, glyoxal, and glyoxylic acid production; and facilities conducting geologic sequestration of carbon dioxide with enhanced oil recovery. These source categories were identified upon evaluation of emission sources that potentially contribute significant GHG emissions that are not currently reported or where facilities representative of these source categories may currently report under another part 98 source category using methodologies that may not provide complete or accurate emissions. Additionally, the inclusion of certain source categories will improve the completeness of the emissions estimates presented in the Inventory, such as collection of data on ceramics manufacturing; calcium carbide production; and caprolactam, glyoxal, and glyoxylic acid production. The EPA is also finalizing updates to certain subparts to add reporting of new emissions or emissions sources for existing sectors to address potential gaps in reporting. For example, we are adding requirements for the monitoring, calculation, and reporting of F–GHGs other than sulfur hexafluoride (SF_6) and perfluorocarbons (PFCs) under subparts DD (Electrical Equipment and Distribution Equipment Use) and SS (Electrical Equipment Manufacture or Refurbishment) to account for the introduction of alternative technologies and replacements for SF_6.

Likewise, we are finalizing revisions that will improve reporting under subpart HH to better account for CH_4 emissions from these facilities. Following review of recent studies indicating that CH_4 emissions from landfills may be considerably higher than what is currently reported to part 98 due in part to emissions from poorly operating gas collection systems or destruction devices, we are revising the calculation methodologies in subpart HH to better account for these scenarios. These changes are necessary for the EPA to continue to analyze the relative emissions and distribution of emissions from specific industries, improve the overall quality of the data collected under the GHGRP, and better inform future EPA policy and programs under the CAA. For example, the final revisions to subpart HH will be used to further improve the data in the EPA's landfills data set by providing more

[2] IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp. The GWPs are listed in table 8.A.1 of Appendix 8.A: Lifetimes, Radiative Efficiencies and Metric Values, which appears on pp. 731–737 of Chapter 8, ''Anthropogenic and Natural Radiative Forcing.''

[3] Smith, C., Z.R.J. Nicholls, K. Armour, W. Collins, P. Forster, M. Meinshausen, M.D. Palmer, and M. Watanabe, 2021: The Earth's Energy Budget, Climate Feedbacks, and Climate Sensitivity Supplementary Material. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Available from *www.ipcc.ch/* The AR6 GWPs are listed in table 7.SM.7, which appears on page 16 of the Supplementary Material.

[4] Intergovernmental Panel on Climate Change. 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Calvo Buendia, E., Tanabe, K., Kranjc, A., Baasansuren, J., Fukuda, M., Ngarize, S., Osako, A., Pyrozhenko, Y., Shermanau, P. and Federici, S. (eds). Published: IPCC, Switzerland. 2019. *https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html.*

comprehensive and accurate information on landfill emissions and the efficacy of gas collection systems and destruction devices.

The final revisions also help ensure that the data collected in the GHGRP can be compared to the data collected and presented by other EPA programs under the CAA. For example, we are finalizing several revisions to the reporting requirements for subpart HH, including more clearly identifying reporting elements associated with each gas collection system, each measurement location within a gas collection system, and each control device associated with a measurement location in subpart HH of part 98. These revisions can be used to estimate the relative volume of gas flared versus sent to landfill-gas-to-energy projects to better understand the amount of recovered CH_4 that is beneficially used in energy recovery projects. Understanding the energy recovery of these facilities is critical for evaluating and identifying progress towards renewable energy targets. Specifically, these data will allow the Agency to identify industry-specific trends of beneficial use of landfill gas, communicate best operating practices for reducing GHG emissions, and evaluate options for expanding the use of these best practices or other potential policy options under the CAA.

Similarly, we are finalizing revisions to clarify subpart RR (Geologic Sequestration of Carbon Dioxide) and add subpart VV (Geologic Sequestration of Carbon Dioxide With Enhanced Oil Recovery Using ISO 27916) to part 98. Subpart VV provides for the reporting of incidental CO_2 storage associated with enhanced oil recovery based on the CSA Group (CSA)/American National Standards Institute (ANSI) International Standards Organization (ISO) 27916:19.

In the EGU NSPS/EG proposed rule, the EPA proposed that any affected EGU that employs CCS technology that captures enough CO_2 to meet the proposed standard and injects the CO_2 underground must assure that the CO_2 is managed at a facility reporting under subpart RR or new subpart VV of part 98. As such, this final rule complements the EGU NSPS/EG proposed rule.

In other cases, the revisions include collection of data that could be compared to other national and international inventories, improving, for example, the estimates provided to the Inventory. For instance, we are finalizing revisions to subpart N (Glass Production) to require reporting of the annual quantities of cullet (*i.e.,* recycled scrap glass) used as a raw material. Because differences in the quantities of cullet used can lead to variations in emissions from the production of different glass types, the annual quantities of cullet used will provide a useful metric for understanding variations and differences in emissions estimates as well as improve the analysis, transparency, and accuracy of the glass manufacturing sector in the Inventory and other EPA programs. Likewise, the addition of reporting for new source categories will improve the completeness of the emissions estimates presented in the Inventory, such as collection of data on ceramics manufacturing, calcium carbide production, and caprolactam, glyoxal, and glyoxylic acid production.

The EPA is finalizing several amendments to improve verification of the annual GHG reports. For example, we are finalizing amendments to subpart H (Cement Production) to collect additional data including annual averages for certain chemical composition input data on a facility-basis, which the Agency will use to build verification checks. These edits will provide the EPA the ability to check reported emissions data from subpart H reporters using both the mass balance and direct measurement estimation methods, allowing the EPA to back-estimate process emissions, which will result in more accurate reporting. Similarly, we are amending subparts OO (Suppliers of Industrial Greenhouse Gases) and QQ (Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged Equipment or Closed-Cell Foams) of part 98 to require reporting of the Harmonized Tariff System code for each F–GHG, fluorinated heat transfer fluid (F–HTF), or nitrous oxide (N_2O) shipped, which will reduce instances of reporting where the data provided is unclear or unable to be compared to outside data sources for verification.

Lastly, the changes in this final rule will further advance the ability of the GHGRP to provide access to quality data on greenhouse gas emissions. Since its implementation, the collection of data under the GHGRP has allowed the Agency and relevant stakeholders to identify changes in industry and emissions trends, such as transitions in equipment technology or use of alternative lower-GWP greenhouses gases, that may be beneficial for informing other EPA programs under the CAA. The GHGRP provides an important data resource for communities and the public to understand GHG emissions. Since facilities are required to use prescribed calculation and monitoring methods, emissions data can be compared and analyzed, including locations of emissions sources. GHGRP data are easily accessible to the public via the EPA's online data publication tool, also known as FLIGHT at: *https://ghgdata.epa.gov/ghgp/main.do.* FLIGHT allows users to view and sort GHG data for every reporting year starting with 2010 from over 8,000 entities in a variety of ways including by location, industrial sector, and type of GHG emitted. This powerful data resource provides a critical tool for communities to identify nearby sources of GHGs and provide information to state and local governments. Overall, the final revisions in this action will improve the quality of the data collected under the program and available to communities.

These final revisions will, as such, maximize the effectiveness of part 98. Section III. of this preamble describes the specific changes that we are finalizing for each subpart to part 98 in more detail. Additional discussion of the benefits of the final rule are in section VII. of this preamble.

Additionally, we are finalizing a technical amendment to 40 CFR part 9 to update the table that lists the OMB control numbers issued under the PRA to include the information collection request (ICR) for 40 CFR part 98. This amendment satisfies the display requirements of the PRA and OMB's implementing regulations at 5 CFR part 1320 and is further described in section IV. of this preamble.

III. Final Revisions to Each Subpart of Part 98 and Summary of Comments and Responses

This section summarizes the final amendments to each part 98 subpart, as generally described in section II. of this preamble. Major changes to the final rule as compared to the proposed revisions are identified in this section. The amendments to each subpart are followed by a summary of the major comments on those amendments, and the EPA's responses to those comments. Other minor corrections and clarifications are reflected in the final redline regulatory text in the docket for this rulemaking (Docket ID. No. EPA–HQ–OAR–2019–0424).

A. Subpart A—General Provisions

The EPA is finalizing several amendments to subpart A of part 98 (General Provisions) as proposed. In some cases, we are finalizing the proposed amendments with revisions. Section III.A.1. of this preamble discusses the final revisions to subpart A. The EPA received several comments on the proposed subpart A revisions which are discussed in section III.A.2.

of this preamble. We are not finalizing the proposed confidentiality determinations for data elements that were included in the proposed revisions to subpart A, as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart A

This section summarizes the final amendments to subpart A. Major changes in this final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart A can be found in section III.A.2. of this preamble. Additional information for these amendments and their supporting basis is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

a. Revisions to Global Warming Potentials

As proposed, we are revising table A–1 to subpart A of part 98 to reflect more accurate GWPs to better characterize the climate impacts of individual GHGs and to ensure continued consistency with other U.S. climate programs, including the Inventory. The amendments to the GWPs in table A–1 that we are finalizing in this document are discussed in this section of this preamble. The EPA's response to comments received on the proposed revisions to table A–1 are in section III.A.2.a. of this preamble.

In the 2022 Data Quality Improvements Proposal, the EPA proposed two updates to table A–1 to subpart A of part 98 to update GWP values to reflect advances in scientific knowledge. First, we proposed to adopt a chemical-specific GWP of 0.14 for carbonic difluoride (COF_2) using the atmospheric lifetime and radiative efficiency published by the World Meteorological Organization (WMO) in its Scientific Assessment of Ozone Depletion.[5] We also proposed to expand one of the F–GHG groups to which a default GWP is assigned. Default GWPs are applied to GHGs for which peer-reviewed chemical-specific GWPs are not available. Specifically, we proposed to expand the ninth F–GHG group in table A–1 to subpart A of part 98, which includes unsaturated PFCs, unsaturated HFCs, unsaturated hydrochlorofluorocarbons (HCFCs), unsaturated halogenated ethers, unsaturated halogenated esters, fluorinated aldehydes, and fluorinated ketones, to include additional unsaturated fluorocarbons. Given the very short atmospheric lifetimes of unsaturated GHGs and review of available evaluations of individual unsaturated chlorofluorocarbons and unsaturated bromofluorocarbons in the 2018 WMO Scientific Assessment, we proposed to add unsaturated bromofluorocarbons, unsaturated chlorofluorocarbons, unsaturated bromochlorofluorocarbons, unsaturated hydrobromofluorocarbons, and unsaturated hydrobromochlorofluorocarbons to this F–GHG group, which will apply a default GWP of 1 to these compounds. Additional information on these amendments and their supporting basis is available in section III.A.1. of the preamble to the 2022 Data Quality Improvements Proposal.

As the 2022 Data Quality Improvements Proposal was nearing publication, the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) fully specified which GWPs countries should use for purposes of GHG reporting.[6] The EPA subsequently proposed a comprehensive update to table A–1 to subpart A of part 98 in the 2023 Supplemental Proposal, consistent with recent science and the UNFCCC decision. This update carried out the intent that the EPA expressed at the time the GHGRP was first promulgated and in subsequent updates to part 98 to periodically update table A–1 as science and UNFCCC decisions evolve. Specifically, the EPA proposed revisions to table A–1 to update the chemical-specific GWPs values of certain GHGs to reflect values from the IPCC AR5 [7] and, for certain GHGs that do not have chemical-specific GWPs listed in AR5, to adopt GWP values from the IPCC AR6.[8] We proposed to adopt the AR5 and AR6 GWPs based on a 100-year time horizon. We also proposed to revise and expand the set of default GWPs in table A–1 for GHGs for which peer-reviewed chemical-specific GWPs are not available, including adding two new fluorinated GHG groups for saturated chlorofluorocarbons (CFCs) and for cyclic forms of unsaturated halogenated compounds, modifying the ninth F–GHG group to more clearly apply to non-cyclic unsaturated halogenated compounds, and updating the existing default GWP values to reflect values estimated from the chemical-specific GWPs that we proposed to adopt from AR5 and AR6. See sections II.A. and III.A.1. of the preamble to the 2023 Supplemental Proposal for additional information.

As proposed, we are amending table A–1 to subpart A of part 98 to update and add chemical-specific and default GWPs. Consistent with the 2021 UNFCCC decision, we are updating table A–1 to use, for GHGs with GWPs in AR5, the AR5 GWP values in table 8.A.1 (that reflect the climate-carbon feedbacks of CO_2 but not the GHG whose GWP is being evaluated), and for CH_4, the GWP that is not the GWP for fossil CH_4 in table 8.A.1 (*i.e.,* the GWP for CH_4 that does not reflect either the climate-carbon feedbacks for CH_4 or the atmospheric CO_2 that would result from the oxidation of CH_4 in the atmosphere). We are also updating table A–1 to adopt AR6 GWP values for 31 F–GHGs that have GWPs listed in AR6 but not AR5. Table 2 of this preamble lists the final GWP values for each GHG.

[5] WMO. Scientific Assessment of Ozone Depletion: 2018, Global Ozone Research and Monitoring Project–Report No. 58, 588 pp., Geneva, Switzerland, 2018. *www.esrl.noaa.gov/csd/assessments/ozone/2018/downloads/018OzoneAssessment.pdf.* Retrieved July 29, 2019. Available in the docket for this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424.

[6] As explained in section III.A.1. of the preamble to the 2023 Supplemental Proposal, the Parties to the UNFCCC specified the agreed-on GWPs in November 2021, which was too late to allow the EPA to consider proposing a comprehensive GWP update in the 2022 Data Quality Improvement Proposal.

[7] IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp. The GWPs are listed in table 8.A.1 of Appendix 8.A: Lifetimes, Radiative Efficiencies and Metric Values, which appears on pp. 731–737 of Chapter 8, ''Anthropogenic and Natural Radiative Forcing.''

[8] Smith, C., Z.R.J. Nicholls, K. Armour, W. Collins, P. Forster, M. Meinshausen, M.D. Palmer, and M. Watanabe, 2021: The Earth's Energy Budget, Climate Feedbacks, and Climate Sensitivity Supplementary Material. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Pe´an, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Available from: *www.ipcc.ch/.* The AR6 GWPs are listed in table 7.SM.7, which appears on page 16 of the Supplementary Material.

TABLE 2—REVISED CHEMICAL-SPECIFIC GWPS FOR COMPOUNDS IN TABLE A–1

Name	CAS No.	Chemical formula	GWP (100-year)
Chemical-Specific GWPs			
Carbon dioxide	124–38–9	CO_2	1
Methane	74–82–8	CH_4	28
Nitrous oxide	10024–97–2	N_2O	265
Fully Fluorinated GHGs			
Sulfur hexafluoride	2551–62–4	SF_6	23,500
Trifluoromethyl sulphur pentafluoride	373–80–8	SF_5CF_3	17,400
Nitrogen trifluoride	7783–54–2	NF_3	16,100
PFC–14 (Perfluoromethane)	75–73–0	CF_4	6,630
PFC–116 (Perfluoroethane)	76–16–4	C_2F_6	11,100
PFC–218 (Perfluoropropane)	76–19–7	C_3F_8	8,900
Perfluorocyclopropane	931–91–9	$c\text{-}C_3F_6$	9,200
PFC–3–1–10 (Perfluorobutane)	355–25–9	C_4F_{10}	9,200
PFC–318 (Perfluorocyclobutane)	115–25–3	$c\text{-}C_4F_8$	9,540
Perfluorotetrahydrofuran	773–14–8	$c\text{-}C_4F_8O$	13,900
PFC–4–1–12 (Perfluoropentane)	678–26–2	C_5F_{12}	8,550
PFC–5–1–14 (Perfluorohexane, FC–72)	355–42–0	C_6F_{14}	7,910
PFC–6–1–12	335–57–9	C_7F_{16}; $CF_3(CF_2)_5CF_3$	7,820
PFC–7–1–18	307–34–6	C_8F_{18}; $CF_3(CF_2)_6CF_3$	7,620
PFC–9–1–18	306–94–5	$C_{10}F_{18}$	7,190
PFPMIE (HT–70)	NA	$CF_3OCF(CF_3)CF_2OCF_2OCF_3$	9,710
Perfluorodecalin (cis)	60433–11–6	$Z\text{-}C_{10}F_{18}$	7,240
Perfluorodecalin (trans)	60433–12–7	$E\text{-}C_{10}F_{18}$	6,290
Perfluorotriethylamine	359–70–6	$N(C_2F_5)_3$	10,300
Perfluorotripropylamine	338–83–0	$N(CF_2CF_2CF_3)_3$	9,030
Perfluorotributylamine	311–89–7	$N(CF_2CF_2CF_2CF_3)_3$	8,490
Perfluorotripentylamine	338–84–1	$N(CF_2CF_2CF_2CF_2CF_3)_3$	7,260
Saturated Hydrofluorocarbons (HFCs) With Two or Fewer Carbon-Hydrogen Bonds			
(4s,5s)-1,1,2,2,3,3,4,5-octafluorocyclopentane	158389–18–5	trans-cyc ($-CF_2CF_2CF_2CHFCHF-$)	258
HFC–23	75–46–7	CHF_3	12,400
HFC–32	75–10–5	CH_2F_2	677
HFC–125	354–33–6	C_2HF_5	3,170
HFC–134	359–35–3	$C_2H_2F_4$	1,120
HFC–134a	811–97–2	CH_2FCF_3	1,300
HFC–227ca	220732–84–8	$CF_3CF_2CHF_2$	2,640
HFC–227ea	431–89–0	C_3HF_7	3,350
HFC–236cb	677–56–5	$CH_2FCF_2CF_3$	1,210
HFC–236ea	431–63–0	CHF_2CHFCF_3	1,330
HFC–236fa	690–39–1	$C_3H_2F_6$	8,060
HFC–329p	375–17–7	$CHF_2CF_2CF_2CF_3$	2,360
HFC–43–10mee	138495–42–8	$CF_3CFHCFHCF_2CF_3$	1,650
Saturated Hydrofluorocarbons (HFCs) With Three or More Carbon-Hydrogen Bonds			
1,1,2,2,3,3-hexafluorocyclopentane	123768–18–3	cyc ($-CF_2CF_2CF_2CH_2CH_2-$)	120
1,1,2,2,3,3,4-heptafluorocyclopentane	1073290–77–4	cyc ($-CF_2CF_2CF_2CHFCH_2-$)	231
HFC–41	593–53–3	CH_3F	116
HFC–143	430–66–0	$C_2H_3F_3$	328
HFC–143a	420–46–2	$C_2H_3F_3$	4,800
HFC–10732	624–72–6	CH_2FCH_2F	16
HFC–10732a	75–37–6	CH_3CHF_2	138
HFC–161	353–36–6	CH_3CH_2F	4
HFC–245ca	679–86–7	$C_3H_3F_5$	716
HFC–245cb	1814–88–6	$CF_3CF_2CH_3$	4,620
HFC–245ea	24270–66–4	$CHF_2CHFCHF_2$	235
HFC–245eb	431–31–2	$CH_2FCHFCF_3$	290
HFC–245fa	460–73–1	$CHF_2CH_2CF_3$	858
HFC–263fb	421–07–8	$CH_3CH_2CF_3$	76
HFC–272ca	420–45–1	$CH_3CF_2CH_3$	144
HFC–365mfc	406–58–6	$CH_3CF_2CH_2CF_3$	804
Saturated Hydrofluoroethers (HFEs) and Hydrochlorofluoroethers (HCFEs) With One Carbon-Hydrogen Bond			
HFE–125	3822–68–2	CHF_2OCF_3	12,400
HFE–227ea	2356–62–9	$CF_3CHFOCF_3$	6,450
HFE–329mcc2	134769–21–4	$CF_3CF_2OCF_2CHF_2$	3,070
HFE–329me3	428454–68–6	$CF_3CFHCF_2OCF_3$	4,550
1,1,1,2,2,3,3-Heptafluoro-3-(1,2,2,2-tetrafluoroethoxy)-propane	3330–15–2	$CF_3CF_2CF_2OCHFCF_3$	6,490
Saturated HFEs and HCFEs With Two Carbon-Hydrogen Bonds			
HFE–134 (HG–00)	1691–17–4	CHF_2OCHF_2	5,560
HFE–236ca	32778–11–3	$CHF_2OCF_2CHF_2$	4,240
HFE–236ca12 (HG–10)	7807322–47–1	$CHF_2OCF_2OCHF_2$	5,350
HFE–236ea2 (Desflurane)	57041–67–5	$CHF_2OCHFCF_3$	1,790
HFE–236fa	20193–67–3	$CF_3CH_2OCF_3$	979

TABLE 2—REVISED CHEMICAL-SPECIFIC GWPS FOR COMPOUNDS IN TABLE A–1—Continued

Name	CAS No.	Chemical formula	GWP (100-year)
HFE–338mcf2	156053–88–2	$CF_3CF_2OCH_2CF_3$	929
HFE–338mmz1	26103–08–2	$CHF_2OCH(CF_3)_2$	2,620
HFE–338pcc13 (HG–01)	188690–78–0	$CHF_2OCF_2CF_2OCHF_2$	2,910
HFE–43–10pccc (H-Galden 1040x, HG–11)	E1730133	$CHF_2OCF_2OC_2F_4OCHF_2$	2,820
HCFE–235ca2 (Enflurane)	13838–16–9	CHF_2OCF_2CHFCl	583
HCFE–235da2 (Isoflurane)	26675–46–7	$CHF_2OCHClCF_3$	491
HG–02	205367–61–9	HF_2C-$(OCF_2CF_2)_2$-OCF_2H	2,730
HG–03	173350–37–3	HF_2C-$(OCF_2CF_2)_3$-OCF_2H	2,850
HG–20	249932–25–0	HF_2C-$(OCF_2)_2$-OCF_2H	5,300
HG–21	249932–26–1	HF_2C-$OCF_2CF_2OCF_2OCF_2O$-CF_2H	3,890
HG–30	188690–77–9	HF_2C-$(OCF_2)_3$-OCF_2H	7,330
1,1,3,3,4,4, 6,6,7,7,9,9, 10,10,12,12, 13,13,15, 15-eicosafluoro-2,5,8,11,14-Pentaoxapentadecane.	173350–38–4	$HCF_2O(CF_2CF_2O)_4CF_2H$	3,630
1,1,2-Trifluoro-2-(trifluoromethoxy)-ethane	84011–06–3	$CHF_2CHFOCF_3$	1,240
Trifluoro(fluoromethoxy)methane	2261–01–0	CH_2FOCF_3	751
Saturated HFEs and HCFEs With Three or More Carbon-Hydrogen Bonds			
HFE–143a	421–14–7	CH_3OCF_3	523
HFE–245cb2	22410–44–2	$CH_3OCF_2CF_3$	654
HFE–245fa1	84011–15–4	$CHF_2CH_2OCF_3$	828
HFE–245fa2	1885–48–9	$CHF_2OCH_2CF_3$	812
HFE–254cb1	425–88–7	$CH_3OCF_2CHF_2$	301
HFE–263fb2	460–43–5	$CF_3CH_2OCH_3$	1
HFE–263m1; R–E–143a	690–22–2	$CF_3OCH_2CH_3$	29
HFE–347mcc3 (HFE–7000)	375–03–1	$CH_3OCF_2CF_2CF_3$	530
HFE–347mcf2	171182–95–9	$CF_3CF_2OCH_2CHF_2$	854
HFE–347mmy1	2200732–84–2	$CH_3OCF(CF_3)_2$	363
HFE–347mmz1 (Sevoflurane)	2807323–86–6	$(CF_3)_2CHOCH_2F$	216
HFE–347pcf2	406–78–0	$CHF_2CF_2OCH_2CF_3$	889
HFE–356mec3	382–34–3	$CH_3OCF_2CHFCF_3$	387
HFE–356mff2	333–36–8	$CF_3CH_2OCH_2CF_3$	17
HFE–356mmz1	13171–18–1	$(CF_3)_2CHOCH_3$	14
HFE–356pcc3	160620–20–2	$CH_3OCF_2CF_2CHF_2$	413
HFE–356pcf2	50807–77–7	$CHF_2CH_2OCF_2CHF_2$	719
HFE–356pcf3	35042–99–0	$CHF_2OCH_2CF_2CHF_2$	446
HFE–365mcf2	2200732–81–9	$CF_3CF_2OCH_2CH_3$	58
HFE–365mcf3	378–16–5	$CF_3CF_2CH_2OCH_3$	0.99
HFE–374pc2	512–51–6	$CH_3CH_2OCF_2CHF_2$	627
HFE–449s1 (HFE–7100) Chemical blend	163702–07–6 163702–08–7	$C_4F_9OCH_3$ $(CF_3)_2CFCF_2OCH_3$.	421
HFE–569sf2 (HFE–7200) Chemical blend	163702–05–4 163702–06–5	$C_4F_9OC_2H_5$ $(CF_3)_2CFCF_2OC_2H_5$.	57
HFE–7300	132182–92–4	$(CF_3)_2CFCFOC_2H_5CF_2CF_2CF_3$	405
HFE–7500	297730–93–9	n-$C_3F_7CFOC_2H_5CF(CF_3)_2$	13
HG′-01	73287–23–7	$CH_3OCF_2CF_2OCH_3$	222
HG′-02	485399–46–0	$CH_3O(CF_2CF_2O)_2CH_3$	236
HG′-03	485399–48–2	$CH_3O(CF_2CF_2O)_3CH_3$	221
Difluoro(methoxy)methane	359–15–9	CH_3OCHF_2	144
2-Chloro-1,1,2-trifluoro-1-methoxyethane	425–87–6	CH_3OCF_2CHFCl	122
1-Ethoxy-1,1,2,2,3,3,3-heptafluoropropane	22052–86–4	$CF_3CF_2CF_2OCH_2CH_3$	61
2-Ethoxy-3,3,4,4,5-pentafluorotetrahydro-2,5-bis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-furan.	920979–28–8	$C_{12}H_5F_{19}O_2$	56
1-Ethoxy-1,1,2,3,3,3-hexafluoropropane	380–34–7	$CF_3CHFCF_2OCH_2CH_3$	23
Fluoro(methoxy)methane	460–22–0	CH_3OCH_2F	13
1,1,2,2-Tetrafluoro-3-methoxy-propane; Methyl 2,2,3,3-tetrafluoropropyl ether	60598–17–6	$CHF_2CF_2CH_2OCH_3$	0.49
1,1,2,2-Tetrafluoro-1-(fluoromethoxy)ethane	37031–31–5	$CH_2FOCF_2CF_2H$	871
Difluoro(fluoromethoxy)methane	461–63–2	CH_2FOCHF_2	617
Fluoro(fluoromethoxy)methane	462–51–1	CH_2FOCH_2F	130
Saturated Chlorofluorocarbons (CFCs)			
E–R316c	3832–15–3	trans-cyc (-CClFCF$_2$CF$_2$CClF-)	4,230
Z–R316c	3934–26–7	cis-cyc (-CClFCF$_2$CF$_2$CClF-)	5,660
Fluorinated Formates			
Trifluoromethyl formate	85358–65–2	$HCOOCF_3$	588
Perfluoroethyl formate	313064–40–3	$HCOOCF_2CF_3$	580
1,2,2,2-Tetrafluoroethyl formate	481631–19–0	$HCOOCHFCF_3$	470
Perfluorobutyl formate	197218–56–7	$HCOOCF_2CF_2CF_2CF_3$	392
Perfluoropropyl formate	271257–42–2	$HCOOCF_2CF_2CF_3$	376
1,1,1,3,3,3-Hexafluoropropan-2-yl formate	856766–70–6	$HCOOCH(CF_3)_2$	333
2,2,2-Trifluoroethyl formate	32042–38–9	$HCOOCH_2CF_3$	33
3,3,3-Trifluoropropyl formate	1344118–09–7	$HCOOCH_2CH_2CF_3$	17
Fluorinated Acetates			
Methyl 2,2,2-trifluoroacetate	431–47–0	CF_3COOCH_3	52
1,1-Difluoroethyl 2,2,2-trifluoroacetate	1344118–13–3	$CF_3COOCF_2CH_3$	31
Difluoromethyl 2,2,2-trifluoroacetate	2024–86–4	$CF_3COOCHF_2$	27

TABLE 2—REVISED CHEMICAL-SPECIFIC GWPS FOR COMPOUNDS IN TABLE A–1—Continued

Name	CAS No.	Chemical formula	GWP (100-year)
2,2,2-Trifluoroethyl 2,2,2-trifluoroacetate	407–38–5	$CF_3COOCH_2CF_3$	7
Methyl 2,2-difluoroacetate	433–53–4	HCF_2COOCH_3	3
Perfluoroethyl acetate	343269–97–6	$CH_3COOCF_2CF_3$	2
Trifluoromethyl acetate	74123–20–9	CH_3COOCF_3	2
Perfluoropropyl acetate	1344118–10–0	$CH_3COOCF_2CF_2CF_3$	2
Perfluorobutyl acetate	209597–28–4	$CH_3COOCF_2CF_2CF_2CF_3$	2
Ethyl 2,2,2-trifluoroacetate	383–63–1	$CF_3COOCH_2CH_3$	1
Carbonofluoridates			
Methyl carbonofluoridate	1538–06–3	$FCOOCH_3$	95
1,1-Difluoroethyl carbonofluoridate	1344118–11–1	$FCOOCF_2CH_3$	27
Fluorinated Alcohols Other Than Fluorotelomer Alcohols			
Bis(trifluoromethyl)-methanol	920–66–1	$(CF_3)_2CHOH$	182
2,2,3,3,4,4,5,5-Octafluorocyclopentanol	16621–87–7	cyc (-$(CF_2)_4CH(OH)$-)	13
2,2,3,3,3-Pentafluoropropanol	422–05–9	$CF_3CF_2CH_2OH$	19
2,2,3,3,4,4,4-Heptafluorobutan-1-ol	375–01–9	C_3F_7CH2OH	34
2,2,2-Trifluoroethanol	75–89–8	CF_3CH_2OH	20
2,2,3,4,4,4-Hexafluoro-1-butanol	382–31–0	$CF_3CHFCF_2CH_2OH$	17
2,2,3,3-Tetrafluoro-1-propanol	76–37–9	$CHF_2CF_2CH_2OH$	13
2,2-Difluoroethanol	359–13–7	CHF_2CH2OH	3
2-Fluoroethanol	371–62–0	CH_2FCH_2OH	1.1
4,4,4-Trifluorobutan-1-ol	461–18–7	$CF_3(CH_2)_2CH_2OH$	0.05
Non-Cyclic, Unsaturated Perfluorocarbons (PFCs)			
PFC–1114; TFE	116–14–3	$CF_2=CF_2$; C_2F_4	0.004
PFC–1216; Dyneon HFP	116–15–4	C_3F_6; $CF_3CF=CF_2$	0.05
Perfluorobut-2-ene	360–89–4	$CF_3CF=CFCF_3$	1.82
Perfluorobut-1-ene	357–26–6	$CF_3CF_2CF=CF_2$	0.10
Perfluorobuta-1,3-diene	685–63–2	$CF_2=CFCF=CF_2$	0.003
Non-Cyclic, Unsaturated Hydrofluorocarbons (HFCs) and Hydrochlorofluorocarbons (HCFCs)			
HFC–1132a; VF2	75–38–7	$C_2H_2F_2$, $CF_2=CH_2$	0.04
HFC–1141; VF	75–02–5	C_2H_3F, $CH_2=CHF$	0.02
(E)-HFC–1225ye	5595–10–8	$CF_3CF=CHF(E)$	0.06
(Z)-HFC–1225ye	507328–43–8	$CF_3CF=CHF(Z)$	0.22
Solstice 1233zd(E)	102687–65–0	$C_3H_2ClF_3$; $CHCl=CHCF_3$	1.34
HCFO–1233zd(Z)	99728–16–2	(Z)-$CF_3CH=CHCl$	0.45
HFC–1234yf; HFO–1234yf	754–12–1	$C_3H_2F_4$; $CF_3CF=CH_2$	0.31
HFC–1234ze(E)	1645–83–6	$C_3H_2F_4$; trans-$CF_3CH=CHF$	0.97
HFC–1234ze(Z)	29118–25–0	$C_3H_2F_4$; cis-$CF_3CH=CHF$; $CF_3CH=CHF$	0.29
HFC–1243zf; TFP	677–21–4	$C_3H_3F_3$, $CF_3CH=CH_2$	0.12
(Z)-HFC–1336	692–49–9	$CF_3CH=CHCF_3(Z)$	1.58
HFO–1336mzz(E)	66711–86–2	(E)-$CF_3CH=CHCF_3$	18
HFC–1345zfc	374–27–6	$C_2F_5CH=CH_2$	0.09
HFO–1123	359–11–5	$CHF=CF_2$	0.005
HFO–1438ezy(E)	14149–41–8	(E)-$(CF_3)_2CFCH=CHF$	8.2
HFO–1447fz	355–08–8	$CF_3(CF_2)_2CH=CH_2$	0.24
Capstone 42–U	19430–93–4	$C_6H_3F_9$, $CF_3(CF_2)_3CH=CH_2$	0.16
Capstone 62–U	2073291–17–2	$C_8H_3F_{13}$, $CF_3(CF_2)_5CH=CH_2$	0.11
Capstone 82–U	2160732–58–4	$C_{10}H_3F_{17}$, $CF_3(CF_2)_7CH=CH_2$	0.09
(e)-1-chloro-2-fluoroethene	460–16–2	(E)-$CHCl=CHF$	0.004
3,3,3-trifluoro-2-(trifluoromethyl)prop-1-ene	382–10–5	$(CF_3)_2C=CH_2$	0.38
Non-Cyclic, Unsaturated CFCs			
CFC–1112	598–88–9	$CClF=CClF$	0.13
CFC–1112a	79–35–6	$CCl_2=CF_2$	0.021
Non-Cyclic, Unsaturated Halogenated Ethers			
PMVE; HFE–216	1187–93–5	$CF_3OCF=CF_2$	0.17
Fluoroxene	406–90–6	$CF_3CH_2OCH=CH_2$	0.05
Methyl-perfluoroheptene-ethers	N/A	$CH_3OC_7F_{13}$	15
Non-Cyclic, Unsaturated Halogenated Esters			
Ethenyl 2,2,2-trifluoroacetate	433–28–3	$CF_3COOCH=CH_2$	0.008
Prop-2-enyl 2,2,2-trifluoroacetate	383–67–5	$CF_3COOCH_2CH=CH_2$	0.007
Cyclic, Unsaturated HFCs and PFCs			
PFC C–1418	559–40–0	c-C_5F_8	2
Hexafluorocyclobutene	697–11–0	cyc (-$CF=CFCF_2CF_2$-)	126
1,3,3,4,4,5,5-heptafluorocyclopentene	1892–03–1	cyc (-$CF_2CF_2CF_2CF=CH$-)	45
1,3,3,4,4-pentafluorocyclobutene	374–31–2	cyc (-$CH=CFCF_2CF_2$-)	92
3,3,4,4-tetrafluorocyclobutene	2714–38–7	cyc (-$CH=CHCF_2CF_2$-)	26

TABLE 2—REVISED CHEMICAL-SPECIFIC GWPS FOR COMPOUNDS IN TABLE A–1—Continued

Name	CAS No.	Chemical formula	GWP (100-year)
Fluorinated Aldehydes			
3,3,3-Trifluoro-propanal	460–40–2	CF_3CH_2CHO	0.01
Fluorinated Ketones			
Novec 1230 (perfluoro (2-methyl-3-pentanone))	756–13–8	$CF_3CF_2C(O)CF(CF3)_2$	0.1
1,1,1-trifluoropropan-2-one	421–50–1	CF_3COCH_3	0.09
1,1,1-trifluorobutan-2-one	381–88–4	$CF_3COCH_2CH_3$	0.095
Fluorotelomer			
3,3,4,4,5,5,6,6,7,7,7-Undecafluoroheptan-1-ol	185689–57–0	$CF_3(CF_2)_4CH_2CH_2OH$	0.43
3,3,3-Trifluoropropan-1-ol	2240–88–2	$CF_3CH_2CH_2OH$	0.35
3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-Pentadecafluorononan-1-ol	755–02–2	$CF_3(CF_2)_6CH_2CH_2OH$	0.33
3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11-Nonadecafluoroundecan-1-ol	87017–97–8	$CF_3(CF_2)_8CH_2CH_2OH$	0.19
Fluorinated GHGs With Carbon-Iodine Bond(s)			
Trifluoroiodomethane	2314–97–8	CF_3I	0.4
Remaining Fluorinated GHGs with Chemical-Specific GWPs			
Dibromodifluoromethane (Halon 1202)	75–61–6	CBr_2F_2	231
2-Bromo-2-chloro-1,1,1-trifluoroethane (Halon-2311/Halothane)	151–67–7	$CHBrClCF_3$	41
Heptafluoroisobutyronitrile	42532–60–5	$(CF_3)_2CFCN$	2,750
Carbonyl fluoride	353–50–4	COF_2	0.14

As proposed, we are also amending table A–1 to subpart A of part 98 to revise the default GWPs. We are modifying the default GWP groups to add a group for saturated CFCs and a group for cyclic forms of unsaturated halogenated compounds. Based on the numerical differences between the GWP for cyclic unsaturated halogenated compounds and non-cyclic unsaturated halogenated compounds, we are also modifying the ninth F–GHG group to reflect non-cyclic forms of unsaturated halogenated compounds. The amendments update the default GWPs of each group based on the average of the updated chemical-specific GWPs (adopted from either the IPCC AR5 or AR6) for the compounds that belong to that group. We are also finalizing our proposal to rename the fluorinated GHG group ''Other fluorinated GHGs'' to ''Remaining fluorinated GHGs.'' The new and revised fluorinated GHG groups and their new and revised GWPs are listed in table 3 of this preamble.

TABLE 3—FLUORINATED GHG GROUPS AND DEFAULT GWPS FOR TABLE A–1

Fluorinated GHG group	GWP (100-year)
Fully fluorinated GHGs	9,200
Saturated hydrofluorocarbons (HFCs) with two or fewer carbon-hydrogen bonds.	3,000
Saturated HFCs with three or more carbon-hydrogen bonds.	840
Saturated hydrofluoroethers (HFEs) and hydrochlorofluoroethers (HCFEs) with one carbon-hydrogen bond.	6,600
Saturated HFEs and HCFEs with two carbon-hydrogen bonds.	2,900
Saturated HFEs and HCFEs with three or more carbon-hydrogen bonds.	320
Saturated chlorofluorocarbons (CFCs).	4,900
Fluorinated formates	350
Cyclic forms of the following: unsaturated perfluorocarbons (PFCs), unsaturated HFCs, unsaturated CFCs, unsaturated hydrochlorofluorocarbons (HCFCs), unsaturated bromofluorocarbons (BFCs), unsaturated bromochlorofluorocarbons (BCFCs), unsaturated hydrobromofluorocarbons (HBFCs), unsaturated hydrobromochlorofluorocarbons (HBCFCs), unsaturated halogenated ethers, and unsaturated halogenated esters.	58
Fluorinated acetates, carbonofluoridates, and fluorinated alcohols other than fluorotelomer alcohols.	25

TABLE 3—FLUORINATED GHG GROUPS AND DEFAULT GWPS FOR TABLE A–1—Continued

Fluorinated GHG group	GWP (100-year)
Fluorinated aldehydes, fluorinated ketones, and non-cyclic forms of the following: unsaturated PFCs, unsaturated HFCs, unsaturated CFCs, unsaturated HCFCs, unsaturated BFCs, unsaturated BCFCs, unsaturated HBFCs, unsaturated HBCFCs, unsaturated halogenated ethers, and unsaturated halogenated esters.	1
Fluorotelomer alcohols	1
Fluorinated GHGs with carbon-iodine bond(s).	1
Remaining fluorinated GHGs	1,800

b. Other Revisions To Improve the Quality of Data Collected for Subpart A

The EPA is finalizing several revisions to improve the quality of data collected for subpart A as proposed. In some cases, we are finalizing the proposed amendments with revisions. First, we are clarifying in 40 CFR 98.2(i)(1) and (2), as proposed, that the provision to allow cessation of reporting or ''off-ramping,'' due to meeting either the 15,000 $mtCO_2e$ level or the 25,000 $mtCO_2e$ level for the number of years specified in 40 CFR 98.2(i), is based on the CO_2e reported, calculated in accordance with 40 CFR 98.3(c)(4)(i) (*i.e.,* the annual emissions report value as specified in that provision). The final amendments also clarify that after an

owner or operator off-ramps, the owner or operator must use equation A–1 to subpart A and follow the requirements of 40 CFR 98.2(b)(4) (the emission estimation methods used for determination of applicability) in subsequent years to determine if emissions exceed the 25,000 $mtCO_2e$ applicability threshold and whether the facility or supplier must resume reporting.

Additionally, the EPA is amending 40 CFR 98.2(f)(1) and adding new paragraph (k) as proposed to clarify the calculation of GHG quantities for comparison to the 25,000 $mtCO_2e$ threshold for importers and exporters of industrial greenhouse gases. The final amendments to 40 CFR 98.2(f)(1) state that importers and exporters must include the F–HTFs that are imported or exported during the year. New paragraph (k) specifies how to calculate the quantities of F–GHGs and F–HTFs destroyed for purposes of comparing them to the 25,000 $mtCO_2e$ threshold for stand-alone industrial F–GHG or F–HTF destruction facilities. The EPA is also finalizing as proposed revisions to 40 CFR 98.3(h)(4) to limit the total number of days a reporter can request to extend the time period for resolving a substantive error, either by submitting a revised report or providing information demonstrating that the previously submitted report does not contain the substantive error, to 180 days. Specifically, the Administrator will only approve extension requests for a total of 180 days from the initial notification of a substantive error. See section III.A.1. of the preamble to the 2022 Data Quality Improvements Proposal for additional information on these revisions and their supporting basis.

We are finalizing minor clarifications to the reporting and special provisions for best available monitoring methods in 40 CFR 98.3(k) and (l) as proposed, which apply to owners or operators of facilities or suppliers that first become subject to any subpart of part 98 due to amendment(s) to table A–1 to subpart A. The final requirements revise the term ''published'' to add ''in the **Federal Register** as a final rulemaking'' to clarify the EPA's intent that the requirements apply to facilities or suppliers that are first subject to the GHGRP in the year after the year the GWP is published as part of a final rule.

The EPA is finalizing an additional edit to subpart A to the electronic reporting provisions of 40 CFR 98.5(b). The revisions clarify that 40 CFR 98.5(b) applies to any data that is specified as verification software records in a subpart's applicable recordkeeping section.

The EPA is finalizing several revisions to subpart A to incorporate new and revised source categories. We are revising tables A–3 and A–4 to subpart A to clarify the reporting applicability for facilities included in the new source categories of coke calcining; ceramics manufacturing; calcium carbide production; caprolactam, glyoxal, and glyoxylic acid production; and facilities conducting geologic sequestration of carbon dioxide with enhanced oil recovery. We are revising table A–3 to subpart A to add new subparts that are ''all-in'' source categories, including subpart VV (Geologic Sequestration of Carbon Dioxide with Enhanced Oil Recovery Using ISO 27916) (section III.AA. of this preamble), subpart WW (Coke Calciners) (section III.BB. of this preamble), subpart XX (Calcium Carbide Production) (section III.CC. of this preamble), and subpart YY (Caprolactam, Glyoxal, and Glyoxylic Acid Production) (section III.DD. of this preamble). We are revising table A–4 to add new subpart ZZ (Ceramics Manufacturing) and assign a threshold of 25,000 $mtCO_2e$, as proposed. As discussed in section III.EE. of this preamble, subpart ZZ to part 98 applies to certain ceramics manufacturing processes that exceed a minimum production level (*i.e.,* annually consume at least 2,000 tons of carbonates, either as raw materials or as a constituent in clay, heated to a temperature sufficient to allow the calcination reaction to occur) and that exceed the 25,000 $mtCO_2e$ threshold. The revisions to tables A–3 and A–4 to subpart A clarify that these new source categories apply in RY2025 and future years.

The EPA is finalizing several revisions to defined terms in 40 CFR 98.6 as proposed to provide further clarity. These revisions to definitions include:

- Revising the definition of ''bulk'' to clarify that the import and export of gas includes small containers and does not exclude a minimum container size below which reporting will not be required (except for small shipments (*i.e.,* those including less than 25 kilograms)), and to align with the definition of ''bulk'' under the American Innovation and Manufacturing Act of 2020 (AIM) regulations at 40 CFR part 84.
- Revising the definition of ''greenhouse gas or GHG'' to clarify the treatment of fluorinated greenhouse gases by removing the partial list of fluorinated GHGs currently included in the definition and to simply refer to the definition of ''fluorinated greenhouse gas (GHG).''
- Adding the acronym ''(GHGs)'' after the term ''fluorinated greenhouse gas'' both in the definition of ''greenhouse gas or GHG'' and in the definition of ''fluorinated greenhouse gas'' to avoid redundancy and potential confusion between the definitions of ''greenhouse gas'' and ''fluorinated greenhouse gas.''
- Consistent with the revisions of the fluorinated GHG groups used to assign default GWPs discussed in section III.A.1.a. of this preamble, adding a definition of ''cyclic'' as it applies to molecular structures of various fluorinated GHGs; adding definitions of ''unsaturated chlorofluorocarbons (CFCs),'' ''saturated chlorofluorocarbons (CFCs),'' ''unsaturated bromofluorocarbons (BFCs),'' ''unsaturated bromochlorofluorocarbons (BCFCs),'' ''unsaturated hydrobromofluorocarbons (HBFCs),'' and ''unsaturated hydrobromochlorofluorocarbons (HBCFCs)''; and revising the definition of ''fluorinated greenhouse (GHG) group'' to include the new and revised groups.
- Revising the term ''other fluorinated GHGs'' to ''remaining fluorinated GHGs'' and to revise the definition of the term to reflect the new and revised fluorinated GHG groups discussed in section III.A.1.a. of this preamble.
- Revising the definition of ''fluorinated heat transfer fluids'' and moving it from 40 CFR 98.98 to 98.6 to harmonize with changes to subpart OO of part 98 (Suppliers of Industrial Greenhouse Gases) (see section III.U. of this preamble). The revised definition (1) explicitly includes industries other than electronics manufacturing, and (2) excludes most HFCs which are widely used as heat transfer fluids outside of electronics manufacturing and are regulated under the AIM regulations at 40 CFR part 84.
- Consistent with final revisions to subpart PP (Suppliers of Carbon Dioxide) (see section III.V. of this preamble), we are finalizing revisions to 40 CFR 98.6 to add a definition for ''Direct air capture'' and to amend the definition of ''Carbon dioxide stream.''

The EPA is making one revision to the definitions in the final rule from proposed to correct the definition of ''ASTM''. This change updates the definition to include the current name of the standards organization, ''ASTM, International''.

Consistent with final revisions to subparts Q (Iron and Steel Production), VV (Geologic Sequestration of Carbon Dioxide with Enhanced Oil Recovery Using ISO 27916), WW (Coke Calciners), and XX (Calcium Carbide Production), we are finalizing revisions to 40 CFR

98.7 to incorporate by reference ASTM International (ASTM) E415–17, *Standard Test Method for Analysis of Carbon and Low-Alloy Steel by Spark Atomic Emission Spectrometry* (2017) (subpart Q); CSA/ANSI ISO 27916:19, *Carbon dioxide capture, transportation and geological storage—Carbon dioxide storage using enhanced oil recovery* (CO_2–EOR) (2019) (subpart VV) (as proposed in the 2023 Supplemental Proposal); ASTM D3176–15 *Standard Practice for Ultimate Analysis of Coal and Coke* (2015), ASTM D5291–16 *Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants* (2016), ASTM D5373–21 *Standard Test Methods for Determination of Carbon, Hydrogen, and Nitrogen in Analysis Samples of Coal and Carbon in Analysis Samples of Coal and Coke* (2021), and NIST HB 44–2023: *Specifications, Tolerances, and Other Technical Requirements For Weighing and Measuring Devices,* 2023 edition (subpart WW); and ASTM D5373–08 *Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Laboratory Samples of Coal* (2008) and ASTM C25–06, *Standard Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime* (2006) (subpart XX). The EPA has revised the regulatory text of 40 CFR 98.7 from proposal to incorporate these revisions and to reorganize the existing referenced ASTM standards in alphanumeric order.

The EPA is not finalizing proposed amendments to subpart A from the 2022 Data Quality Improvements Proposal that correlate with proposed amendments to subpart W of part 98 (Petroleum and Natural Gas Systems) from the 2022 Data Quality Improvements Proposal in this action. As noted in section I.C. of this preamble, the EPA has issued a subsequent proposed rule for subpart W on August 1, 2023, and has reproposed related amendments to subpart A in that action. Additionally, the EPA is not taking final action at this time on proposed amendments to subpart A from the 2023 Supplemental Proposal that were proposed harmonizing revisions intended to integrate proposed subpart B (Energy Consumption), including proposed reporting and recordkeeping under 40 CFR 98.2(a)(1), 98.3(c)(4), and 98.3(g)(5). Finally, we are not taking final action, at this time, on proposed amendments to 40 CFR 98.7 to incorporate by reference standards for electric metering. As discussed in section III.B. of this document, the EPA is not taking final action on subpart B at this time.

c. Revisions To Streamline and Improve Implementation for Subpart A

The EPA is finalizing several revisions to subpart A proposed in the 2022 Data Quality Improvements Proposal that will streamline and improve implementation for part 98. First, we are revising tables A–3 and table A–4 to subpart A to revise the applicability of subparts DD (Electrical Transmission and Distribution Equipment Use) and SS (Electrical Equipment Manufacture of Refurbishment) of part 98 as proposed. For subpart DD, the final revisions to table A–3 change the threshold such that facilities must account for the total estimated emissions from F–GHGs, as determined under 40 CFR 98.301 (subpart DD), for comparison to a threshold equivalent to 25,000 $mtCO_2e$ or more per year. We are also moving subpart SS from table A–3 to table A–4 to subpart A and specifying that subpart SS facilities must account for emissions of F–GHGs, as determined under the requirements of 40 CFR 98.451 (subpart SS), for comparison to a threshold equivalent to 25,000 $mtCO_2e$ or more per year. The final rule updates the threshold of subparts DD and SS to be consistent with the threshold set for the majority of subparts under part 98, and accounts for additional fluorinated gases (including F–GHG mixtures) reported by industry. For subpart DD, these final changes also focus Agency resources on the substantial emission sources within the sector by excluding facilities or operations that may report emissions that are consistently and substantially below 25,000 $mtCO_2e$ per year. See sections III.Q. and III.Y. of this preamble for additional information.

2. Summary of Comments and Responses on Subpart A

This section summarizes the major comments and responses related to the proposed amendments to subpart A. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart A.

a. Comments on Revisions To Global Warming Potentials

Comment: Several commenters supported the proposed revisions to table A–1 to subpart A to update the GWP values to use values from table 8.A.1 from the IPCC AR5, and for certain GHGs without GWP values listed in AR5, to adopt values from the IPCC AR6. Commenters remarked that the updates to the GWP values will be more accurate, align with UNFCCC guidance and the Inventory, and provide consistency to reporters who may also report under various voluntary standards, such as the GHG Protocol or Sustainability Accounting Standards Board.

Some commenters requested that the EPA clarify the effects of changing the GWP (particularly for CH_4) on the reported total CO_2e emissions, despite any actual change in mass emissions. The commenters asserted that it is important to inform stakeholders that future increases in CO_2e emissions due to the change in GWP are not reflective of any actual mass emission increases and may obscure decreases in annual mass emissions. The commenters also recommended that the EPA acknowledge how combustion CO_2e emissions will be affected.

Response: In the final rule, the EPA is finalizing its proposal (in the 2023 Supplemental Proposal) to adopt the 100-year GWPs from AR5, and for certain GHGs without GWPs listed in AR5, to adopt values from AR6. Regarding the commenters' concern that the change in GWPs may result in apparent, but not real, upward or downward trends in the data, the EPA has always published emissions using consistent GWPs for every year and will continue to do so. Prior to publication, the EPA updates all reported CO_2e values to reflect the current GWP values in table A–1 to subpart A of part 98. The CO_2e published by the EPA are based on the same GWP values across all reporting years. Hence, there will be no apparent upward or downward trend in emissions that are due only to a change in a GWP value.

Comment: A number of commenters supported the continued use of a 100-year GWP; one commenter stated that the 100-year GWP is consistent with Article 2 of the UNFCCC and that any movement to a framework that reduces the mitigation focus on CO_2 emissions and adds to long-term warming potential compared to the 100-year GWP framework would not be well justified. Several commenters specifically commented on the proposed GWP for CH_4; a number of commenters generally supported revising the CH_4 GWP value from 25 to 28 using the 100-year GWP. Other commenters recommended that the EPA consider incorporating GWP values on multiple time horizons in the reporting requirement, or when publicizing reported emissions. One

commenter stated that the 100-year GWP does not capture the near-term potency of short-lived gases like methane and hydrogen and is insufficient to reflect a pollutant's warming power over time. Commenters requested that the EPA incorporate the use of additional time horizons, such as the 20-year GWP, to acknowledge the near-term warming potency of short-lived gases such as CH_4, because they play a critical role in driving the rate of warming for the near future. Commenters argued that the 20-year GWP more accurately represents the powerful, short-term impact of methane on the atmosphere. Commenters noted that this would also align with several state regulatory programs, including California, New York, and New Jersey, that currently consider 20-year GWPs. Commenters stressed that adopting short-lived climate pollutant strategies and emissions controls to limit near-term warming is critical from a policy perspective and directly relevant to the EPA's efforts under the Clean Air Act. Commenters also requested that historic inventories be updated to reflect the role that short-lived climate pollutants play and to demonstrate that near-term CH_4 emissions reductions are as important as long-term CO_2 reductions.

Response: As has been the case since the inception of the GHGRP, we are finalizing 100-year GWPs for all GHGs. As noted in the ''Response to Comments on Final Rule, Volume 3: General Monitoring Approach, the Need for Detailed Reporting, and Other General Rationale Comments'' (see Docket ID. No. EPA–HQ–OAR–2008–0508–2260), the EPA selected the 100-year GWPs because these values are the internationally accepted standard for reporting GHG emissions. For example, the parties to the UNFCCC agreed to use GWPs that are based on a 100-year time period for preparing national inventories, and the reports submitted by other signatories to the UNFCCC use GWPs based on a 100-year time period, including the GWP for CH_4 and certain GHGs identified as short-lived climate pollutants. These values were subsequently adopted and used in multiple EPA climate initiatives, including the EPA's Significant New Alternatives Policy (SNAP) program and the Inventory, as well as EPA voluntary reduction partnerships (*e.g.,* Natural Gas STAR). Human-influenced climate change occurs on both short (decadal) and long (millennial) time scales. While there is no single best way to value both short- and long-term impacts in a single metric, the 100-year GWP is a reasonable approach that has been widely accepted by the international community. If the EPA were to adopt a 20-year GWP solely for CH_4, or for certain other compounds, it would introduce a metric that is inconsistent with both the GWPs used for the remaining table A–1 gases and with the reporting guidelines issued by the UNFCCC and used by the Inventory and other EPA programs. Additionally, the EPA and other Federal agencies, which calculate the impact of short-lived GHGs using 100-year GWPs, are making reduction of short-lived GHGs a priority, such as through the U.S. Global Methane Initiative. In addition, it is beneficial for both regulatory agencies and industry to use the same GWP values for these GHG compounds because it allows for more efficient review of data collected through the GHGRP and other U.S. climate programs, reduces potential errors that may arise when comparing multiple data sets or converting GHG emissions or supply based on separate GWPs, and reduces the burden for reporters and agencies to keep track of separate GWPs. For the reasons described above, the EPA is retaining a 100-year time horizon as the standard metric for defining GWPs in the GHGRP.

b. Comments on Other Revisions To Improve the Quality of Data Collected for Subpart A

Comment: Several commenters opposed the EPA's proposed revisions to 40 CFR 98.3(h)(4) to limit the total number of days a reporter can request to extend the time period for resolving a substantive error, either by submitting a revised report or providing information demonstrating that the previously submitted report does not contain the substantive error, to 180 days. Commenters requested that the Agency not put an inflexible cap on the number of days to resolve reporting issues; the commenters asserted that the extensions can be helpful for newly affected sources, when there is a change in facility ownership, and in other situations. One commenter stated that the proposed revision may result in arbitrarily short time-periods in which an operator may correct an error, especially in cases where the correction may not be accepted. The commenter contended that the EPA must add additional language to clarify that the 180-day limit will restart if the correction is not accepted. Commenters also requested that the EPA increase the limit of the total number of days a reporter can request an extension beyond the proposed 180 days to provide reporters more time to work through the new provisions in the program. One commenter requested the EPA restart the 180-day extension request opportunity for each instance in which an operator is notified of a substantive error or rejected correction (*e.g.,* if a correction is rejected, if additional corrections are requested, if corrections span more than one reporting year, or if EPA responses to operator questions are delayed).

Response: The EPA expects that 180 days is a reasonable amount of time for a facility to examine company records, gather additional data, and/or perform recalculations to submit a revised report or provide the necessary information such that the report may be verified. This represents more than four 30-day additional extensions beyond the initial 45-day period. As noted in the preamble to the final rule promulgated on October 30, 2009 (74 FR 52620, hereafter referred to as the ''2009 Final Rule''), the EPA concluded that this initial 45-day period would be sufficient since facilities have three months from the end of a reporting period to submit the initial annual report and have already collected and retained data needed for the analyses, so revisions to address a known error would likely require less time (see 74 FR 56278). A subsequent series of extensions of up to an additional 135 days is a reasonable amount of time to accommodate any additional changes that may be needed to the revision.

B. Subpart B—Energy Consumption

The EPA is not taking final action on the proposed addition of subpart B of part 98 (Energy Consumption) in this final rule. The EPA received a number of comments for proposed subpart B. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to proposed subpart B.

In the 2022 Data Quality Improvements Proposal, the EPA requested comment on collecting data on energy consumption in order to improve the quality of the data collected under the GHGRP. Specifically, we provided background on the EPA's original request for comment on the collection of data related to electricity consumption in the development of part 98 and the EPA's response in the 2009 Final Rule, and requested comment on whether and how the EPA should collect energy consumption data in order to support data analyses related to informing voluntary energy efficiency

programs, provide information on industrial sectors where currently little data are reported to GHGRP, and inform quality assurance/quality control (QA/QC) of the Inventory. We requested comment on specific considerations for the potential addition of the energy consumption source category (see section IV.F. of the preamble to the 2022 Data Quality Improvements Proposal for additional information).

Following consideration of comments received in response to the EPA's request for comment, we subsequently proposed, in the 2023 Supplemental Proposal, the addition of subpart B to part 98. At that time, we reiterated our interest in collecting data on energy consumption to gain an improved understanding of the energy intensity (*i.e.,* the amount of energy required to produce a given level of product or activity, both through on-site energy produced from fuel combustion and purchased energy) of specific facilities or sectors, and to better inform our understanding of energy needs and the potential indirect GHG emissions associated with certain sectors. The proposed rule included specific monitoring and reporting requirements for direct emitting facilities that report under part 98 and purchase metered electricity or metered thermal energy products. In the proposed rule, the EPA outlined a source category definition, rationale for the proposed applicability of the subpart to direct emitting facilities in lieu of a threshold, and specific monitoring, missing data, recordkeeping, and reporting requirements. The EPA did not propose requirements for facilities to calculate or report indirect emissions estimates associated with purchased metered electricity or metered thermal energy products. Additional information on the proposed amendments is available in the preamble to the 2023 Supplemental Proposal.

In response to the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal, the EPA received many comments on the proposed subpart from a variety of stakeholders providing input on the definition, applicability criteria, monitoring, reporting, recordkeeping, and additional requirements of the source category, as proposed, as well as a number of comments on the EPA's authority to collect the energy consumption data proposed under subpart B. The EPA is not taking final action on proposed subpart B at this time. The EPA intends to further review and consider these comments and other relevant information and may consider any next steps on the collection of data related to energy consumption in a future rulemaking. Therefore, none of the proposed requirements related to subpart B are included in this final rule. The EPA is also not taking final action on related amendments to subpart A (General Provisions) of part 98 that were proposed harmonizing changes for the implementation subpart B, including reporting requirements, as discussed in section III.A.1.b. of this preamble.

C. Subpart C—General Stationary Fuel Combustion

The EPA is finalizing several amendments to subpart C of part 98 (General Stationary Fuel Combustion) as proposed. In some cases, we are finalizing the proposed amendments with revisions. In other cases, we are not taking final action on the proposed amendments. Section III.C.1. of this preamble discusses the final revisions to subpart C. The EPA received several comments on the proposed subpart C revisions which are discussed in section III.C.2. of this preamble. We are also finalizing as proposed confidentiality determinations for new data elements resulting from the final revisions to subpart C, as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart C

This section summarizes the final amendments to subpart C. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart C can be found in this section and section III.C.2. of this preamble. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

a. Revisions To Improve the Quality of Data Collected for Subpart C

The EPA is finalizing several revisions to improve the quality of data collected for subpart C. First, the EPA is finalizing modifications to the Tier 3 calculation methodology, including revisions to 40 CFR 98.33(a)(3)(iii) to provide new equations C–5A and C–5B, as proposed. The updated equations provide for calculating a weighted annual average carbon content and a weighted annual average molecular weight, respectively, and correct the calculation method for Tier 3 gaseous fuels. The new equations incorporate the molar volume conversion factor at standard conditions (as defined at 40 CFR 98.6) and, for annual average carbon content, the measured molecular weight of the fuel, in order to convert the fuel flow to the appropriate units of measure. The final rule includes corrections to the proposed paragraph references included in the definition of the variable ''MW'' (*i.e.,* molecular weight) to equation C–5.

The EPA is also finalizing as proposed revisions to provisions pertaining to the calculation of biogenic emissions from tire combustion. These revisions include:

- Removing the additional provision in 40 CFR 98.33(b)(1)(vii) on how to apply the threshold to only municipal solid waste (MSW) fuel when MSW and tires are both combusted and the reporter elects not to separately calculate and report biogenic CO_2 emissions from the combustion of tires, since biogenic CO_2 emissions from tire combustion must now be calculated and reported in all cases;
- Removing the language in 40 CFR 98.33(e) and 98.36(e)(2)(xi) referring to optional biogenic CO_2 emissions reporting from tire combustion;
- Removing the restriction in 40 CFR 98.33(e)(3)(iv) that the default factor that is used to determine biogenic CO_2 emissions may only be used to estimate the annual biogenic CO_2 emissions from the combustion of tires if the combustion of tires represents ''no more than 10 percent annual heat input to a unit'';
- Revising 40 CFR 98.33(e)(3)(iv)(A) so that total annual CO_2 emissions will be calculated using the applicable methodology in 40 CFR 98.33(a)(1) through (3) for units using Tier 1 through 3 for purposes of 40 CFR 98.33(a), and using the Tier 1 calculation methodology in 40 CFR 98.33(a)(1) for units using the Tier 4 or part 75 calculation methodologies for purposes of 40 CFR 98.33(a), when determining the biogenic component of MSW and/or tires under 40 CFR 98.33(e)(3)(iv);
- Revising 40 CFR 98.33(e)(3)(iv)(B) to update the default factor that is used to determine biogenic CO_2 emissions from the combustion of tires from 0.20 to 0.24; and
- Correcting 40 CFR 98.34(d) to reference 40 CFR 98.33(e)(3)(iv) instead of 40 CFR 98.33(b)(1)(vi) and (vii) and correcting 40 CFR 98.33(e)(1) to delete the parenthetical clause ''(except MSW and tires).''

These final revisions will update the default factor to be based on more recent data collected on the average composition of natural rubber in tires, remove potentially confusing or conflicting requirements, and result in a more accurate characterization of biogenic emissions from these sources.

See section III.B.1. of the preamble to the 2022 Data Quality Improvements Proposal for additional information on these revisions and their supporting basis. The EPA is also finalizing one additional revision related to the estimation of biogenic emissions after consideration of comments received on the 2022 Data Quality Improvements Proposal. Commenters requested that the EPA expand the monitoring requirements at 40 CFR 98.34(e) to include all combined biomass and fossil fuels and to allow for testing at one source when a common fuel is combusted. The EPA agrees that testing one emission source is reasonable when multiple combustion units are fed from a common fuel source. Accordingly, the EPA is revising 40 CFR 98.34(e) to allow for quarterly ASTM D6866–16 and ASTM D7459–08 testing of one representative unit for a common fuel source for all combined biomass (or fuels with a biomass component) and fossil fuels. See section III.C.2. of this preamble for additional information on related comments and the EPA's response.

We are finalizing corrections to the variable ''R'' in equation C–11. The term ''R'' is currently defined as ''The number of moles of CO_2 released upon capture of one mole of the acid gas species being removed (R = 1.00 when the sorbent is $CaCO_3$ and the targeted acid gas species is SO_2)'' and is being amended to ''The number of moles of CO_2 released per mole of sorbent used (R = 1.00 when the sorbent is $CaCO_3$ and the targeted acid gas species is SO_2).'' We are finalizing amendments to 40 CFR 98.33(c)(6)(i), (ii), (ii)(A), and (iii)(C), and to remove and reserve 40 CFR 98.33(c)(6)(iii)(B) (to clarify the methods used to calculate CH_4 and N_2O emissions for blended fuels when heat input is determined after the fuels are mixed and combusted), as proposed.

The EPA identified one additional minor correction to subpart C in review of changes for the final rule. Subsequently, we are correcting the definition of the term emission factor ''EF'' in equation C–10 from ''Fuel-specific emission factor for CH_4 or N_2O, from table C–2 of this section'' to ''Fuel-specific emission factor for CH_4 or N_2O, from table C–2 to this subpart.''

The EPA is finalizing as proposed two additional clarifications to the reporting and recordkeeping requirements. We are revising the first sentence of 40 CFR 98.36(e)(2)(ii)(C) to clarify that both the annual average, and where applicable, monthly high heat values are required to be reported. This change clarifies that the annual average high heat value is also a reporting requirement (for reporters who do not use the electronic inputs verification tool (IVT) within the e-GGRT). We are finalizing revisions to the 40 CFR 98.37(b) introductory paragraph and paragraphs (b)(9) through (11), (14), (18), (20), (22), and (23) to specify recordkeeping data that is currently contained in the file generated by the verification software that is already required to be retained by reporters under 40 CFR 98.37(b). These revisions correct omissions that currently exist in the verification software recordkeeping requirements specific to equations C–2a, C–2b, C–3, C–4, and C–5. They also align the verification software recordkeeping requirements with the final revisions to equation C–5 at 40 CFR 98.33(a)(3)(iii).

In the 2022 Data Quality Improvements Proposal, we proposed additional reporting requirements, for each unit greater than or equal to 10 mmBtu/hour in either an aggregation of units or common pipe configuration. The proposed reporting included, for each individual unit with maximum rated heat input capacity greater than or equal to 10 mmBtu/hour included in the group, the unit type, maximum rated heat input capacity, and an estimate of the fraction of the total group annual heat input attributable to each unit (proposed 40 CFR 98.36(c)(1)(ii) and (c)(3)(xi)). Following consideration of public comments, the EPA is not taking final action on the proposed reporting requirements (*i.e.,* identifying the unit type, maximum rated heat input capacity, and fraction of the total annual heat input for each unit in the aggregation of unit or common pipe). See section III.C.2. of this preamble for a summary of the related comments and the EPA's response.

In the 2023 Supplemental Proposal, the EPA proposed to add a requirement to report whether the unit is an EGU for each configuration that reports emissions, under either the individual unit provisions at 40 CFR 98.36(b)(12) or the multi-unit provisions at 40 CFR 98.36(c)(1)(xii), (c)(2)(xii), and (c)(3)(xii). For multi-unit reporting configurations, we also proposed adding a requirement for facilities to report an estimated decimal fraction of total emissions from the group that are attributable to EGU(s) included in the group. Following consideration of public comments, the EPA is not taking final action on the proposed revisions to the reporting requirements in this rule. See section III.C.2. of this preamble for a summary of the related comments and the EPA's response.

The EPA is also not taking final action in this final rule on proposed revisions to subpart C correlated with proposed amendments to subpart W (Petroleum and Natural Gas Systems). As noted in section I.C. of this preamble, the EPA has issued a subsequent proposed rule for subpart W on August 1, 2023 and has reproposed related amendments to subpart C in that separate action.

b. Revisions To Streamline and Improve Implementation for Subpart C

The EPA is finalizing all revisions to streamline and improvement implementation for subpart C as proposed. Specifically, the EPA is finalizing (1) amendments to 40 CFR 98.34(c)(6) to allow cylinder gas audits (CGAs) to be performed using calibration gas concentrations of 40–60 percent and 80–100 percent of CO_2 span, whenever the required CO_2 span value for a flue gas does is not appropriate for the prescribed audit ranges in appendix F of 40 CFR part 60; and (2) amendments to provisions in 40 CFR 98.36(c)(1)(vi) and 98.36(c)(3)(vi) to remove language requiring that facilities with the aggregation of units or common pipe configuration types report the total annual CO_2 mass emissions from all fossil fuels combined. See section III.B.2. of the preamble to the 2022 Data Quality Improvements Proposal for additional information on these changes and their supporting basis.

2. Summary of Comments and Responses on Subpart C

This section summarizes the major comments and responses related to the proposed amendments to subpart C. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart C.

Comment: One commenter provided a correction to the proposed revisions to equation C–5 related to the revisions to the Tier 3 calculation methodology. The commenter noted that the proposed revisions to variable ''MW'' of equation C–5 which specify the procedures to be used to determine the annual average molecular weight included an incorrect reference to paragraphs (a)(3)(iii)(A)(3) and (4), and should point to (a)(3)(iii)(B)(1) and (2).

Response: We agree that the proposal inadvertently contained incorrect cross-references for the variable ''MW'' of equation C–5, and the EPA has corrected these cross-references in the final rule.

Comment: Commenters generally supported the EPA's proposed revisions

to update the calculation methodology for biogenic emissions from tire combustion. One commenter requested that the EPA consider expanding the requirements of 40 CFR 98.34(e), which requires quarterly testing to determine biogenic CO_2 when biomass and non-biogenic fuels are co-fired in a unit. The commenter noted that 40 CFR 98.34(e) currently allows for testing of a single representative unit for facilities with multiple units in which tires are the primary fuel combusted and the units are fed from a common fuel source. The commenter noted that for facilities with multiple units combusting the same fuel, testing each source quarterly imposes an additional burden without enhancing the accuracy of reported emissions. The commenter requested that the EPA expand the provisions to include all combined biomass and fossil fuels and to allow for testing one representative unit when fuel from a common fuel source is combusted.

Response: The EPA acknowledges the commenter's support for the proposed revisions. The EPA agrees with the commenter that testing one emission source when multiple emission sources are fed from a common fuel source should be allowed for all combined biomass (or fuels with a biomass component) and fossil fuels. Accordingly, the EPA has finalized quarterly ASTM D6866–16 and ASTM D7459–08 testing of one representative unit for multiple units fed from a common fuel source, for all combined biomass (or fuels with a biomass component) and fossil fuels.

Comment: Some commenters supported the EPA's proposal to revise 40 CFR 98.36(c)(1) and (3) to require reporting of additional information for each unit in either an aggregation of units or common pipe configuration (excluding units with maximum rated heat input capacity less than 10 mmBtu/hour), including the unit type, maximum rated heat input capacity, and an estimate of the fraction of the total annual heat input to the unit. These commenters agreed that unit-specific data is necessary to understand both the distribution of emissions across unit types and sizes, but also the abatement potential through various decarbonization strategies (*e.g.,* certain abatement strategies may be better suited for certain unit types and uses). The commenters stated that the requested data could assist the EPA in the development of NSPS or EG under CAA section 111. The commenters noted that, given the prevalence of reporting using combined configurations, this data would fill large data gaps in the current characterization of industrial sectors. One commenter asserted that the requirement should be extended to facilities that report using the common stack configuration or the alternative part 75 configuration, which would ensure that all emissions under the subpart are similarly affected by the proposed revisions and would provide a full picture of the GHG abatement potential of various source categories. Commenters also requested the EPA consider lowering or eliminate the size threshold below 10 mmBtu/hour; the commenter stated that although smaller units do not account for a large share of total capacity, they often present the most viable opportunities for greenhouse gas emissions abatement such as electrification with heat pump technology.

Other commenters opposed the proposed requirements. Opposing commenters stated that the EPA's explanation for collecting the data was ambiguous and did not sufficiently explain what data gaps are missing or how the collection of the additional information would resolve issues within the currently collected data. One commenter opposed disaggregating total emissions from the grouped combustion equipment, asserting that aggregating the emissions by individual equipment (excluding units rated less than 10 mmBtu/hour) using estimation techniques would not provide useful information. Several commenters asserted that the proposed approach could not reliably provide accurate estimates of actual heat input and is likely not to be technically feasible. For example, one commenter stated that the physical configuration of certain lime plants would preclude accurate unit-specific estimates of actual heat input, as the facilities lack certified calibrated meters on a kiln-by-kiln basis and rely on quantifying solid fuel usage based on surveys of on-site stockpiles. The commenter added that facility-wide reporting of combustion emissions satisfies the EPA's objective of developing facility-wide emissions information, and additional unit-level information is superfluous and of limited value. Other commenters stated that individual fuel meters are not common, asserting that annual heat input for individual units is often estimated based on the maximum high heat input rating and operating hours. One commenter stated that the heat input records maintained by facilities do not necessarily correspond to the actual heat input of a unit, especially for industries that use batching with different process equipment for different products. That commenter asserted that actual heat input may vary based on age of the unit; how it is utilized in processes for steam, cooling, or other purposes; and the high heating value of fuel during certain operating periods. Another commenter questioned whether the estimation technique proposed would likely undermine the reported data or compromise the integrity of actual values that are currently reported. Commenters asserted that the requirements would have potentially very limited value and may detract from the GHG emission estimates that regulated facilities produce for the EPA or other proposed Federal rules.

Commenters also expressed that the proposed requirements would be overly burdensome and significantly increase the recordkeeping and reporting burden. One commenter specifically referred to the requirement for facilities to estimate the total annual input of each unit expressed as a decimal fraction based on the actual heat input of each unit compared to the whole; the commenter stated that this requirement would essentially negate the time efficiencies gained by reporting the aggregated group, especially for reporters using the common pipe configuration. The commenter stated that this would essentially require that heat inputs be calculated for each piece of equipment each year and could result in a ten-fold increase in burden for reporters using the common pipe method. Commenters urged that the maximum rated heat input of each unit in the aggregated group and operating hours should provide enough information for the EPA to reasonably approximate emissions for individual equipment.

Response: Upon careful consideration, the EPA has decided not to take final action on the proposed reporting requirements for each unit greater than or equal to 10 mmBtu/hour in either an aggregation of units or common pipe configuration (the unit type, maximum rated heat input capacity, and an estimate of the fraction of the total annual heat input attributable to each unit in the group) (proposed 40 CFR 98.36(c)(1)(ii) and (c)(3)(xi)) at this time. We note that the EPA disagrees that estimating the fraction of the actual total annual heat input for each unit in the group, based on company records, will be overly burdensome to reporters. ''Company records'' is defined in the existing part 98 regulations at 40 CFR 98.6 to mean, ''in reference to the amount of fuel consumed by a stationary combustion unit (or by a group of such units), a complete record of the methods used, the measurements made, and the calculations performed to quantify fuel

usage. Company records may include, but are not limited to, direct measurements of fuel consumption by gravimetric or volumetric means, tank drop measurements, and calculated values of fuel usage obtained by measuring auxiliary parameters such as steam generation or unit operating hours. Fuel billing records obtained from the fuel supplier qualify as company records.'' The broad definition of company records would afford reporters considerable flexibility when it comes to estimating the fraction of the actual total annual heat input for each unit in the group. The EPA may consider such reporting requirements in future rulemakings.

Comment: Two commenters stated that EGUs should not be reported under subpart C and are already reported under subpart D (Electricity Generation); one commenter asserted that it is unclear from the proposal how reporting these emissions under subpart C would not be duplicative. One of the two commenters additionally stated that EGUs are not specifically defined in subparts A or C of part 98, and that the EPA should provide clarification on the definition of EGUs. The commenter added that the proposed requirement would impose burden and regulatory confusion because of the conflicting definitions in, and applicability of, other EPA regulatory programs which traditionally have regulated EGUs separately from non-EGU combustion sources. The commenter stated that 40 CFR 98.36(f) already requires sources to identify if they are tied to an entity regulated by any public utility commission.

Another commenter suggested a definition for EGUs that aligns with a footnote to table A–7 to subpart A that defines EGUs for sources reporting under subpart C as ''a fuel-fired electric generator owned or operated by an entity that is subject to regulation of customer billing rates by the public utilities commission (excluding generators connected to combustion units subject to 40 CFR part 98, subpart D) and that are located at a facility for which the sum of the nameplate capacities for all such electric generators is greater than or equal to 1 megawatt electric output.''

One commenter requested clarification that waste heat generation is not included; the commenter added that requiring facilities to report emissions from the generation of electricity using waste heat recovery would be double counting. Other commenters requested clarification that emergency generators are exempt from the proposed requirements.

Two commenters supported the EPA's proposed requirement to allow operators to use an engineering estimate of the percentage of combustion emissions attributable to facility electricity generation. However, another commenter disagreed, stating that the EPA did not describe how a reporter would identify such a fraction. The commenter added that the EPA failed to take into account that emissions from a single combustion unit might provide steam to multiple consumers for multiple purposes, only a portion of which includes on-site electricity generation. The commenter expressed concerns that, if the rule is finalized as proposed, the methods to determine electricity-related emissions by fraction could become subject to numerous other requirements, such as calculations for GHG emissions, monitoring and QA/QC requirements, data reporting, and record retention obligations.

Response: The EPA is not taking final action on the proposed addition of a new indicator that would identify units as electricity generating units at this time. Furthermore, the EPA is not taking final action on the additional requirement for reporting an estimate of a group's total reported emissions attributable to electricity generation at this time. As discussed in the preamble to the 2023 Supplemental Proposal, under the current subpart C reporting requirements, the EPA cannot currently determine the quantity of EGU emissions included in the reported total emissions for the subpart. Although some facilities currently indicate whether certain stationary fuel combustion sources are connected to a fuel-fired electric generator in 40 CFR 98.36(f), this requirement only captures a subset of subpart C EGU emissions. The EPA therefore intended the proposed reporting requirements to identify other EGUs reporting under subpart C in order to improve our understanding of subpart C EGU GHG emissions and the attribution of GHG emissions to the power plant sector. However, we agree with commenters that the proposed requirements could require additional burden not contemplated by the proposed rule. Specifically, as noted by commenters, we recognize that there could be scenarios in which a single combustion unit or group of units may provide steam for multiple purposes, only a portion of which includes on-site electricity generation. In this case, although a facility may know the quantity of electricity generated and could estimate the quantity of steam required to generate the electricity, determination of the portion of GHG emissions that are attributable to the combustion unit(s) producing the steam that is used in an on-site EGU (among other processes) would additionally require the estimation of the type and quantity of fuel used by each combustion unit for the purposes of producing the steam used to generate electricity. For this reason we are not taking final action on these requirements in this rule.

D. Subpart F—Aluminum Production

We are not taking final action on any proposed amendments to subpart F of part 98 (Aluminum Production) in this action. In the 2022 Data Quality Improvements Proposal, the EPA requested comment on several issues related to determining emissions from aluminum production. Specifically, the EPA requested information on the extent to which low voltage emissions have been characterized, if data are available to develop guidance on low voltage emission measurements, and on the use of the non-linear method as an alternative to the slope coefficient and overvoltage methods currently allowed in subpart F. The EPA received comments on these issues but is not taking final action on any changes to the measurement methodology for subpart F at this time.

In the 2023 Supplemental Proposal, the EPA proposed revisions to the reporting requirements at 40 CFR 98.66(a) and (g) to require that facilities report the facility's annual production capacity and annual days of operation for each potline. We noted at that time that the capacity of the facility and capacity utilization would provide useful information for understanding variations in annual emissions and emission trends across the sector. The EPA received several comments on the proposed subpart F revisions. Following consideration of comments received, we are not taking final action on the proposed revisions at this time. However, the EPA may consider similar changes to reporting requirements in a future rulemaking. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart F.

E. Subpart G—Ammonia Manufacturing

We are finalizing amendments to subpart G of part 98 (Ammonia Manufacturing) as proposed. In some cases, we are finalizing the proposed

amendments with revisions. In other cases, we are not taking final action on the proposed amendments. This section discusses the final revisions to subpart G. The EPA received only supportive comments for the proposed revisions to subpart G. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart G. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

In the 2022 Data Quality Improvements Proposal, the EPA proposed several revisions to subpart G to require reporters to report the GHG emissions that occur directly from the ammonia manufacturing process (*i.e.,* net CO_2 process emissions) after subtracting out carbon or CO_2 captured and used in other products. The proposed revisions included combining equation G–4 and equation G–5 into a new equation G–4 and several harmonizing revisions to 40 CFR 98.72(a); revisions to the introductory paragraph of 40 CFR 98.73; the removal of § 98.73(b)(5); revisions to the introductory paragraph of 40 CFR 98.76; and revisions to the reported data elements at 40 CFR 98.76(b)(1) and (13), as described in section III.C. of the preamble to the 2022 Data Quality Improvements Proposal.

The EPA is finalizing minor edits to 40 CFR 98.72(a), the introductory paragraph of 40 CFR 98.73, the introductory paragraph to 40 CFR 98.76, and 40 CFR 98.76(b)(1) to clarify the term ''ammonia manufacturing unit,'' as well as clarifying edits to 40 CFR 98.76(b)(13) to clearly identify any CO_2 used in the production of urea and carbon bound in methanol that is intentionally produced as a desired product. Additionally, we are finalizing clarifying amendments to equation G–1, equation G–2, and equation G–3 to simplify the equations by removing the process unit ''k'' designation in the terms ''$CO_{2,G,k}$,'' ''$CO_{2,L,k}$,'' and ''$CO_{2,S,k}$.'' We are also finalizing the removal of § 98.73(b)(5) and equation G–5, consistent with our intent at proposal to require reporting of emissions by ammonia manufacturing unit.

Following consideration of comments received on similar changes proposed for subpart S (Lime Manufacturing), the EPA is not taking final action at this time on the proposed revisions to allow facilities to subtract out carbon or CO_2 captured and used in other products. We have revised new equation G–4 in the final rule to remove the proposed equation terms related to CO_2 collected and consumed on-site for urea production and the mass of methanol intentionally produced as a desired product, and removed text related to ''net'' CO_2 process emissions. The EPA is also not taking final action at this time on the addition of related monthly recordkeeping data elements that were proposed as verification software records. See section III.K.2. of this preamble for a summary of related comments and the EPA's response.

We are finalizing as proposed one amendment to subpart G from the 2023 Supplemental Proposal to include a requirement for facilities to report the annual quantity of excess hydrogen produced that is not consumed through the production of ammonia at 40 CFR 98.76(b)(16). This is a harmonizing change to ensure that the final revisions to subpart P (Hydrogen Production) to exclude reporting from any process unit for which emissions are reported under another subpart of part 98, including ammonia production units that report emissions under subpart G (see section III.I. of this preamble), will not result in the exclusion of reporting of any excess hydrogen production at facilities that are subject to subpart G.

We are also finalizing as proposed related confidentiality determinations for data elements resulting from the revisions to subpart G, as described in section VI. of this preamble.

F. Subpart H—Cement Production

We are finalizing several amendments to subpart H of part 98 (Cement Production) as proposed. In some cases, we are finalizing the proposed amendments with revisions. Section III.F.1. of this preamble discusses the final revisions to subpart H. The EPA received several comments on the proposed subpart H revisions which are discussed in section III.F.2. of this preamble. We are also finalizing confidentiality determinations for new data elements resulting from the revisions to subpart H, as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart H

This section summarizes the final amendments to subpart H. Major changes in this final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart H can be found in this section and section III.F.2. of this preamble. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal.

The EPA is finalizing several revisions to improve the quality of data collected for subpart H. First, we are finalizing the addition of several new data reporting elements to subpart H under 40 CFR 98.86(a) and (b) to enhance the quality and accuracy of the data collected. In the 2022 Data Quality Improvements Proposal, the EPA proposed to add several data reporting elements based on annual average chemical composition data for facilities using either the direct measurement (using a continuous emission monitoring system (CEMS)) methodology or the mass balance methodology, in order to assist in improving verification of reported data. The proposed data elements included (for both facilities that report CEMS data and those that report using a mass balance method) the annual arithmetic average weight fraction of: the total calcium oxide (CaO) content, non-calcined CaO content, total magnesium oxide (MgO) content, and non-calcined MgO content of clinker at the facility (proposed 40 CFR 98.86(a)(4) through (a)(7) and (b)(19) through (b)(22)); and the total CaO content of cement kiln dust (CKD) not recycled to the kiln(s), non-calcined CaO content of CKD not recycled to the kiln(s), total MgO content of CKD not recycled to the kiln(s), and non-calcined MgO content of CKD not recycled to the kiln(s) at the facility (proposed 40 CFR 98.86(a)(8) through (11) and (b)(23) through (26)). The EPA also proposed to collect other data (from both facilities using CEMS and those that report using the mass balance method), including annual facility CKD not recycled to the kiln(s) in tons (proposed 40 CFR 98.86(a)(12) and (b)(27)) and raw kiln feed consumed annually at the facility in tons (dry basis) (proposed 40 CFR 98.86(a)(13) and (b)(28)), for both verification and to improve the methodologies of the Inventory.

The EPA is finalizing the proposed requirements to report the annual arithmetic average weight fraction of the total CaO content, non-calcined CaO content, total MgO content, and non-calcined MgO content of clinker at the facility (proposed 40 CFR 98.86(a)(4) through (7) and (b)(19) through (22)), and the annual facility CKD not recycled to the kiln(s) (proposed 40 CFR 98.86(a)(12) and (b)(27), finalized as 40 CFR 98.86(a)(8) and (b)(27), respectively), for both facilities that use CEMS and those that report using the mass balance method. We are also finalizing, for facilities using the mass

balance method, the total CaO content of CKD not recycled to the kiln(s), non-calcined CaO content of CKD not recycled to the kiln(s), total MgO content of CKD not recycled to the kiln(s), and non-calcined MgO content of CKD not recycled to the kiln(s) at the facility (proposed 40 CFR 98.86(b)(23) through (26)), and the amount of raw kiln feed consumed annually (proposed 40 CFR 98.86(b)(28)). Finalizing these data elements will improve the EPA's ability to verify reported emissions (*e.g.,* the EPA will be able to create a rough estimate of process emissions at the facility and compare that to the reported total emissions, and check whether the ratio is within expected ranges). For facilities using CEMS, the finalized data elements will enable the EPA to estimate process emissions from facilities to provide a more accurate national-level cement emissions profile and the Inventory. Following consideration of public comments, we are not taking final action on certain proposed data elements for facilities that report using CEMS. Specifically, the EPA is not taking final action on the proposed requirements to report the annual arithmetic average of the total CaO content of CKD not recycled to the kiln(s), non-calcined CaO content of CKD not recycled to the kiln(s), total MgO content of CKD not recycled to the kiln(s), and non-calcined MgO content of CKD not recycled to the kiln(s) at the facility (proposed 40 CFR 98.86(a)(8) through (11)). We are also not taking final action on the reporting of the amount of raw kiln feed consumed annually (proposed 40 CFR 98.86(a)(13)). See section III.F.2. of this preamble for a summary of the related comments and the EPA's response.

The EPA is finalizing as proposed several clarifications and corrections to equations H–1, H–4, and H–5 included in the 2022 Data Quality Improvements Proposal. The final revisions to equation H–1 add brackets to clarify the summation of clinker and raw material emissions for each kiln, and update the definition of parameter ''$CO_{2\ rm}$'' to ''$CO_{2\ rm,m}$'' and clarify the raw material input is on a per-kiln basis. The final revisions to equation H–5 revise the inputs ''rm,'' ''$CO_{2\ rm}$'' (revised to ''$CO_{2\ rm,m}$''), and ''TOC_{rm},'' and add brackets to clarify that emissions are calculated as the sum of emissions from all raw materials or raw kiln feed used in the kiln. The final revisions to equation H–4 correct the defined parameters for the quarterly non-calcined CaO content and the quarterly non-calcined MgO content of CKD not recycled to ''CKD_{ncCaO}'' and ''CKD_{ncMgO},'' respectively, to align with the parameters defined in the equation.

2. Summary of Comments and Responses on Subpart H

This section summarizes the major comments and responses related to the proposed amendments to subpart H. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart H.

Comment: One commenter objected to the EPA's proposed addition of data reporting requirements for facilities reporting using the CEMS methodology. The commenter asserted that the new data requirements would add unnecessary burden without providing additional insight into cement industry GHG emissions or improving the quality or accuracy of the emissions data provided. The commenter stated that, under the new provisions, the EPA would essentially be requiring kilns that are currently using CEMS to report their emissions to verify their data by using the mass balance method, with associated reporting and recordkeeping. The commenter noted that CEMS are already required to meet extensive quality assurance and quality control requirements and have been determined as the most accurate means of measuring stack emissions. Further, the commenter reasoned that the EPA can accurately determine process emissions using already reported data, total kiln stack emissions data, and combustion emissions data, which they stated is included in the confidential monthly clinker production data and fuel use data provided using the Tier 4 methodology in subpart C. The commenter stated that it is well established by the scientific community that process emissions represent 60 percent of CO_2 emissions from the kiln based on the standard chemistry of the cement manufacturing process, and that the currently reported data should be sufficient.

The commenter also opposed the EPA's proposed data reporting elements for facilities using the mass balance (non-CEMS) methodology, likewise insisting that the EPA can readily determine both process and combustion emissions from the existing reporting requirements. The commenter explained that (1) the reporting of total and non-calcined CaO and MgO is irrelevant to calculating CO_2 process emissions as they are inherently non-carbonate; and (2) in reference to the proposed CKD reporting requirement, calculating the CKD not recycled and the quantity of raw kiln feed at all kilns within a facility would add burden without providing any additional information about industry GHG emissions. The commenter also questioned the need for the additional data, stating that the EPA did not provide an explanation of how the additional data would be used separately from potentially verifying process emissions. The commenter also expressed concern that the addition of these data elements would justify regulatory overreach from other programs.

Response: We disagree with the commenter's statement that reporting additional data from facilities using CEMS will not enhance the EPA's verification of the facility reported values. The EPA has encountered occasional instances of mistakes in reported CEMS data (*e.g.,* from data entry mistakes), resulting in significant errors in reported emissions. Fuel use data are not provided to the EPA for cement plants that report emissions using CEMS. Currently, fuel use data are entered into the IVT to calculate CH_4 and N_2O emissions from combustion for kilns with CEMS, as the process and combustion emissions are both vented through the same stack. These IVT data are not directly reported to the EPA, so the EPA cannot use them to verify the accuracy of reported emissions.

Furthermore, we are not persuaded by the commenter's assertion that process emissions represent 60 percent of kiln emissions. Cement kilns can have very different process and combustion emissions depending on the input materials, the fuel or energy source used, etc., and an average process emissions factor would not be representative of all facilities in subpart H. Furthermore, the commenter does not provide additional information about how this statistic was calculated and whether it is representative of cement manufacturing plants in the United States. The commenter did not specify where this statistic can be found in the cited source (''Getting the Numbers Right Database, Global Cement and Concrete Association'' [9]) and did not provide the underlying data to the EPA for review. Importantly, this database contains information on global cement production, and emissions profiles at facilities in the United States can differ widely from those in other countries due to differences in input

[9] Available at *https://gccassociation.org/sustainability-innovation/gnr-gcca-in-numbers/*. Accessed January 9, 2024.

materials, fuels used, and emission control systems that may be in place. The EPA has reviewed data, such as those from the UNFCCC, which suggest that implied emissions rates may vary from 49–57 percent and change by country.[10]

Upon careful review and consideration, the EPA has decided not to adopt the proposed changes to require the chemical composition data for CKD and amount of raw kiln feed consumed annually for facilities reporting with CEMS (proposed 40 CFR 98.86(a)(8) through (11) and (a)(13)). We are not taking final action on these elements after consideration of the comments and in an effort to reduce potential burden. The EPA is finalizing the remaining proposed reporting requirements as these data elements will improve verification of reported emissions. For example, the EPA will be able to create a rough estimate of process emissions at the facility and compare that to the reported total emissions, and check whether the ratio is within expected ranges. We will also be able to build evidence-based verification checks on the clinker composition data that is entered by facilities that do not use CEMS (we currently have very little information on what chemical compositions are typical in cement kilns). The final reporting elements will also enable the EPA to estimate process emissions from CEMS facilities to provide a more accurate national-level emissions profile for the cement industry and the Inventory. Reporting average chemical composition data for the clinker is expected to be less burdensome for facilities, as this data is likely collected as a part of normal business operations, while collection of CKD data may be less common. Furthermore, we do not believe these additional data elements constitute regulatory overreach as they are similar to other data already collected under subpart H and will be important for verification and our understanding of process and combustion emissions.

We also disagree that collecting additional data from facilities using the mass balance method will not enhance the EPA's verification of the facility reported values. Currently clinker composition data are entered into the IVT and are not included in the annual report that is submitted to the EPA. Reporting of these and additional data elements will improve verification of reported emissions and the mass balance calculations (*e.g.,* by allowing us to create evidence-based verification checks for clinker composition data). The final reporting elements will also provide a more accurate national-level emissions profile for the cement industry and the Inventory. With respect to the burden associated with these added reporting elements for reporters using the mass balance reporting method, these data elements are the annual arithmetic averages of either monthly or quarterly data elements that these reporters already input into e-GGRT through the IVT. These data elements are currently entered into the IVT and used for equations H–2 through H–5; but they are not reported to the EPA. Thus, the burden, if any, is expected to be minimal. There are no changes, as compared to the proposal, to the final reporting requirements for facilities using the mass balance methodology after consideration of this comment.

G. Subpart I—Electronics Manufacturing

We are finalizing several amendments to subpart I of part 98 (Electronics Manufacturing) as proposed. In some cases, we are finalizing the proposed amendments with revisions. In other cases, we are not taking final action on the proposed amendments. Section III.G.1. of this preamble discusses the final revisions to subpart I. The EPA received several comments on the proposed subpart I revisions which are discussed in section III.G.2. of this preamble. We are also finalizing as proposed related confidentiality determinations for data elements resulting from the revisions to subpart I as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart I

This section summarizes the final amendments to subpart I. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart I can be found in this section and section III.G.2. of this preamble. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

a. Revisions To Improve the Quality of Data Collected for Subpart I

In the 2022 Data Quality Improvements Proposal, the EPA proposed several revisions to subpart I to improve data quality, including revising the stack testing calculation method, updating the calculation methods used to estimate emission factors in the technology assessment report, updating existing default emission factors and destruction or removal efficiencies (DREs) based on new data, adding a calculation method for calculating byproducts produced in abatement systems, amending data reporting requirements, and providing clarification on reporting requirements. In the 2023 Supplemental Proposal, the EPA subsequently proposed corrections to specific revisions from the 2022 Data Quality Improvements Proposal, including DRE values in table I–16 and gamma factors in proposed new table I–18 to subpart I of part 98.

The EPA is finalizing several revisions to 40 CFR 98.93(i) to improve the calculation methodology for stack testing. These revisions include:

- Adding new equations I–24C and I–24D and a table of default weighting factors (new table I–18) to calculate the fraction of fluorinated input gases exhausted from tools with abatement systems, $a_{i,f}$, for use in equations I–19A through I–19C and I–21, and the fraction of byproducts exhausted from tools with abatement systems, $a_{k,i,f}$, for use in equations I–20 and I–22.
- Revising equations I–24A and I–24B, which calculate the weighted average DREs for individual F–GHGs across process types in each fab.
- Revising 40 CFR 98.93(i)(3) to require that all stacks be tested if the stack test method is used.
- Replacing equation I–19 with a set of equations (*i.e.,* equations I–19A, I–19B, and I–19C) that will more accurately account for emissions when pre-control emissions of an F–GHG come close to or exceed the consumption of that F–GHG during the stack testing period.
- Clarifying the definitions of the variables d_{if} and d_{kif}, the average DREs for input gases and byproduct gases respectively, in equations I–19A, I–19B, I–19C, and I–19D, in equations I–20 through I–22, in equations I–24A and B, and in equation I–28 to subpart I.

These revisions will remove the current requirements to apportion gas consumption to different process types, to manufacturing tools equipped versus not equipped with abatement systems, and to tested versus untested stacks. Equations I–24C and I–24D add the option to calculate the fraction of each input gas ''i'' and byproduct gas ''k'' exhausted from tools with abatement systems based on the number of tools that are equipped versus not equipped with abatement systems, along with weighting factors that account for the

[10] United Nations Framework Convention on Climate Change. (2023). National inventory submissions 2023. *https://unfccc.int/ghg-inventories-annex-i-parties/2023.*

different per-tool emission rates that apply to different process types. The weighting factors ($\gamma_{i,p}$ for input gases and $\gamma_{k,i,p}$ for byproduct gases, provided in table I–18) are based on data submitted by semiconductor manufacturers during the process of developing the 2019 Refinement (as corrected in the 2023 Supplemental Proposal). We are finalizing revisions to equations I–24A and I–24B, used to calculate the average DRE for each input gas ''i'' and byproduct gas ''k,'' based on tool counts and the same weighting factors that will be used in equations I–24C and I–24D; this accounts for operations in which a facility uses one or more abatement systems with a certified DRE value that is different from the default to calculate and report controlled emissions. We are finalizing the requirement that all stack systems be tested by removing 40 CFR 98.93(i)(1); this removes not only the need to apportion gas usage to tested versus untested stack systems, but also the requirement to perform a preliminary calculation of the emissions from each stack system. We are finalizing new equations I–19A, I–19B, and I–19C, with a clarification, which will more accurately account for emissions when emissions of an F–GHG prior to entering any abatement system (*i.e.,* pre-control emissions) would approach or exceed the consumption of that F–GHG during the stack testing period. We are clarifying that the 0.8 maximum for the 1–U value only applies to carbon-containing F–GHGs. As discussed in the proposal, the modification to the stack testing method was intended to accurately account for the source of emissions when the measured emissions exceed the consumption of the F–GHG during the stack testing period, which may occur in situations where the input gas is also generated in significant quantities as a by-product by the other input gases. However, it is not expected that NF_3 or SF_6 could be generated as a by-product by a fluorocarbon used as an input gas. Therefore, this modification is not appropriate and was not intended to apply to SF_6 or NF_3 emissions when calculating emissions using the stack test method. The revised equations improve upon the current equations because they account both for any control of the emissions and for some utilization of the input gas. Finally, we are finalizing revisions to the definitions of the variables d_{if} and d_{kif} in equations I–19A, I–19B, I–19C, and I– 19D, in equations I–20 through I–22, in equations I–24A and B, and in equation I–28 to clarify that these variables reflect the fraction of gas i (or byproduct gas k) that is destroyed once gas i (or byproduct gas k) is fed into abatement systems. See section III.E.1.a. of the preamble to the 2022 Data Quality Improvements Proposal for additional information on these revisions and their supporting basis.

With some changes, the EPA is finalizing revisions to improve the quality of the data submitted in the technology assessment reports in 40 CFR 98.96(y) as proposed in the 2022 Data Quality Improvements Proposal. Specifically, the EPA proposed to require that reporters who submit a technology assessment report would use three methods (the ''all-input gas method,'' the ''dominant gas method,'' and the ''reference emission factor method'') to report the results of each emissions test to estimate utilization and byproduct formation emission rates. The EPA is finalizing a requirement to report the results using two of the three methods proposed, including the all-input gas method, with a clarification, and the reference emission factor method, and is allowing use of a third method of the reporter's choice, as follows:

- All-input gas method. For input gas emission rates, this method attributes all emissions of each F–GHG that is an input gas to the input gas emission factor (1–U) factor for that gas, if the input gas does not contain carbon or until that 1–U factor reaches 0.8 if the input gas does contain carbon, after which emissions of the F–GHG are attributed to the other input gases. For byproduct formation rates, this method attributes emissions of F–GHG byproducts that are not also input gases to all F–GHG input gases (kilogram (kg) of byproduct emitted/kg of all F–GHGs used).
- Reference emission factor method. This method estimates emissions using the 1–U and the byproduct formation rates that are observed in single gas recipes and then adjusts both emission factors based on the ratio between the emissions calculated based on the factors and the emissions actually observed in the multi-gas process.
- The EPA is finalizing an option for reporters to use, in addition to the utilization and byproduct formation rates calculated according to the required all-input gas method and the reference emission factor method, an alternative method of their choice to calculate and report the utilization or byproduct formation rates based on the collected data.

These revisions will ensure that the emission factors submitted in the technology assessment reports are robust (for example, not unduly affected by changing ratios of input gases) and are comparable to each other and to the emission factors already in the EPA's database. The EPA proposed, and is finalizing with a clarification, modifications to the all-input gas method to avoid an input gas emission factor greater than 0.1 when multiple gases are used. The modified method uses 0.8 as the maximum 1–U value, and as such, attributes emissions of each F–GHG used as an input gas to that input gas until the mass emitted equals 80 percent of the mass fed into the process (*i.e.,* until the 1–U factor equals 0.8). The all-input gas method assigns the remaining emissions of the F–GHG to the other input gases as a byproduct in proportion to the quantity of each input gas used in the process. We are finalizing this modified method with the clarification that the 0.8 maximum for the 1–U value only applies to carbon-containing F–GHGs. As discussed in the proposal, the modification to the all-input method was intended to avoid the situations where the historical methods would violate the conservation of mass or fail to reflect the fact that some fraction of the input gas reacts with the film it is being used to etch or clean, which may occur in situations where the input gas is also generated in significant quantities as a by-product by the other input gases. However, it is not expected that NF_3 or SF_6 could be generated as a by-product by a fluorocarbon used as an input gas. Therefore, this modification is not appropriate and was not intended to apply to SF_6 or NF_3 emissions when calculating emission factors. The EPA is requiring use of the all-input gas method to facilitate comparisons of new data to historical data; the all-input gas method was the most commonly used method in the submitted data sets included in technology assessment reports from 2013 and earlier. Following consideration of comments received and to reduce burden, the EPA is not taking final action on the proposed requirement to report emission factors using the dominant gas method. The dominant gas method calculates 1–U factors in the same way as the all-input gas method, but it calculates byproduct formation rates differently, attributing all emissions of F–GHG byproducts to the carbon-containing F–GHG input gas accounting for the largest share by mass of the input gases. Additional information on each of the three methods is available in section III.E.1.b. of the preamble to the 2022 Data Quality Improvements Proposal and in the memorandum ''Technical Support for Modifications to the Fluorinated

Greenhouse Gas Emission Estimation Method Option for Semiconductor Facilities under Subpart I,'' available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424. As noted in the proposed rule, the EPA intends to make available a calculation workbook for the technology assessment report that will calculate the two sets of emission factors based on each of the final methods using a single set of data entered by the reporter. The option to calculate the emission factors using an additional method provides flexibility for reporters while enabling comparison between the results of the additional method and the results of the two required methods. Where reporters choose to submit emission factors using the additional method, we will be able to evaluate the reliability and robustness of emission factors calculated using all three methods. Additional information on comments related to the calculation methods and the EPA's response can be found in section III.G.2.a. of this preamble.

The EPA is also finalizing two additional requirements for the submitted technology assessment reports including requiring reporters to specify (1) the method used to calculate the reported utilization and byproduct formation rates and assign and provide an identifying record number for each data set; and (2) for any DRE data submitted, whether the abatement system used for the measurement is specifically designed to abate the gas measured under the operating condition used for the measurement. For reporters who opt to additionally provide utilization and byproduct formation rates using an alternative method of their choice, reporters must provide this information and a description of the alternative method used.

The EPA is finalizing revisions to update the default emission factors and DREs in subpart I based on new data submitted as part of the 2017 and 2020 technology assessment reports and the 2019 Refinement, as proposed in the 2022 Data Quality Improvements Proposal and corrected in the 2023 Supplemental Proposal. These revisions include:

- Updates to the utilization rates and byproduct emission factors (BEFs) for F–GHGs used in semiconductor manufacturing in tables I–3, I–4, I–11 and I–12;
- Removal of byproduct emission factors from tables I–3 and I–4 where there is a combination of both a low BEF and a low GWP resulting in very low reported emissions per metric ton of input gas used (removes the BEF for C_4F_6 and C_5F_8 for all input gases used in wafer cleaning or plasma etching processes, and results in not adding BEFs for COF_2 and C_2F_4 for any input gas/process combination from the new data submitted as part of the 2017 and 2020 technology assessment reports).
- In cases where neither the input gas nor the films being processed in the tool contain carbon, setting the BEF for the carbon-containing byproducts to zero. These provisions apply at the process subtype level. For example, a BEF of zero will only be used for a combination of input gas and chamber cleaning process subtype (*e.g.,* NF_3 in remote plasma cleaning (RPC)) if no carbon-containing materials were removed using that combination of input gas and chamber cleaning process subtype during the year and no carbon-containing input gases were used on those tools. Otherwise, the default BEF will be used for that combination of input gas and chamber cleaning process subtype for all of that gas consumed for that subtype in the fab for the year. The EPA is making one modification to the proposed equation to clarify that the carbon-containing byproduct emission factors are zero when the combination of input gas and etching and wafer cleaning process type uses only non-carbon containing input gases (SF_6, NF_3, F_2 or other non-carbon input gases) and etches or cleans only films that do not contain carbon.
- Updates to the default emission factors for N_2O used in all electronics manufacturing in table I–8, including distinct utilization rates for semiconductor manufacturing and LCD manufacturing and, for semiconductor manufacturing, utilization rates by wafer size;
- Revisions to the calculation methodology for MEMS and PV manufacturing to allow use of 40 CFR 98.93(a)(1), the current methodology for semiconductor manufacturing, for manufacture of MEMS and PV using semiconductor tools and processes, which applies the default emission factors in tables I–3 and I–4 to these processes;
- Revisions to 40 CFR 98.93(a)(6) to revise the utilization rate and byproduct emission factor values assigned to gas/process combinations where no default utilization rate is available; these revisions account for the likely partial conversion of the input gas into CF_4 and C_2F_6. The final rule requires, for a gas/process combination where no default input gas emission factor is available in tables I–3, I–4, I–5, I–6, and I–7, reporters will use an input gas emission factor (1–U) equal to 0.8 (*i.e.,* a default utilization rate or U equal to 0.2) with BEFs of 0.15 for CF_4 and 0.05 for C_2F_6.
- Revisions to the default DREs in table I–16 to subpart I to reflect new data and strengthening of abatement system certification requirements. The final revisions assign chemical-specific DREs to all commonly used F–GHGs for the semiconductor manufacturing sub-sector without distinguishing between process types.

Additional information on the EPA's derivation of the final emission factors and DREs is available in section III.E.1.c. of the preamble to the 2022 Data Quality Improvements Proposal and in the revised technical support document, ''Revised Technical Support for Revisions to Subpart I: Electronics Manufacturing,'' available in the docket for this rulemaking (Docket ID. No. EPA–HQ–OAR–2019–0424).

The EPA is also finalizing revisions to the conditions under which the default DRE may be claimed, with some revisions from the proposal so that the new documentation requirements apply only to abatement systems purchased and installed on or after January 1, 2025. For all abatement systems for which a DRE is being claimed, including abatement systems purchased and installed during or after 2025 and older abatement systems, the EPA is maintaining the current certification and documentation requirements and is finalizing the proposed additional requirement that the certification must contain a manufacturer-verified DRE value. If the abatement system is certified to abate the F–GHG or N_2O at a value equal to or higher than the default DRE, the facility may claim the default DRE. If the abatement system is certified to abate the F–GHG or N_2O but at a value lower than the default DRE, the facility may not claim the default; however, the facility may claim the lower manufacturer-verified value. (Site-specific measurements by the electronics manufacturer are still required to claim a DRE higher than the default.) Based on annual reports submitted through RY2022, facilities have historically been able to provide manufacturer-verified DRE values for all abatement systems for which emission reductions have been claimed.

Additional requirements apply to abatement systems purchased and installed on or after January 1, 2025. Specifically, the EPA is finalizing revisions to the definition of operational mode in 40 CFR 98.98 to specify that for abatement systems purchased and installed during or after January 1, 2025, operational mode means that the system is operated within the range of parameters as specified in the DRE certification documentation. The specified parameters must include the

highest total F–GHG or N_2O flows and highest total gas flows (with N_2 dilution accounted for) through the emissions control systems. Systems operated outside the range of parameters specified in the documentation supporting the DRE certification may rely on a measured site-specific DRE according to 40 CFR 98.94(f)(4) to be considered operational within the range of parameters used to develop a site-specific DRE.

The EPA is also finalizing revisions to 40 CFR 98.94(f)(3) to modify the conditions under which the default or lower DRE may be claimed for abatement systems purchased and installed on or after January 1, 2025. For systems purchased and installed on or after January 1, 2025, reporters are required to: (1) certify that the abatement device is able to achieve, under the worst-case flow conditions during which the facility is claiming that the system is in operational mode, a DRE equal to or greater than either the default DRE value, or if the DRE claimed is lower than the default DRE value, a manufacturer-verified DRE equal to or greater than the DRE claimed; and (2) provide supporting documentation. Specifically, for POU abatement devices purchased and installed on or after January 1, 2025, reporters must certify and document under 40 CFR 98.94(f)(3)(i) and (ii) that the abatement system has been tested by the abatement system manufacturer using a scientifically sound, industry-accepted measurement methodology that accounts for dilution through the abatement system, such as EPA 430–R–10–003,[11] and that the system has been verified to meet (or exceed) the destruction or removal efficiency used for that fluorinated GHG or N_2O under worst-case flow conditions (the highest total F–GHG or N_2O flows and highest total gas flows, with N_2 dilution accounted for). Because manufacturers routinely conduct DRE testing and are familiar with the protocols of EPA 430–R–10–003, we anticipate this information will be readily available for abatement systems purchased in calendar year 2025 or later. The EPA is finalizing that the new DRE requirements will be implemented for reports prepared for RY2025 and submitted March 31, 2026, which provides over a year for reporters to acquire the necessary documentation. Reporters are not required to maintain documentation of the DRE on abatement systems for which a DRE is not being claimed.

We are also clarifying that the list of abatement system manufacturer specifications within which the abatement system must be operated at 40 CFR 98.96(q)(2) is intended to be exemplary, adding ''which may include, for example,'' before the list. This clarifies that some of the listed specifications or parameters may not be specified by all abatement system manufacturers for all abatement systems, and leaves open the possibility that some abatement system manufacturers may include other specifications within which the abatement system must be operated.

Additionally, following consideration of comments received, we are clarifying how reporters account for uptime of the abatement device if suitable backup emissions control equipment or interlocking with the process tool is implemented for each emissions control system. The EPA is revising the definition of the term ''UT_{ij}'' in equation I–15 and the definition of ''UT_f'' in equation I–23 to clarify that if all the abatement systems for the relevant input gas and process type are interlocked with all the tools feeding them, the uptime may be set to one (1). We are also clarifying equations I–15 and I–23 to reference the provisions in 40 CFR 98.94(f)(4)(vi) when accounting for uptime when redundant abatement systems are used. See section III.G.2.a. of this preamble for additional information on related comments and the EPA's response.

The EPA is finalizing the addition of a calculation methodology that estimates the emissions of CF_4 produced in hydrocarbon-fuel based combustion emissions control systems (''HC fuel CECs'') that are not certified not to generate CF_4. Following consideration of public comments, the calculation will be required only for HC fuel CECs purchased and installed on or after January 1, 2025. To implement the new calculation methodology, we are adding a new equation I–9 and renumbering the previous equation I–9 as equation I–8B. Equation I–9 only applies to processes that use F_2 as an input gas or to remote plasma cleaning processes that use NF_3 as an input gas. Equation I–9 estimates the emissions of CF_4 from generation in emissions control systems by calculating the mass of the fluorine entering uncertified HC fuel CECs (the product of the consumption of the input gas, the emission factor for fluorine, and a_i, where a_i is the ratio of the number of tools with uncertified abatement devices for the gas-process combination to the total number of process tools for the gas-process combination) and multiplying that mass by a CF_4 emission factor, $AB_{CF4,F2}$, which has a value of 0.116. In related changes, the EPA is finalizing a BEF for F_2 from NF_3 used in remote plasma clean processes of 0.5. For other gas and process combinations where no data are available (listed as ''NA'' in tables I–3 and I–4), the EPA is finalizing a BEF of 0.8 be used for F_2 in equation I–9 for all process types.

The EPA is requiring that reporters estimate CF_4 emissions from all HC fuel CECs that are purchased and installed on or after January 1, 2025 and that are not certified not to produce CF_4, even if reporters are not claiming DREs for those systems. However, as noted above, the requirements apply only to HC fuel CECs used on processes that use F_2 as an input gas or to remote plasma cleaning processes that use NF_3 as an input gas. We are also finalizing a related definition of ''hydrocarbon-fuel-based combustion emissions control system (HC fuel CECS),'' which we have revised from the proposed ''hydrocarbon-fuel-based emissions control system,'' to align with the 2019 Refinement and to clarify that the term includes systems used on processes that have the potential to emit F_2 or fluorinated GHGs, as recommended by commenters. As noted above, we have also revised the final rule from proposal to require these estimates from HC fuel CECS purchased and installed on or after January 1, 2025. We are also finalizing corresponding monitoring, reporting, and recordkeeping requirements (see 40 CFR 98.94(e), 40 CFR 98.96(o), and 40 CFR 98.97(b), respectively) for facilities that use HC fuel CECS purchased and installed during or after 2025 to control emissions from tools that use either NF_3 as an input gas in RPC processes or F_2 as an input gas in any process and assume in equation I–9 that one or more of those systems do not form CF_4 from F_2. Under these requirements facilities must certify and document that the model for each of the systems that the facility assumes does not form CF_4 from F_2 has been tested and verified to produce less than 0.1 percent CF_4 from F_2, and that each of these systems is installed, operated, and maintained in accordance with the directions of the HC fuel CECS manufacturer. The facility may perform the testing itself, or it may supply documentation from the HC fuel CECS manufacturer that supports the certification. Because the requirement to quantify emissions of CF_4 from F_2 is being applied only to HC fuel CECS purchased and installed on or after

[11] Protocol for Measuring Destruction or Removal Efficiency of Fluorinated Greenhouse Gas Abatement Equipment in Electronics Manufacturing, Version 1, March 2010 (''EPA DRE Protocol''), as incorporated at 40 CFR 98.7.

January 1, 2025, we anticipate that most HC fuel CECS will be tested by the HC fuel CECS manufacturer. If the facility performs the testing, it is required to measure the rate of conversion from F_2 to CF_4 using a scientifically sound, industry-accepted method that accounts for dilution through the abatement device, such as the EPA DRE Protocol, adjusted to calculate the rate of conversion from F_2 to CF_4 rather than the DRE.

The EPA is also finalizing related amendments to 40 CFR 98.94(j)(1)(i) to require that the uptime (*i.e.,* the fraction of time that abatement system is operational and maintained according to the site maintenance plan for abatement systems) during the stack testing period average at least 90 percent for uncertified HC fuel CECS. Following consideration of comments received, we are clarifying in the final rule that these provisions are limited to only those HC fuel CECS that were purchased and installed on or after January 1, 2025, that are used to control emissions from tools that use either NF_3 in remote plasma cleaning processes or F_2 as an input gas in any process type or sub-type, and that are not certified not to form CF_4. See section III.G.2.a. of this preamble for additional information on related comments on HC fuel CECS and the EPA's response.

Finally, the EPA is not taking final action on proposed revisions to the calibration requirements for abatement systems. In the 2022 Data Quality Improvements Proposal, the EPA proposed that a vacuum pump's purge flow indicators are calibrated every time a vacuum pump is serviced or exchanged, with the expectation that this requirement would require calibrations every one to six months, depending on the process. Following review of input provided by commenters, we are not taking final action on the proposed revisions. Removal of the proposed requirements is anticipated to reduce the potential burden on reporters without any large effects on data quality. Section III.G.2.a. of this preamble provides additional information on the comments received related to vacuum pump purge flow calibration and the EPA's response.

b. Revisions To Streamline and Improve Implementation for Subpart I

In the 2022 Data Quality Improvements Proposal, the EPA proposed several revisions intended to streamline the calculation, monitoring, or reporting in specific provisions in subpart I to provide flexibility or increase the efficiency of data collection. The EPA is finalizing these changes as proposed. First, the final rule revises the applicability of subpart I as follows:

- Adds a second option in 40 CFR 98.91(a)(1) and (2) for estimating GHG emissions for semiconductor, MEMS, and LCD manufacturers, for comparison to the 25,000 $mtCO_2e$ per year emissions threshold in 40 CFR 98.2(a)(2), that is based on gas consumption in lieu of production capacity. The revisions include new equations I–1B and I–2B to multiply gas consumption by a simple set of emission factors, the gas GWPs, and a factor to account for heat transfer fluid to estimate emissions. The emission factors are included in new table I–2 to subpart I of part 98 and are the same as the emission factors for gas and process combinations for which there is no default in tables I–3, I–4, or I–5 to subpart I. Facilities that choose to use this option for their calculation method will be required to track annual gas consumption by GHG but are not required to apportion consumption by process type for the purposes of assessing rule applicability.
- Revises the current applicability calculation for PV manufacturers to revise equation I–3 and refer to new table I–2, and delete the phrase ''that have listed GWP values in table A–1,'' to increase the accuracy of the estimated emissions for determining applicability; and
- Updates the emission factors in table I–1 to subpart I of part 98 used in the current applicability calculations for MEMS and LCD manufacturers based on new Tier 1 emission factors in the 2019 Refinement.

Additional information on the EPA's revisions to applicability and the final emission factors is available in section III.E.2.a. of the preamble to the 2022 Data Quality Improvements Proposal.

The EPA additionally proposed, and is finalizing, to revise the frequency and applicability of the technology assessment report requirements in 40 CFR 98.96(y), which applies to semiconductor manufacturing facilities with GHG emissions from subpart I processes greater than 40,000 $mtCO_2e$ per year. First, we are finalizing amendments to 40 CFR 98.96(y) to decrease the frequency of submission of the reports from every three years to every five years. As we noted in the preamble to the 2022 Data Quality Improvements Proposal, revising the frequency of submission to every five years will increase the likelihood that reports will include updates in technology rather than conclusions that technology has not changed. At the time of proposal, this would have moved the due date for the next technology assessment, from March 31, 2023, to March 31, 2025. Because the EPA is not implementing the revisions in this final rule until January 1, 2025, we have revised the provision in the final rule to clarify that the first technology assessment report due after January 1, 2025 is due on March 31, 2028. Section III.G.2.b. of this preamble provides additional information on the comments received related to the frequency of submittal of the technology assessment report and the EPA's response.

We are also finalizing revisions to restrict the reporting requirement in 40 CFR 98.96(y) to facilities that emitted greater than 40,000 $mtCO_2e$ and produced wafer sizes greater than 150 mm (*i.e.,* 200 mm or larger) during the period covered by the technology assessment report, as well as explicitly state that semiconductor manufacturing facilities that manufacture only 150 mm or smaller wafers are not required to prepare and submit a technology assessment report. The final provisions also clarify that a technology assessment report need not be submitted by a facility that has ceased (and has not resumed) semiconductor manufacturing before the last reporting year covered by the technology assessment report (*i.e.,* no manufacturing at the facility for the entirety of the year immediately before the year during which the technology assessment report is due).

2. Summary of Comments and Responses on Subpart I

This section summarizes the major comments and responses related to the proposed amendments to subpart I. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart I.

a. Comments on Revisions To Improve the Quality of Data Collected for Subpart I

Comment: The EPA received several comments related to the proposed revisions to the stack testing calculation methodology in subpart I. Largely, commenters objected to the EPA's proposal that ''all stacks'' be tested. The commenters questioned the use of the terminology ''all stacks'' within the proposed preamble and disagreed with the EPA's assumption that the number of stacks at each fab is expected to be small (*e.g.,* one to two). The commenters provided input from an industry survey of 33 fabs, suggesting that over 250

stacks would require testing, as well as an additional 170 process stacks that do not contain F–GHGs (*e.g.,* general fab exhausts). The commenters urged that adding stacks that do not have the potential to emit F–GHGs to the stack testing scope would add an additional $60,000 to $200,000 per testing event and as much as $400,000 for large sites. The commenters requested the EPA clarify that the testing is required for all operating stacks or stack systems that have the potential to emit F–GHGs, and that the rule retain the current terminology of ''stack system.''

Response: Even though the EPA referred to ''all stacks'' in the proposal preamble, we agree that the testing is required only for all operating stack systems. The proposed and final regulatory text continue to use the term ''stack system,'' which is defined as ''one or more stacks that are connected by a common header or manifold, through which a fluorinated GHG-containing gas stream originating from one or more fab processes is, or has the potential to be, released to the atmosphere. For purposes of this subpart, stack systems do not include emergency vents or bypass stacks through which emissions are not usually vented under typical operating conditions.'' We are finalizing the proposed requirement that all stack systems must be tested in accordance with 40 CFR 98.93(i)(3)(ii).

Comment: The EPA received comments objecting to proposed revisions to the technology assessment report to require use of three proposed calculation methods (*i.e.,* the dominant input gas method, all-input gas method, and reference emission factor method) to develop utilization and byproduct emission factors. The commenters expressed that each of EPA's proposed methods fails to meet the agency's goals for consistent implementation of emission factors across facilities and to allow for comparability across the industry and in industry emission rates. Specifically, the commenters asserted that the dominant input gas method and all-input gas method violate the physical reality of conservation of mass for plasma etch/wafer cleaning processes when using multiple gases and may lead to byproduct emission factors greater than 1. The commenters continued that the dominant input gas method does not clearly define what gas would be dominant in situations where gases of equal or near-equal mass are used. For both of the all-input gas method and the dominant input gas method, the commenters criticized the use of a ''cap'' value of 0.8 as inconsistent with the agency's goal to calculate emission factors consistently with those already in the EPA's data set. For the all-input gas method, commenters added that the cap of 0.8 for individual testing does not align with the maximum seen within historical test data submitted by industry, but is instead aligned with the maximum average emission factor across all gases. Commenters stated that the modification to both methods may amplify or obfuscate technology changes by setting an artificial maximum emissions value.

The commenters also stated that it is unclear how the reference emission factor method would be implemented. Specifically, commenters questioned whether 1–U or the byproduct emission factors would be held constant, maintaining that the method increases the difficulty in comparing individual tests depending on what is held constant, and adding that if new gases or byproducts are used or measured, the methodology will not have a reference emission basis to apply. Commenters expressed that the additional burden and complexity of calculating technology emission factors three different ways could be a disincentive to facility testing and would not improve overall emissions accuracy.

The commenters requested that in lieu of the three calculation methods, the EPA consider use of the ''multi-gas method,'' which attributes all non-carbon-containing GHGs, such as SF_6 and NF_3, to the input of these non-carbon-containing GHGs and attributes all carbon-containing F–GHG emissions across all carbon-based input F–GHGs. The commenters believe that the multi-gas method would appropriately assign emissions (especially for recipes running more than two gases at once), would eliminate concerns regarding emission factors that do not meet conservation of mass principles, and is not reliant on past or assumed data to calculate emission factors or byproduct emission factors. Commenters explained that high variability in single-gas emission factors is due to a variety of factors, including the amount or concentration of input gases, as well as plasma and manufacturing tool variables, and suggested that use of the multi-gas method would generate emission factors consistent and within the range of the existing emission factor data, while also being able to accommodate new gases and changes in technology.

Response: The EPA disagrees with the commenter's assessment of the three proposed emission factor methods. We also disagree that the proposed requirements are overly burdensome. However, following consideration of the comments raised, we are revising the final rule to require reporters to estimate emission factors using two of the three proposed methods (the all-input gas method and the reference emission factor method) and to allow reporters to submit results using an additional method of their choice. As noted in the preamble to the proposed rule, we plan to provide a spreadsheet that will automatically perform the calculations for the two required methods using a single data set entered by the reporters, minimizing burden. As explained in both section III.E.1.b. to the preamble to the 2022 Data Quality Improvements proposal and the subpart I technical support document,[12] the all-input gas method is quite consistent with the historically used methods, differing from the historically used methods only under circumstances where the historically used methods are likely to yield unrealistic results (*e.g.,* where CF_4 is used as an input gas and accounts for a small fraction of the mass of all input gases, yielding CF_4 input gas emission factors over 0.8). Of the three methods proposed, the reference emission factor method is somewhat less consistent with the historically used methods, but is expected to be more robust in that its results are less affected by changing ratios of input gases. As discussed further below, both of these methods are more consistent with the historical methods and less affected by changing input gas ratios than the method favored by the commenter, the multi-gas method.

After consideration of comments, the EPA is not taking final action on the proposed requirement to report emission factors calculated using the dominant gas method for several reasons. First, the dominant gas method estimates the input gas emission rate in the same way as the all-input gas method, making it redundant with the all-input gas method for calculation of input gas emission rates. Second, the dominant gas method estimates the byproduct emission rate by assigning all emissions of F–GHG byproducts to the carbon-containing F–GHG input gas accounting for the largest share by mass of the input gases, which is anticipated, as noted by commenters, to be less accurate in cases where input gases of equal or near-equal mass are used. Third, in the historical data sets submitted to the EPA, the all-input gas method was the most commonly used

[12] See document ''Technical Support for Proposed Revisions to Subpart I (2022),'' available in the docket for this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424.

method; therefore, retaining this approach rather than the dominant gas method will allow the EPA to more reliably compare the new data submitted to the historical data set. Finally, not requiring use of the dominant gas method will reduce burden on facilities that are required to submit technology assessment reports.

As noted in the preamble to the 2022 Data Quality Improvements proposal, receiving results based on multiple methods will enable the EPA: (1) to directly compare the new emission factor data to the emission factor data that are already in the EPA's database and that were calculated using the historical method; and (2) to compare the results across the available emission factor calculation methods and to identify any systematic differences in the results of the different methods for each gas and process type. By identifying and quantifying systematic differences in the results of the different methods, we will be better able to distinguish these differences from differences attributable to technology changes. Knowledge of these systematic differences will also be useful in the event that we ultimately require facilities to submit emission factors using one method only, particularly if that method is not closely related to one of the methods used historically. We will also be able to evaluate how much the results of each method vary for each gas and process type; high variability may indicate that the results of a method are being affected by varying input gas proportions rather than differences in gas behavior. On the other hand, extremely low variability may also indicate that a method is affected by input gas proportions. For example, if the all-input-gas method yields a large number of input gas emission factors equal to 0.8, the maximum allowed value for input gas emission factors under this method, this implies that some of the emissions being attributed to the input gas are actually being generated as byproducts from other input gases that are collectively more voluminous, conditions under which the reference emission factor method may yield the most reliable results. Ultimately, these analyses will enable us to more accurately characterize emissions from semiconductor manufacturing by selecting the most robust emission factor data for updating the default emission factors in tables I–3 and I–4. Note that the EPA would update the default emission factors using the rulemaking process, providing an opportunity for industry to comment on the data and methodology used to develop any proposed factors.

Regarding the comment that the proposed rule did not clarify how the reference emission factor would be implemented, including whether the 1–U or by-product emission factors would be adjusted, the proposed rule made it clear that both the 1–U and byproduct emission factors would be adjusted where the emitted gas was also an input gas. The preamble to the proposed rule stated, ''the reference emission factor method calculates emissions using the 1–U and the BEFs [by-product emission factors] that are observed in single gas recipes and then adjusts both factors based on the ratio between the emissions calculated based on the factors and the emissions actually observed in the multi-gas process. This approach uses all the information available on utilization and by-product generation rates from single-gas recipes while avoiding assumptions about which of these are changing in the multi-gas recipe'' (87 FR 36947). The proposed equations I–31A (for 1–U factors, finalized as equation I–30A) and I–31B (for by-product factors, finalized as equation I–30B) showed this in mathematical terms and also showed how the method would apply where more than two input gases were used. The proposed rule also clearly indicated that where a by-product gas was not also an input gas, proposed equation I–30B (finalized as equation I–29B) was to be used. Equation I–29B is the equation used in the all-input-gas method as well as the reference emission factor method for by-products that are not also input gases. Equation I–29B would apply to newly observed as well as previously observed by-product gases that were not also input gases.

This leaves only the situation where an input gas is used in a process type for the first time along with other input gases. While we expect that this situation will be rare, we agree that it should be addressed. We are clarifying in the final rule that where an input gas is used in a process type with other input gases and there is no 1–U factor for that input gas in table I–19 or I–20, as applicable, the Reference Emission Factor Method will not be used to estimate the emission factors for that process.

We are not specifying the multi-gas method as the sole method for calculating emission factors submitted in the technology assessment report. As noted in the proposed rule, one of the EPA's goals in collecting emission factor data through the technology assessment report is to better understand how emission factors may be changing as a result of technological changes in the semiconductor industry, and whether the changes to the emission factors may justify further data collection to comprehensively update the default emission factors in tables I–3 and I–4. To meet this goal, the emission factors submitted in the technology assessment reports should be calculated using methods that are similar to the methods used to calculate the emission factors already in the EPA's database; otherwise, differences attributable to differences in calculation methods may amplify or obscure differences attributable to technology changes. The multi-gas method assigns emissions of all carbon-containing F–GHGs to all carbon-containing F–GHG input gases, regardless of species, yielding input gas emission factors that are equal to byproduct gas formation factors for each emitted F–GHG. These input gas and byproduct gas emission factors are significantly different from the input gas and byproduct gas emission factors yielded by the historically used methods, making it difficult to discern the impact of technology changes as opposed to calculation method changes on the emission factors. In addition, our analysis indicated that the multi-gas method results are highly sensitive to the ratios of the masses of input gases fed into the process, which appears likely to affect the robustness and reliability of emission factors calculated using that method.[13] For these reasons, we have concluded that it would not be appropriate to require submission of emission factors using only the multi-gas method.

However, we are providing an option in the final rule for reporters to use, in addition to the required all-input gas method and the reference emission factor method, an alternative method of their choice to calculate and report updated utilization or byproduct formation rates based on the collected data. Reporters will therefore have the opportunity to provide emission factor data that are calculated using the multi-gas method or other methodologies, provided the reporter provides a complete, mathematical description of the alternative calculation method and labels the data calculated using that method consistent with the requirements for the all-input gas method and the reference emission factor method. Submitting emission factors calculated using the multi-gas

[13] *Id.* The EPA has included in the docket a memo and spreadsheet showing the results of the different emission factor calculation methods using the same data (see Docket ID. No. EPA–HQ–OAR–2019–0424–0142, memorandum and attachment 3 Excel spreadsheet).

method along with the other two methods would allow us to compare the results of the multi-gas method to the results of the other two (one of which is very similar to the primary historically used method) and to identify any systematic differences. As noted above, by identifying and quantifying systematic differences in the results of the different methods, we will be better able to distinguish these differences from differences attributable to technology changes. We may also be able to relate the results of the historical methods to the results of methods that differ from those used historically. Receiving emission factors calculated using three methods would also allow us to better assess the robustness and reliability of the emission factors calculated using all three methods, *e.g.,* by seeing which methods yield highly variable emission factors within each input gas-process type combination. Because the final rule does not require reporters to submit emission factors calculated using an alternative methodology, the requirement to provide a complete, mathematical description of the alternative calculation method used is not anticipated to add significant burden.

Comment: Commenters supported the proposal to remove BEFs for C_4F_6 and C_5F_8 and the decision to not add COF_2 and C_2F_4, as byproduct emissions of them account for <<0.001% of overall GHG emissions from semiconductor manufacturing operations. One commenter also requested the EPA clarify that carbon-containing byproduct emission factors are zero when calculating emissions from non-carbon containing input gases (SF_6, NF_3, F_2, or other non-carbon input gases) and when the film being etched or cleaned does not contain carbon, as this would align the EPA final rule with the 2019 Refinement.

Response: The EPA is finalizing the rule as proposed to remove the BEFs for C_4F_6 and C_5F_8. The EPA is also not adding BEFs for COF_2 or C_2F_4. For non-carbon containing input gases used in cleaning processes, we proposed to set carbon-containing byproduct emission factors to zero when the combination of input gas and chamber cleaning process sub-type is never used to clean chamber walls on manufacturing tools that process carbon-containing films during the year (*e.g.,* when NF_3 is used in remote plasma cleaning processes to only clean chambers that never process carbon-containing films during the year). We agree with the commenter that non-carbon-containing input gases used in etching processes are similarly not expected to give rise to carbon-containing byproducts if neither the input gases nor the films being etched contain carbon. We are therefore finalizing an expanded version of the proposed provision, setting carbon-containing byproduct emission factors to zero for etching and wafer cleaning processes as well as chamber-cleaning processes when these conditions are met. The revisions align the rule requirements with the 2019 Refinement.

Comment: Commenters expressed several concerns regarding the EPA's proposed revisions to the conditions under which the default DRE may be claimed. One commenter requested the EPA remove the requirement to provide supporting documentation for all abatement units using certified default or lower than default DREs. The commenter also requested the EPA clarify that reporters are not required to maintain supporting documentation on abatement units for which a DRE is not being claimed.

Commenters also contended that the existing language in subpart I is sufficient to ensure proper point-of-use (POU) device performance while being consistent with the 2019 Refinement, and the requirement to provide supporting documentation of manufacturer certified POU DREs, including testing method, is burdensome and may be unachievable, especially for older abatement units. One commenter expressed concern that the proposed increase in certification and documentation requirements beyond existing POU operational requirements will dissuade semiconductor companies from accounting for DREs from installed POU, resulting in an over-estimate of emissions from the semiconductor industry. The commenter also stated that adding operational elements of fuel and oxidizer settings, fuel gas flows and pressures, fuel calorific values, and water quality, flow, and pressures to the POU DRE requirements are outside the manufacturer-specified requirements for emissions control and are not necessary to ensure accurate POU DREs. Commenters stated that abatement equipment installed across the industry does not have manufacturer specifications for all listed parameters, or the capability to track all listed parameters. Commenters concluded that these and other POU default DRE certification and documentation requirements go above and beyond the 2019 Refinement and will make it more difficult for U.S. reporters to take credit for installed and future emissions control devices, resulting in a less accurate, overestimated GHG emissions inventory. One commenter supported applying the requirements only to equipment purchased after the reporting rule becomes effective. The commenter stated that verification testing would be especially burdensome; the commenter estimated testing to take approximately 20 weeks per chemistry and stated it could take up to 2+ years for individual vendors to have required documentation. The commenter also expressed concern that the proposed requirements could have cascading impacts to facility manufacturing and operating permits based on state implementation of the Tailoring Rule, which typically rely on GHGRP protocols. Commenters supported aligning the emission control device operational requirements for default POU DREs with the following 2019 Refinement language: ''. . . obtain a certification by the emissions control system manufacturers that their emissions control systems are capable of removing a particular gas to at least the default DRE in the worst-case flow conditions, as defined by each reporting site.''

The commenter also requested the EPA include language supporting full uptime for emission control devices interlocked with manufacturing tools or with abatement redundancy. The commenter supported 2019 Refinement language that: ''Inventory compilers should also note that UT [uptime] may be set to one (1) if suitable backup emissions control equipment or interlocking with the process tool is implemented for each emissions control system. Thus, using interlocked process tools or backup emissions control systems reduces uncertainty by eliminating the need to estimate UT for the reporting facility.'' The commenter contended that such language will drive further use of manufacturing tool interlocks or emission control system redundancy while having the added benefit of simplifying uptime tracking of individual POU.

Response: The EPA is clarifying in this response that reporters are not required to maintain documentation of the DRE on abatement units for which a DRE is not being claimed. However, no regulatory changes are needed to reflect this clarification. For abatement units for which a DRE is being claimed, reporters are still required to provide certification that the abatement systems for which emissions are being reported were specifically designed for fluorinated GHG or N_2O abatement, as applicable, and support the certification by providing abatement system supplier documentation stating that the system was designed for fluorinated GHG or N_2O abatement. The facility must certify

that the DRE provided by the abatement system manufacturer is greater than or equal to the DRE claimed (either the default, if the certified DRE is greater than or equal to the default, or the manufacturer-verified DRE itself, if the certified DRE is lower than the default DRE). To use the default or lower manufacturer-verified destruction or removal efficiency values, operation of the abatement system must be within the manufacturer's specifications. It was not the EPA's intent to require that certified abatement systems that operate within the manufacturer's specifications must meet all the operational parameters listed, and we are revising the final rule at 40 CFR 98.96(q)(2) to add ''which may include, for example,'' to clarify that, in order to use the default or lower manufacturer-verified destruction or removal efficiency values, operation of the abatement system must be within those manufacturer's specifications that apply for the certification.

In the final rule, the EPA is maintaining the current certification and documentation requirements for older POU abatement devices, although the certification must contain a manufacturer-verified DRE value that is equal to or higher than the default in order to claim the default DRE; facilities are allowed to claim a lower manufacturer-verified value if the provided certified DRE is lower than the default. The EPA concurs that some older POU abatement systems may not have full documentation from the manufacturer of the test methods used and whether testing was conducted under worst-case flow conditions; however, we believe this documentation should be available for most newer abatement systems. As a result, reporters with the older POU abatement devices will not have any additional documentation requirements beyond those currently in place, except to provide the certified DRE. Following a review of annual reports submitted under subpart I, we determined that facilities have historically provided manufacturer-verified DRE values for all abatement systems for which emission reductions have been claimed. Therefore, we have determined that these final requirements are reasonable. The EPA is finalizing the new documentation requirements for POU abatement devices purchased on or after January 1, 2025 under 40 CFR 98.94(f)(3)(i) and (ii), these additional requirements include that the manufacturer-verified DREs reflect that the abatement system has been tested by the manufacturer using a scientifically sound, industry-accepted measurement methodology that accounts for dilution through the abatement system, such as the EPA DRE Protocol (EPA 430–R–10–003), and verified to meet (or exceed) the default destruction or removal efficiency for the fluorinated GHG or N_2O under worst-case flow conditions. Since manufacturers routinely conduct DRE testing and are familiar with the protocols of EPA 430–R–10–003, this information would be readily available for abatement systems purchased in calendar year 2025 or later. Further, these final rule requirements will be implemented for reports prepared for RY2025 and submitted March 31, 2026, providing adequate time for reporters to acquire documentation.

The EPA agrees with the recommendation to align the rule with the 2019 Refinement with respect to the uptime factor for interlocked tools and abatement systems and is making this change in the final rule. The use of interlocked tools is already accounted for in the current rule in the definition of terms ''UT_{ijp}'' and ''UT_{pf}'' in equations I–15 and I–23 (the total time in minutes per year in which the abatement system has at least one associated tool in operation), which state that ''[i]f you have tools that are idle with no gas flow through the tool for part of the year, you may calculate total tool time using the actual time that gas is flowing through the tool.'' However, to clarify and simplify the calculation of uptime where interlocked tools are used, the EPA is revising the definition of the term ''UT_{ij}'' in equation I–15 to say that if all the abatement systems for the relevant input gas and process type are interlocked with all the tools feeding them, the uptime may be set to one (1). The revised text specifies that ''all'' tools and abatement systems for the relevant input gas and process sub-type or type are interlocked because the numerator and denominator of the uptime calculation in equations I–15 and I–23 are separately summed across abatement systems for input gas ''i'' and process sub-type or type ''j.'' Similar changes are made for the same reasons in the definition of ''UT_f'' in equation I–23. With the use of an interlock between the process tool and abatement device, the process tool should never be operating when the abatement device is not operating.

The current rule also accounts for the use of redundant abatement systems. Section 98.94(f)(4)(vi) currently states, ''If your fab uses redundant abatement systems, you may account for the total abatement system uptime (that is, the time that at least one abatement system is in operational mode) calculated for a specific exhaust stream during the reporting year.'' This provision achieves nearly the same objective as suggested by the commenters. To clarify this point, the EPA is revising the definition of the terms ''Td_{ijp}'' in equation I–15 and ''Td_{pf}'' in equation I–23 to reference the provision in 40 CFR 98.94(f)(4)(vi) when accounting for uptime when redundant abatement systems are used.

Comment: Commenters objected to the EPA's proposed requirements to include a calculation methodology to estimate emissions of CF_4 produced in hydrocarbon-fuel based combustion emissions control systems (HC fuel CECS) that are not certified not to generate CF_4. The commenters claimed that the CF_4 byproduct emissions from HC fuel CEC abatement of F_2 gas (from etch or remote plasma chamber cleaning processes) are based on limited and unverified data. Specifically, the commenters expressed concern that the values documented within the 2019 Refinement and referenced within the proposal are based on a single, confidential data set from one abatement supplier. One commenter stated that developing regulatory language around this single, unverified data set does not accurately represent the CF_4 byproduct emissions from the uses or generation of F_2 and may deliver an advantage to the single emissions control system supplier that provided the data.

The commenters also listed the following concerns with the information provided within the 2019 Refinement and the proposed rule supporting documentation upon which the CF_4 byproduct ($AB_{CF4,F2}$ and $B_{F2,NF3}$) is based:

- The F_2 emission values presented in ''Influence of CH_4-F_2 mixing on CF_4 byproduct formation in the combustive abatement of F_2'' by Gray & Banu (2018) are based on testing conducted in a lab under conditions that are not found in actual semiconductor abatement installations. Test methods do not appear to adhere to those specified in industry standard test methods or the EPA DRE Protocol. F_2 results are measured from a device, the MST Satellite XT, designed to provide ''nominal'' F_2 concentrations meant for health and safety risk management and not for environmental emissions measurement.
- ''FTIR spectrometers measure scrubber abatement efficiencies'' by Li, et al. (2002) and ''Thermochemical and Chemical Kinetic Data for Fluorinated Hydrocarbons'' by Burgess, et al. (1996) provide anecdotal and hypothetical emission pathways for the combustion of fluorinated gases, but do not confirm

reliable and peer reviewed CF_4 emission results from current semiconductor manufacturing use or generation of F_2.

- EPA references a single, confidential data set from Edwards, Ltd. (2018) upon which numerical $AB_{CF4,F2}$ and $B_{F2,NF3}$ values are based. This single data set of 15 measurements refers to an RPC NF_3 to F_2 emission value based on mass balance. The commenter opposed using the data provided by Edwards confidentially without the ability to review the underlying data and experimental procedure of the 15 measurements upon which the RPC NF_3 to F_2 emission factor was based. Mass balance has shown to be a highly conservative method in estimating emission factors and this confidential data set lacks visibility into repeatability, experimental design, and semiconductor process applicability.

The commenters further contended that the requirement to calculate CF_4 emissions from HC fuel CECS abatement of F_2, based on equation I–9 if the HC fuel CECS is not certified to not convert F_2 at less than 0.1%, adds complexity to apportioning RPC NF_3 and F_2 to both <0.1% certified and uncertified HC fuel CECS and will require time and cost investments which are not justified by data. One commenter added that this could disincentivize the use of low emission NF_3 cleans or potentially slow implementation of F_2 processes with zero-GWP potential due to the requirement to report CF_4 BEF generation with tools with POU abatement. Another commenter added that this requirement appears to apply to all relevant HC fuel CECS regardless of whether a default or measured DRE is claimed for the abatement device. The commenter stated that if HC fuel CECS abatement suppliers and device manufacturers are not able to provide the required certification to exempt systems from this added emission, for every kilogram of RPC NF_3 used, CO_2e emissions out of the HC fuel CECS will increase more than 600% for 200 mm and more than 400% for 300 mm processes. Commenters added that this jump in CF_4 emissions will result in a time series inconsistency for semiconductor industry greenhouse gas reporting.

One commenter also stated that, if EPA maintains this requirement, it is unclear if equation I–9 applies in addition to or in place of existing CF_4 byproduct emission factors. The commenter requested that CF_4 emissions from the HC fuel CECS abatement of F_2, as calculated by equation I–9, are applied instead of, not in addition to, default CF_4 BEFs for RPC NF_3. Commenters requested the removal of equation I–9 and associated $AB_{CF4,F2}$ and $B_{F2,NF3}$ data elements; one commenter added that an alternative would be to make changes to HC fuel CECS requirements to remove confusion and double counting of emissions.

Response: The EPA disagrees with the commenter after a thorough review of the issue, as documented in detail in a memorandum in the docket for the final rulemaking.[14] The analysis conducted for the EPA demonstrated that: (1) the formation of CF_4 by reaction of CH_4 and F_2 in POU combustion systems is thermodynamically favored and that there is no question that CF_4 emissions can be observed if mixing of CH_4 and F_2 is allowed to occur; (2) that a revised $B_{F2,NF3}$ default emission factor of 0.5 is well supported by scientific peer-reviewed evidence to describe the formation of F_2 from NF_3-based RPC processes; (3) that the proposed default value for $AB_{CF4,F2}$ of 0.116, describing the rate of formation of CF_4 from F_2, is well supported by experimental evidence under conditions that are representative of the designs and use of commercially available POU emissions control systems in production conditions; (4) that there is strong *prima facie* evidence of the formation of CF_4 from within POU emissions control systems during the production of semiconductor devices; and (5) that not reporting such CF_4 emissions could lead to a significant underestimation of GHG emissions from semiconductor manufacturing facilities.

Based on the evidence documented in the memorandum, the EPA is finalizing as proposed the requirement that the electronic manufacturers estimate and report CF_4 byproduct emissions from hydrocarbon-fuel-based POU emissions control systems that abate F_2 processes or NF_3-based RPC processes.

The EPA is also requiring that reporters estimate CF_4 emissions from all POU abatement devices that are not certified not to produce CF_4, even if they are not claiming a DRE from those devices, because the CF_4 emissions from HC fuel combustion in the abatement of F_2 or F–GHG is a separate issue from whether or not a DRE is claimed for the same devices. The EPA disagrees that the rule is adding unnecessary complexity to apportion RPC NF_3 and F_2 between POU abatement systems that are certified not to convert F_2 to CF_4 and those that are not certified. Reporters will use tool counts in this case rather than the usual gas apportioning model. This should be straightforward because it requires the reporters to: (1) count the total number of tools running the process type of interest (either RPC NF_3 or F_2 in any process type); (2) count the number of tools running that process type that are equipped with HC fuel CECs that are not certified not to form CF_4; and (3) divide (2) by (1).

The EPA is revising the final rule to require that reporters must only provide estimates of CF_4 emissions from HC fuel CECS purchased and installed on or after January 1, 2025. We recognize that applying the testing, certification, and emissions estimation requirements to older equipment would have expanded the set of equipment for which testing would need to be performed and/or emissions would need to be estimated, which may have posed logistical challenges, particularly for older equipment that may no longer be manufactured. Making the requirements applicable only to HC fuel CECs purchased and installed on or after January 1, 2025 ensures that abatement system manufacturers and/or electronics manufacturers can test the equipment and measure its CF_4 generation rate from F_2 by March 31, 2026, by which time facilities must either certify that the HC fuel CECS do not generate CF_4 or quantify CF_4 emissions from the HC fuel CECS.

The EPA recognizes that the new requirement to report CF_4 emissions from HC fuel CECS could lead to a time series inconsistency in reported emissions. However, such an inconsistency is not in conflict with the overall purpose of the GHGRP to accurately estimate GHG emissions. Nor would it be unique to the electronics industry, because other GHGRP subparts have been revised in ways that altered the time series of the emissions as new source types were added or more accurate methods were adopted. For example, in 2015, subpart W was updated to include a new source, completions and workovers of oil wells with hydraulic fracturing, in the existing Onshore Petroleum and Natural Gas Production segment and also added two entirely new segments, the Onshore Petroleum and Natural Gas Gathering and Boosting and Onshore Natural Gas Transmission Pipelines segments. Such changes in reported emissions are often documented in the public data, including in the EPA's sector profiles.

The EPA is clarifying in this response to comment that equation I–9 is in addition to, rather than in place of, CF_4 byproduct factors for RPC NF_3, because the CF_4 byproduct factors for RPC NF_3

[14] Memorandum from Sebastien Raoux to U.S. EPA. ''CF_4 byproduct formation from the combustion of CH_4 and F_2 in Point of Use emissions control systems in the electronics industry.'' Prepared for the U.S. EPA. May 2023, available in the docket for this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424.

represent emissions from the process before abatement, and these emissions were measured without abatement equipment running.

Comment: One commenter supported using the term ''hydrocarbon-fuel-based combustion emissions control systems'' (HC fuel CECS) because it aligns with the nomenclature within 2019 Refinement rather than the less used ''hydrocarbon-fueled abatement systems'' or other terms. The commenter explained that semiconductor facilities widely implement large, facility-level volatile organic compound abatement devices to eliminate and control criteria volatile and non-volatile organic compounds, with no expectation of fluorinated greenhouse gas emissions. The commenter expressed concern that the broad definition of HC fuel CECS may be interpreted to include all hydrocarbon-based fuel control systems, not just tool-level POU abatement. The commenter added that, although not currently implemented, future facility-level F–GHG abatement systems could be incorrectly included in the scope of equation I–9 as it is written. The commenter requested that all emissions control systems language is updated to be consistent. The commenter also specifically requested the definition of ''hydrocarbon-fuel-based combustion emission control systems'' be tailored to specify HC fuel CECS connected to manufacturing tools, and include the following language: ''and have the potential to emit fluorinated greenhouse gases.''

Response: The EPA agrees with the commenter and has revised the proposed language to include the term, ''hydrocarbon-fuel-based combustion emissions control systems'' (HC fuel CECS) to align with the nomenclature within 2019 Refinement. The EPA is also clarifying in the final rule that these requirements apply only to equipment that is connected to manufacturing tools that have the potential to emit F_2 or F–GHGs. It is important to include emissions of F_2 as well as F–GHGs since it is F_2 that may combine with hydrocarbon fuels to generate CF_4 emissions. These changes include revising ''hydrocarbon fuel-based emissions control systems'' to ''HC fuel CECS'' in the terms ''$EAB_{CF4,}$,'' ''$a_{F2,j,}$'' ''$UT_{F2,j,}$'' ''$AB_{CF4,F2,}$'' ''$a_{NF3,RPC,}$'' ''and ''$UT_{NF3,RPC,F2}$'' defined in equation I–9.

Comment: One commenter requested the EPA specify that HC fuel CECS uptime during stack testing is ''representative of the emissions stream'' and the EPA specify that HC fuel CECS uptime during stack testing applies to RPC NF_3 or input F_2 processes only. The commenter questioned the EPA's proposed requirement that the uptime during the stack testing period must average at least 90 percent for uncertified hydrocarbon-fueled emissions control systems. The commenters asserted that uptime tracking for uncertified abatement devices is excessive, goes beyond the 2019 Refinement requirements, and does not improve the accuracy of emissions estimates. The commenter requested language to limit this requirement to ''at least 90% uptime of NF_3 remote plasma clean HC fuel CECS devices that are not certified to not form CF_4 during the test.'' The commenter also requested EPA clarify that equation I–9 does not apply in addition to stack testing requirements. The commenter requested that CF_4 emissions from the HC fuel CECS abatement of F_2, as calculated by equation I–9, be specifically exempted from the stack testing method as it would double count CF_4 emissions.

Response: The EPA agrees with the commenter that it would be helpful to clarify of the applicability of the 90-percent uptime requirement for HC fuel CECS. The EPA is revising the rule language at 40 CFR 98.94(j)(1) to further limit the HC fuel CECS 90-percent uptime requirement to systems that were purchased and installed on or after January 1, 2025 and that are used to control emissions from tools that use either NF_3 in remote plasma cleaning processes or F_2 as an input gas in any process type or sub-type. Either of these input gas-process type combinations may exhaust F_2 into HC fuel CECS, potentially leading to the formation of CF_4. The qualification ''that are not certified not to form CF_4'' is being finalized as proposed.

Regarding the commenters' concerns related to the uptime tracking requirements for uncertified abatement devices during stack testing, we reiterate that the uptime tracking requirement during stack testing is for hydrocarbon-fueled abatement devices that are not certified to not form CF_4, because these reporters still need to account for CF_4 emissions even if not accounting the abatement device's F–GHG DRE.

The EPA is also clarifying in this response that equation I–9 is *not* in addition to stack test calculations. The emissions from HC fuel CECS, should they occur, will be captured by the stack testing measurements. Because equation I–9 is not included in or referenced by the stack testing section, the regulatory text in 40 CFR 98.93(i) as currently drafted does not need any additional revision. However, the header paragraph 40 CFR 98.93(a) has been revised to clarify that paragraph (a)(7), which includes equation I–9, is one of the paragraphs used to calculate emissions based on default gas utilization rates and byproduct formations rates.

Comment: One commenter objected to the EPA's proposed calibration requirements for abatement systems, specifically for vacuum pump purge systems. The commenter urged that this would have significant impacts on the semiconductor industry and would drive a major increase in pump replacement and tool downtime. The commenter explained that POU abatement devices and their connected vacuum pumps are separate systems, and while physically connected, POU maintenance and pump replacement schedules are independent of one another. Further, the commenter asserted that pump purge flow calibration is technically and operationally infeasible for device manufacturers to perform. The commenter explained that purge flow indicators are factory calibrated and are part of the pump installation and commissioning; if there is a flow indicator failure, the vacuum pump is replaced with a factory-calibrated pump. The commenter stated that pump maintenance and repair is not typically performed at the manufacturing tool and requires pump disconnection and physical removal, and thus pumps are often repaired off-site. The commenter stressed that pump manufacturers do not provide recommendations or specifications for re-calibration of these pumps. The commenter added that there is no pump redundancy installed on a tool, and to check the calibration and potentially replace the flow transducer, the vacuum pump must be shutdown to safely work on it. The commenter noted that any replacement of the pump would require a tool shutdown and therefore 12 to 48 hours of downtime for manufacturing requalification.

The commenter stated that pumps remain continually in service on the order of years and asserted that pump vendors indicate that pumps can remain in service for many years without requiring calibration of the pump purge. The commenter provided that pump changes and refurbishment costs can be over $5,000 per occurrence and noted that pump repair or calibration activities can require significant coordination with factory and site operations due to the highly specialized equipment and resources needed. The commenter estimated that semiconductor manufacturing sites can have 2,000+ POU abatement devices as well as 4,000+ vacuum pumps in a high-volume-manufacturing site. The

commenter subsequently estimated that the EPA's proposed revisions could result in pump downtime, process equipment tool downtime, and maintenance costs to the U.S. semiconductor industry of about $40 million annually.

The commenter also stated that they believe the existing performance certification of POU emissions control devices based on high flow conditions are highly protective of POU system reliability. The commenter reiterated that high flow POU certification is based on maximum device flows, which, for multi-chamber tools, includes all chambers running at once. The commenter urged that significant variations in pump purge flows are unlikely and the magnitude of these variations would be a small component of overall POU flow volumes. As such, the commenter urged that pump purge flows are not necessary to calibrate after initial pump commissioning.

Response: The EPA agrees with the commenter that calibration of N_2 purge flows is normally done during pump service or maintenance, when the pumps are typically: (1) disconnected from the process tool; (2) replaced by a new or refurbished pump; and (3) brought to a ''service center'' for refurbishment (sometimes on-site, sometimes off-site). The EPA also concurs with commenters that requiring N_2 pump purge calibration could be disruptive if done outside of ''normal'' service periods. Consequently, the EPA proposed to require that pump purge flow indicators be calibrated ''each time a vacuum pump is serviced or exchanged'' rather than more frequently. The anticipated frequency of calibration mentioned in the preamble, every six months, was intended to be descriptive rather than prescriptive. Thus, the EPA does not believe that the proposed requirement would have the large economic impacts cited by the commenter. Nevertheless, because it appears that pumps are typically factory calibrated when commissioned and are replaced with factory-calibrated pumps when the flow indicator fails, a calibration requirement is not required. Therefore, the EPA is not taking final action on the proposed calibration requirement.

b. Comments on Revisions To Streamline and Improve Implementation for Subpart I

Comment: One commenter supported finalizing the amendment to 40 CFR 98.96(y) decreasing the frequency of submission of technology assessment reports, before the due date for the next technology assessment report.

Response: The EPA acknowledges the commenter's support and is finalizing revisions to 40 CFR 98.96(y) to decrease the frequency of submission of technology assessment reporters to every 5 years, as proposed. However, because the EPA is not implementing the final revisions until January 1, 2025 (see section V. of this preamble), we have revised the provision to clarify that the first technology assessment report due after January 1, 2025 is due on March 31, 2028. Subsequent reports must be submitted every 5 years no later than March 31 of the year in which it is due.

H. Subpart N—Glass Production

We are finalizing several amendments to subpart N of part 98 (Glass Production) as proposed. The EPA received only supportive comments for the proposed revisions to subpart N. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart N. We are also finalizing as proposed related confidentiality determinations for data elements resulting from the revisions to subpart N, as described in section VI. of this preamble.

The EPA is finalizing two revisions to the recordkeeping and reporting requirements of subpart N of part 98 (Glass Production) as proposed in the 2022 Data Quality Improvement Proposal. The revisions apply to both CEMS and non-CEMS reporters and require that facilities report and maintain records of annual glass production by glass type (*e.g.,* container, flat glass, fiber glass, specialty glass). Specifically, the final amendments revise (1) 40 CFR 98.146(a)(2) and (b)(3) to require the annual quantity of glass produced in tons, by glass type, from each continuous glass melting furnace and from all furnaces combined; and (2) 40 CFR 98.147(a)(1) and (b)(1), to add that records must also be kept on the basis of glass type. Differences in the composition profile of raw materials, use of recycled material, and other factors lead to differences in emissions from the production of different glass types. Collecting data on the annual quantities of glass produced by type will improve the EPA's understanding of emissions variations and industry trends, and improve verification for the GHGRP, as well as provide useful information to improve analysis of this sector in the Inventory. The EPA is also finalizing revisions to the recordkeeping and reporting requirements of subpart N as proposed in the 2023 Supplemental Proposal. The final revisions add reporting provisions at 40 CFR 98.146(a)(3) and (b)(4) to require the annual quantity (in tons), by glass type (*e.g.,* container, flat glass, fiber glass, or specialty glass), of cullet charged to each continuous glass melting furnace and in all furnaces combined, and revises 40 CFR 98.146(b)(9) to require the number of times in the reporting year that missing data procedures were used to measure monthly quantities of cullet used. The final revisions also add recordkeeping provisions to 40 CFR 98.147(a)(3) and (b)(3) to require the monthly quantity of cullet (in tons) charged to each continuous glass melting furnace by product type (*e.g.,* container, flat glass, fiber glass, or specialty glass). Differences in the quantities of cullet used in the production of different glass types can lead to variations in emissions, and, due to lower melting temperatures, can reduce the amount of energy and combustion required to produce glass. As such, the annual quantities of cullet used will further improve the EPA's understanding of variations and differences in emissions estimates, industry trends, and verification, as well as improve analysis for the Inventory. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

I. Subpart P—Hydrogen Production

We are finalizing several amendments to subpart P of part 98 (Hydrogen Production) as proposed. In some cases, we are finalizing the proposed amendments with revisions. In other cases, we are not taking final action on the proposed amendments. Section III.I.1. of this preamble discusses the final revisions to subpart P. The EPA received several comments on the proposed subpart P revisions which are discussed in section III.I.2. of this preamble. We are also finalizing related confidentiality determinations for data elements resulting from the revisions to subpart P, as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart P

This section summarizes the final amendments to subpart P. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other final revisions to 40 CFR part 98, subpart P can be found in this

section and section III.I.2. of this preamble. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

a. Revisions To Improve the Quality of Data Collected for Subpart P

In the 2023 Supplemental Proposal, the EPA proposed several amendments to subpart P of part 98 to expand and clarify the source category definition. First, to increase the GHGRP's coverage of facilities in the hydrogen production sector, we are amending, as proposed, the source category definition in 40 CFR 98.160 to include all facilities that produce hydrogen gas regardless of whether the hydrogen gas is sold. The final revisions will address potential gaps in applicability and reporting, allowing the EPA to better understand and track emissions from facilities that do not sell hydrogen gas to other entities. As proposed, these amendments categorically exempt any process unit for which emissions are currently reported under another subpart of part 98, including, but not necessarily limited to, ammonia production units that report emissions under subpart G of part 98 (Ammonia Manufacturing), catalytic reforming units located at petroleum refineries that produce hydrogen as a byproduct for which emissions are reported under subpart Y of part 98 (Petroleum Refineries), and petrochemical production units that report emissions under subpart X of part 98 (Petrochemical Production). As proposed, we are also exempting process units that only separate out diatomic hydrogen from a gaseous mixture and are not associated with a unit that produces diatomic hydrogen created by transformation of feedstocks.

The EPA is also amending the source category definition at 40 CFR 98.160 as proposed to clarify that stationary combustion sources that are part of the hydrogen production unit (*e.g.,* reforming furnaces and hydrogen production process unit heaters) are part of the hydrogen production source category and that their emissions are to be reported under subpart P. These amendments, which include a harmonizing change at 40 CFR 98.162(a), clarify that these furnaces or process heaters are part of the hydrogen production process unit regardless of where the emissions are exhausted (through the same stack or through separate stacks). Similarly, we are finalizing a clarification for hydrogen production units with separate stacks for ''process'' emissions and ''combustion'' emission that use a CEMS to quantify emissions from the process emissions stack. The final amendments at 40 CFR 98.163(c) require reporters to calculate and report the CO_2 emissions from the hydrogen production unit's fuel combustion using the mass balance equations (equations P–1 through P–3) in addition to calculating and reporting the process CO_2 emissions measured by the CEMS. Additional information on these revisions and their supporting basis may be found in section III.G. of the preamble to the 2023 Supplemental Proposal. We are adding one additional revision to address the monitoring of stationary combustion units directly associated with hydrogen production (*e.g.,* reforming furnaces and hydrogen production process unit heaters), following a review of comments received. Based on the EPA's analysis of reported data, there may be a small number of reporters that may not currently measure the fuel use to these combustion units separately. We have decided to add new § 98.164(c) to provide the use of best available monitoring methods (BAMM) for those facilities that may still need to install monitoring equipment to measure the fuel used by each stationary combustion unit directly associated with the hydrogen production process unit. To be eligible to use BAMM, the stationary combustion unit must be directly associated with hydrogen production; the unit must not have a measurement device installed as of January 1, 2025; the hydrogen production unit and the stationary combustion unit are operated continuously; and the installation of a measurement device must require a planned process equipment or unit shutdown or only be able to be done through a hot tap. BAMM can be the use of supplier data, engineering calculation methods, or other company records. We are not requiring facilities to provide an application to use BAMM that would require EPA review and approval to measure the fuel used in the hydrogen production process combustion unit. However, we are adding a new requirement at 40 CFR 98.166(d)(10) to require each facility to indicate in their annual report, for each stationary combustion unit directly associated with hydrogen production, whether they are using BAMM, the date they began using BAMM, and the anticipated or actual end date of BAMM use. Providing the use of BAMM is intended to reduce the burden associated with installation of new equipment, and we do not anticipate that the requirement to report the required indicators of BAMM will add significant burden. See section III.I.2. of this preamble for additional information on related comments and the EPA's response.

In the 2022 Data Quality Improvements Proposal, the EPA proposed several amendments to subpart P to allow the subtraction of the mass of carbon contained in products (other than CO_2 or methanol) and the carbon contained in intentionally produced methanol from the carbon mass balance used to estimate CO_2 emissions. The proposed revisions included new equation P–4 to allow facilities to adjust the calculated emissions from fuel and feedstock consumption in order to calculate net CO_2 process emissions, as well as harmonizing revisions to the introductory paragraph of 40 CFR 98.163 and 98.163(b) and the reporting requirements at 40 CFR 98.167(b)(7). Following review of comments received on similar changes proposed for subpart S (Lime Manufacturing), the EPA is not taking final action at this time on the proposed revisions to allow facilities to subtract out carbon contained in products other than CO_2 or methanol and the carbon contained in methanol. See sections III.E., III.I.2., and III.K.2. of this preamble for additional information on the comments related to subparts G, P and S and the EPA's response. However, the EPA is finalizing the proposed reporting requirement at 40 CFR 98.166(b)(7) (now 40 CFR 98.166(d)(7)), with minor revisions as a result of comments received. See the discussion in this section regarding subpart P reporting requirements for additional information as to why EPA is making revisions as a result of comments received.

The EPA is finalizing several additional revisions to the subpart P reporting requirements to improve the quality of the data collected based on the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal. The final reporting requirements are reorganized to accommodate the final amendments at 40 CFR 98.163(c), which require reporters using CEMS that do not include combustion emissions from the hydrogen production unit to calculate and report the CO_2 emissions from fuel combustion using the material balance equations (equations P–1 through P–3) in addition to the process CO_2 emissions measured by the CEMS. The revisions to 40 CFR 98.166 clarify the reporting elements that must be provided for each hydrogen production process unit based on the calculation methodologies used. Reporters using CEMS to measure combined CO_2 process and fuel combustion emissions will be required

to meet the requirements at 40 CFR 98.166(b); reporters using only the material balance method will be required to meet the requirements at 40 CFR 98.166(c); and reporters using CEMS to measure CO_2 process emissions and the material balance method to calculate emissions from fuel combustion emissions using equations P–1 through P–3 will be required to meet the requirements of 40 CFR 98.166(b) and (c). If a common stack CEMS is used to measure emissions from either a common stack for multiple hydrogen production units or a common stack for hydrogen production unit(s) and other source(s), reporters must also report the estimated fraction of CO_2 emissions attributable to each hydrogen production process unit. All other reporting requirements for each hydrogen production process unit (regardless of the calculation method) are consolidated under 40 CFR 98.166(d).

As proposed, we are finalizing the addition of requirements for facilities to report the process type for each hydrogen production unit (*i.e.,* steam methane reforming (SMR), SMR followed by water gas shift reaction (SMR–WGS), partial oxidation (POX), partial oxidation followed by WGS (POX–WGS), Water Electrolysis, Brine Electrolysis, or Other (specify)), and the purification type for each hydrogen production unit (*i.e.,* pressure swing adsorption (PSA), Amine Adsorption, Membrane Separation, Other (specify), or none); the final requirements have been moved to 40 CFR 98.166(d)(1) and (2) and paragraph (d)(1) has been revised to include ''autothermal reforming only'' and ''autothermal reforming followed by WGS'' as additional unit types.

We are amending, as proposed, requirements to clarify that the annual quantity of hydrogen produced is the quantity of hydrogen that is produced ''. . . by reforming, gasification, oxidation, reaction, or other transformations of feedstocks,'' and to add reporting for the annual quantity of hydrogen that is only purified by each hydrogen production unit; the final requirements have been moved to 40 CFR 98.166(d)(3) and (4).

We are finalizing a requirement at 40 CFR 98.166(c) (proposed 40 CFR 98.166(b)(5)), to report the name and annual quantity (metric tons (mt)) of each carbon-containing fuel and feedstock (formerly 40 CFR 98.166(b)(7)). For clarity, we have revised the text of the requirement at 40 CFR 98.166(c) from proposal to specify that the information is required whenever equations P–1 through P–3 are used to calculate CO_2 emissions. We are finalizing revisions that renumber 40 CFR 98.166(c) and (d) (now 40 CFR 98.166(d)(6) and (7)), and are finalizing paragraph (d)(7) with revisions from those proposed to require reporting, on a unit-level: (1) the quantity of CO_2 that is collected and transferred off-site; and (2) the quantity of carbon other than CO_2 or methanol collected and transferred off-site, or transferred to a separate process unit within the facility for which GHG emissions associated with the carbon is being reported under other provisions of part 98. The final rule also requires at 40 CFR 98.166(d)(9) the reporting of the annual net quantity of steam consumed by the unit (proposed as 40 CFR 98.166(c)(9)). This value will be a positive quantity if the hydrogen production unit is a net steam user (*i.e.,* uses more steam than it produces) and a negative quantity if the hydrogen production unit is a net steam producer (*i.e.,* produces more steam than it uses).

Finally, for consistency with the final revisions to the reporting requirements for facilities subject to revised 40 CFR 98.163(c), we are making a harmonizing change to the recordkeeping requirements at 40 CFR 98.167(a) to specify that, if the facility CEMS measures emissions from a common stack for multiple hydrogen production units or emissions from a common stack for hydrogen production unit(s) and other source(s), reporters must maintain records used to estimate the decimal fraction of the total annual CO_2 emissions from the CEMS monitoring location attributable to each hydrogen production unit. We are also finalizing as proposed clarifying edits in 40 CFR 98.167(e) that retention of the file required under that provision satisfies the recordkeeping requirements for each hydrogen production unit. See section III.G.1. of the preamble to the 2022 Data Quality Improvements Proposal and section III.G. of the preamble to the 2023 Supplemental Proposal for additional information on these revisions and their supporting basis.

In the 2023 Supplemental Proposal, the EPA also requested comment on, but did not propose, other potential revisions to subpart P, including revisions that would remove the 25,000 $mtCO_2e$ threshold under 40 CFR 98.2(a)(2), which would result in a requirement that any facility meeting the definition of the hydrogen production category in 40 CFR 98.160 report annual emissions to the GHGRP. The EPA considered these changes in order to collect information on facilities that use electrolysis or other production methods that may have small direct emissions, but that may use relatively large amounts of off-site energy to power the process (*i.e.,* the emissions occurring on-site at these hydrogen production facilities may fall below the existing applicability threshold, while the combined direct emissions (*i.e.,* ''scope 1'' emissions) and emissions attributable to energy consumption (*i.e.,* ''scope 2'' emissions) could be relatively large), as collecting information from these kinds of facilities as well is especially important in understanding hydrogen as a fuel source. To reduce the burden on small producers, the EPA requested comment on applying a minimum annual production quantity within the source category definition to limit the applicability of the source category to larger hydrogen production facilities, such as defining the source category to only include those hydrogen production processes that exceed a 2,500 metric ton (mt) hydrogen production threshold. The EPA also requested comment on potential options to require continued reporting from hydrogen production facilities that use electrolysis or other production methods that may have small direct emissions (*i.e.,* scope 1 emissions) that would likely qualify to cease reporting after three to five years under the part 98 ''off-ramp'' provisions of 40 CFR 98.2(i) (*i.e.,* facilities may stop reporting after three years if their emissions are under 15,000 $mtCO_2e$ or after five years if their emissions are between 15,000 and 25,000 $mtCO_2e$), to enable collection of a more comprehensive data set over time. Following consideration of comments received, the EPA is not taking final action on these potential revisions in this rule. See section III.I.2. of this preamble for additional information on related comments and the EPA's responses. The EPA also considered, but did not propose, further expanding the reporting requirements to include the quantity of hydrogen provided to each end-user (including both on-site use and delivered hydrogen) and, if the end-user reports to GHGRP, the e-GGRT identifier for that customer. The EPA requested comment on the approach to collecting this sales information and the burden such a requirement may impose in the 2023 Supplemental Proposal. Following review of comments received, the EPA is not taking final action on these potential revisions in this rule.

b. Revisions To Streamline and Improve Implementation for Subpart P

The EPA is finalizing several revisions to subpart P to streamline the requirements of this subpart and improve flexibility for reporters. To

address the recent use of low carbon content feedstocks, the EPA is finalizing, with revisions from those proposed, revisions to 40 CFR 98.164(b)(2) and (3) to allow the use of product specification information annually as specified in the final provisions for (1) gaseous fuels and feedstocks that have carbon content less than or equal to 20 parts per million by weight (*i.e.,* 0.00002 kg carbon per kg of gaseous fuel or feedstock) (rather than at least weekly sampling and analysis), and (2) for liquid fuels and feedstocks that have a carbon content of less than or equal to 0.00006 kg carbon per gallon of liquid fuel or feedstock (rather than monthly sampling and analysis). As explained in the 2022 Data Quality Improvements Proposal, the fuels and feedstocks below these concentrations have very limited GHG emission potential and are currently an insignificant contribution to the GHG emissions from hydrogen production. The revisions from those proposed were included to remove the term ''non-hydrocarbon'' because it is not necessary since the maximum hydrocarbon concentrations that qualify for the revised monitoring requirements are included in 40 CFR 98.164(b)(2) and (3).

The EPA is finalizing, with revisions from those proposed, the addition of new 40 CFR 98.164(b)(5)(xix) to allow the use of modifications of the methods listed in 40 CFR 98.164(b)(5)(i) through (xviii) or use of other methods that are applicable to the fuel or feedstock if the methods currently in 40 CFR 98.164(b)(5) are not appropriate because the relevant compounds cannot be detected, the quality control requirements are not technically feasible, or use of the method would be unsafe. The revisions from those proposed were harmonizing changes to remove the term ''non-hydrocarbon'' and tie the proposed revisions back more clearly to the specifications in paragraphs (b)(2) and (3).

The final rule also finalizes as proposed, revisions to § 98.164(b)(2) through (4) to specifically state that the carbon content must be determined ''. . . using the applicable methods in paragraph (b)(5) of this section'' to clarify the linkage between the requirements in § 98.164(b)(2) through (4) and § 98.164(b)(5).

Finally, the EPA is finalizing revisions to the recordkeeping requirements at 40 CFR 98.167(b) to refer to paragraph (b) of 40 CFR 98.166. For facilities using the alternatives at 40 CFR 98.164(b)(2), (3) or (5)(xix), these requirements include retention of product specification sheets, records of modifications to the methods listed in 40 CFR 98.164(b)(5)(i) through (xviii) that are used, and records of the alternative methods used, as applicable. We are also finalizing a revision to remove and reserve redundant recordkeeping requirements in 40 CFR 98.167(c). See section III.G.2. of the preamble to the 2022 Data Quality Improvements Proposal and section III.G. of the preamble to the 2023 Supplemental Proposal for additional information on these revisions and their supporting basis.

2. Summary of Comments and Responses on Subpart P

This section summarizes the major comments and responses related to the proposed amendments to subpart P. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart P.

Comment: Two commenters recommended expanding the source category to include all hydrogen production facilities; this would include non-merchant producers, facilities that use electrolysis or renewable energy, and include process units that do not report to other subparts. Other commenters did not oppose expanding the source category to non-merchant facilities. One commenter on the 2022 Data Quality Improvements Proposal stated that the existing definition may cause confusion in situations where the hydrogen produced is used on-site or otherwise not ''sold as a product to other entities'' and suggested specific revisions to expand the source category to include other types of hydrogen production plants, including those using electrolysis. One commenter stated that reporting energy consumption by hydrogen production sources is necessary to inform decarbonization strategies, *e.g.,* whether producing excessive amounts of green hydrogen may risk delaying fossil fuel retirement by diverting renewable energy from other uses. The commenter recommended a threshold for these facilities based on energy input. The commenter added that any hydrogen production facilities using carbon capture and sequestration technology should be required to report in all instances, as emissions data and energy consumption data from these facilities will be highly relevant to future regulatory action.

Multiple commenters commented on the EPA's request for comment regarding removing the threshold for the hydrogen production source category. One commenter strongly urged the EPA to make subpart P an ''all-in'' subpart to ensure all hydrogen production facilities are covered by reporting requirements, including the requirements proposed to report purchased energy consumption under proposed subpart B to part 98. The commenter pointed to hydrogen electrolysis facilities that may consume very large amounts of grid electricity that could have significant upstream emissions impacts; the commenter stated that many or most of these facilities will already be tracking the attributes of the energy they consume to qualify for Federal incentives and investment, and will therefore have this information readily available. The commenter stressed that understanding this information and the lifecycle emissions of hydrogen production will be critical to informing future actions under the CAA. The commenter also supported a production-based reporting threshold to ensure reporting for high production facilities with lower direct emissions and suggested the production threshold should at least include at least the top 75 percent of production facilities. One commenter suggested a hydrogen production threshold of 5,000 mt/year. Another commenter recommended that the EPA should implement a threshold to limit the applicability of the subpart to larger hydrogen production facilities. One commenter opposed a hydrogen production threshold, and recommended that the EPA retain the existing emissions-based threshold of 25,000 $mtCO_2e$; the commenter suggested this would further incentivize the implementation of low GHG hydrogen manufacturing processes over higher emitting processes such as steam methane reformers.

Several commenters also opposed revisions that would remove the ability of sources to off-ramp. One commenter offered the following recommendations: (1) hydrogen production process units which produce hydrogen but emit no direct GHG emissions should become eligible to cease reporting starting January 1 of the following year after the cessation of direct GHG emitting activities associated with the process; (2) if the direct GHG emissions remain below 15,000 $mtCO_2e$ or between 15,000 and 25,000 $mtCO_2e$, reporting would be required for 3 or 5 years respectively, consistent with the existing off-ramp provisions; or (3) if the EPA establishes

a hydrogen production threshold for reporting, then falling below the production threshold should be the trigger for cessation of reporting, either starting January 1 of the following year or on a parallel structure to the three and five year off-ramp emission thresholds. Two other commenters stated that the EPA ignores that the ''off-ramp'' is intended for entities that should no longer be subject to reporting requirements by virtue of the fact that their emissions fall below a reasonable threshold. One commenter stated that it is unclear how the EPA would have authority to continue to require reporting for these entities, and the commenters said that the EPA should justify excluding hydrogen production facilities from the off-ramp. The commenters added that the EPA could use other methods to collect this data, including proposing a separate standard addressing emissions from hydrogen production under CAA section 111.

Response: We agreed with commenters that the language regarding ''hydrogen gas sold as a product to other entities'' could cause confusion, as we intended to require non-merchant hydrogen production units to now report under subpart P. As such, we are finalizing, as proposed in the 2023 Supplemental Proposal, the language in 40 CFR 98.160(a) to focus on hydrogen gas production without referring to the disposition of the hydrogen produced. In the 2023 Supplemental Proposal, we also proposed to significantly revise § 98.160(b) and (c). The supplemental proposal revisions appear to address most of the commenter's suggested revisions, except that we are not including ''electrolysis'' in the list of types of transformations in 40 CFR 98.160(b) because we consider electrolysis as already included under ''. . . reaction, or other transformations of feedstocks.'' This is also supported by the inclusion of water electrolysis and brine electrolysis in the list of hydrogen production unit types in the proposed 40 CFR 98.166(b)(1)(i) (now 40 CFR 98.166(d)(1)). We agree with commenters that subpart P should be applicable to non-merchant facilities and are finalizing the proposed revisions.

The EPA has considered comments both supporting and not supporting changes related to the EPA's request for information regarding removing the emissions-based threshold or introducing an alternative production-based threshold for the hydrogen production source category, including options to require continued reporting from hydrogen production facilities by amending the emissions-based off-ramp provisions at 40 CFR 98.2(i)(1) and (2). The EPA did not propose or provide for review specific revisions to part 98 to expand the source category, beyond the inclusion of non-merchant facilities as discussed in section III.I.1. of this preamble. Therefore, we are not including any revisions to the threshold to subpart P or to the ability of hydrogen production facilities to off-ramp in this final rule. However, the EPA may further consider these comments and the information provided as we evaluate next steps concerning the collection of information from hydrogen production facilities and consider approaches to improving our understanding of hydrogen as a fuel source, including to inform any potential future rulemakings.

Comment: Three commenters did not support the requirement to report combustion from hydrogen production process units under subpart P in lieu of subpart C as proposed in 40 CFR 98.160(c). Two commenters stated that these units may not be metered separately from other combustion units located at an integrated facility, which would require additional metering to comply with subpart P reporting of combustion emissions directly associated with the hydrogen production process. These commenters stated that if combustion emissions directly associated with the hydrogen production process must be reported under subpart P, engineering estimations for fuel consumption should be allowed. One commenter recommended that EPA implement a threshold to limit the applicability of the subpart to larger hydrogen production facilities.

Response: Steam methane reforming (SMR) is an endothermic process, and heating and reheating of fuels and feedstocks to maintain reaction temperatures is an integral part of the steam methane reforming reaction. Therefore, subpart P has always required the reporting of ''fuels and feedstocks'' used in the hydrogen production unit and subpart C should only be used for ''. . . each stationary combustion unit other than hydrogen production process units'' (40 CFR 98.162(c)). We have long noted that the emissions from most SMR furnaces include a mixture of process and combustion emissions.[15] For more accurate comparison of CEMS measured emissions with those estimated using the mass balance method, we required reporting of the combustion emissions from the SMR furnace as part of the subpart P emissions. Our proposed revisions, therefore, were not a new requirement, but a further clarification of the existing requirements in subpart P, as we interpret them. Based on previous reviews of the emissions intensities from hydrogen production as compiled from subpart P reported data, we estimate that there are only a few facilities that do not include the SMR furnace or process heaters combustion emissions in their subpart P emission totals. To allow time for those facilities to measure fuel used in stationary combustion units associated with hydrogen production (*e.g.,* reforming furnaces and hydrogen production process unit heaters), we decided to include in this final rule a limited allowance for BAMM for those facilities that may still need to add appropriate monitoring equipment (as demonstrated through meeting the specified criteria in the final provision). We also note that subpart C units reporting under the common pipe reporting configuration at 40 CFR 98.36(c)(3) may use company records to subtract out the portion of the fuel diverted to other combustion unit(s) prior to performing the GHG emissions calculations for the group of units using the common pipe option. Regarding the recommendation to implement a threshold to limit applicability to larger hydrogen production facilities, we are not taking final action on any revisions to the threshold to subpart P, therefore, facilities with hydrogen production plants will continue to determine applicability to part 98 based on the existing requirements of 40 CFR 98.2(a). A facility that contains a source category listed in table A–4 to subpart A of part 98 (which includes hydrogen production) must report only if the estimated combined annual emissions from stationary fuel combustion units, miscellaneous uses of carbonate, and all applicable source categories in tables A–3 and table A–4 of part 98 are 25,000 $mtCO_2e$ or more. Therefore, the applicability of the subpart is already limited to larger hydrogen production facilities.

Comment: One commenter stated that EPA's proposed mass balance equation under 40 CFR 98.163(d), equation P–4, requires further revision to ensure that it is accurate for refineries that have non-merchant hydrogen plants (such as those currently reporting under subpart Y). The commenter added that to ensure proper accounting, the variable ''$C_{offsite,n}$'' should be further revised to include language for non-merchant hydrogen plants as follows: ''Mass of carbon other than CO_2 or methanol collected from the hydrogen production

[15] See, *e.g., https://ccdsupport.com/confluence/pages/viewpage.action?pageId=173080691.*

unit and transferred off site or reported elsewhere by the facility under this part, from company records for month n (metric tons carbon).''

Response: Following consideration of comments on similar proposed revisions in other subparts, as discussed in section III.K.2. of this preamble, we are not taking final action at this time on proposed amendments to equation P–4 to allow the subtraction of carbon contained in products other than CO_2 or methanol and the carbon contained in methanol from the carbon mass balance used to estimate CO_2 emissions. However, we acknowledge this concern and agree that an analogous scenario may also occur within a facility that contains a captive (non-merchant) hydrogen production process unit. For example, some hydrogen production processes may operate without the water-gas-shift reaction and produce a syngas of hydrogen and carbon monoxide. For merchant plants, this syngas would be sold as a product for use as a fuel or as a feedstock for chemical production process. For a non-merchant plant, the syngas may be used on-site as a fuel or feedstock rather than sold off-site as a product. If a captive hydrogen production unit produces syngas for use as a fuel for an on-site stationary combustion unit, for example, the rule as proposed would not have allowed the subtraction of the carbon in the syngas from the emissions from the hydrogen production unit, resulting in double counting the CO_2 emissions related to this carbon (from both the hydrogen production unit and from the stationary combustion source). Most refineries with captive hydrogen production units seek to produce hydrogen for use in their refining process units and, therefore, use the water-gas-shift reaction to make pure hydrogen rather than syngas. However, production of syngas is possible under some circumstances. Although we are not finalizing equation P–4 as proposed, because the rule currently requires the reporting of carbon other than CO_2 or methanol that is transferred off site, we have revised the reporting requirements to clarify that the reported value, for non-merchant hydrogen production facilities, should include the quantity of carbon other than CO_2 or methanol that is transferred to a separate process unit within the facility for which GHG emissions associated with this carbon are being reported under other provisions of part 98.

Comment: One commenter supported the separate reporting of hydrogen that is produced and hydrogen that is only purified, but requested that the EPA provide sufficient implementation time and allow for best available monitoring methods to be used until installation of necessary monitoring equipment could occur.

Another commenter was supportive of reporting steam consumption data (*i.e.,* annual net quantity of steam consumed). However, the commenter added that there may be situations where steam is sourced from equipment (*e.g.,* a stand-alone boiler) distinct from a waste heat boiler associated with the SMR process; the commenter stated the rule should allow for flexibility in how the steam production and consumption is measured and quantified, including the ability to utilize best available monitoring methods.

Other commenters opposed reporting steam consumption data. One commenter opposing the requirements stated it could result in duplicative reporting based on what is proposed to be reported under subpart B. Two commenters stated that the EPA failed to provide justification for the requirement. Two commenters stated that it may be necessary for the EPA to issue an additional supplemental notice of proposed rulemaking to take comment on any such justification.

Response: Subpart P only provides monitoring requirements for fuels and feedstocks, it does not specify monitoring requirements for other reported data, for example, ammonia and methanol production. There are often cases in part 98 where there are reporting elements, but not specific monitoring requirements. In such cases, company records, engineering estimates, and similar approaches may be used (in addition to direct measurement methods) to report these quantities. As such, there is no need for BAMM provisions related to additional reporting requirements that require separately reporting produced and purified hydrogen quantities and net steam consumption.

We also note that the subpart P requirement is process unit specific, which is not duplicative of the proposed subpart B facility- or subpart-level reporting requirements. We also disagree that we did not provide rationale for the proposed requirements. These requirements (as with many of the other proposed requirements for subpart P) are aimed to obtain better information to verify reported emissions. For example, if a facility is a net steam purchaser, some emissions resulting from activities that support the hydrogen production process may occur at the steam production site. Thus, knowing the net steam consumption may help explain why the emissions to production ratios for these facilities based on reported data do not fall within the expected ranges. Understanding this could result in less correspondence from the EPA to verify these facilities' reports and therefore reduce the burden to these facilities.

J. Subpart Q—Iron and Steel Production

We are finalizing the amendments to subpart Q of part 98 (Iron and Steel Production) as proposed. This section discusses the final revisions to subpart Q. The EPA received comments on the proposed requirements for subpart Q; see the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart Q. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal. We are also finalizing as proposed confidentiality determinations for new data elements resulting from the revisions to subpart Q as described in section VI. of this preamble.

1. Revisions To Improve the Quality of Data Collected for Subpart Q

The EPA is finalizing revisions to subpart Q, as proposed in the 2022 Data Quality Improvements Proposal, to enhance the quality and accuracy of the data collected. First, we are revising 40 CFR 98.176(g) for all unit types (taconite indurating furnace, basic oxygen furnace, non-recovery coke oven battery, sinter process, EAF, decarburization vessel, and direct reduction furnace) and all calculation methods (direct measurement using CEMS, carbon mass balance methodologies, or site-specific emission factors) to require that facilities report the type of unit, the annual production capacity, and the annual operating hours for each unit.

The EPA is also finalizing revisions to correct equation Q–5 in 40 CFR 98.173(b)(1)(v) to remove an error introduced into the equation in prior revisions (81 FR 89188, December 9, 2016). The final rule corrects the equation to remove an unnecessary fraction symbol. See section III.H.1. of the preamble to the 2022 Data Quality Improvements Proposal for additional information on these revisions and their supporting basis.

2. Revisions To Streamline and Improve Implementation for Subpart Q

The EPA is finalizing two revisions to subpart Q to streamline monitoring. First, we are revising 40 CFR

98.174(b)(2) to provide the option for facilities to determine the carbon content of process inputs and outputs by use of analyses provided by material recyclers that manage process outputs for sale or use by other industries. Material recyclers conduct testing on their inputs and products to provide to entities using the materials downstream, and therefore perform carbon content analyses using similar test methods and procedures as suppliers. The final revisions include a minor harmonizing change to 40 CFR 98.176(e)(2) to require reporters to indicate if the carbon content was determined from information supplied by a material recycler.

The EPA is also finalizing revisions to 40 CFR 98.174(b)(2) to incorporate a new test method, ASTM E415–17, *Standard Test Method for Analysis of Carbon and Low-Alloy Steel by Spark Atomic Emission Spectrometry* (2017), for carbon content analysis of low-alloy steel. The new method is incorporated by reference in 40 CFR 98.7 and 98.174(b)(2) for use for steel, as applicable. The addition of this alternative test method will provide additional flexibility for reporters. We are also finalizing one harmonizing change to the reporting requirements of 40 CFR 98.176(e)(2), to clarify that the carbon content analysis methods available to report are those methods listed in 40 CFR 98.174(b)(2). See section III.H.2. of the preamble to the 2022 Data Quality Improvements Proposal for additional information on these revisions and their supporting basis.

K. Subpart S—Lime Production

We are finalizing several amendments to subpart S of part 98 (Lime Production) as proposed. In some cases, we are finalizing the proposed amendments with revisions. Section III.K.1. of this preamble discusses the final revisions to subpart S. The EPA received several comments on the proposed subpart S revisions which are discussed in section III.K.2. of this preamble. We are also finalizing as proposed related confidentiality determinations for data elements resulting from the revisions to subpart S, as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart S

The EPA is finalizing several revisions to subpart S of part 98 (Lime Manufacturing) as proposed to improve the quality of the data collected from this subpart. First, we are finalizing the addition of reporting requirements for reporters using the CEMS methodology, in order to improve our understanding of source category emissions and our ability to verify reported data. The EPA is adding data elements under 40 CFR 98.196(a) to collect annual averages of the chemical composition input data on a facility-basis, including the annual arithmetic average calcium oxide content (mt CaO/mt tons lime) and magnesium oxide content (mt MgO/mt lime) for each type of lime produced, for each type of calcined lime byproduct and waste sold, and for each type of calcined lime byproduct and waste not sold. These data elements rely on an arithmetic average of the measurements rather than requiring reporters to weight by quantities produced in each month. Collecting average chemical composition data for CEMS facilities will provide the EPA the ability to develop a process emission estimation methodology for CEMS reporters, which can be used to verify the accuracy of the reported CEMS emission data.

The EPA is also finalizing additional data elements for reporters using the mass balance methodology (*i.e.,* reporters that comply using the requirements at 40 CFR 98.193(b)(2)). The final rule includes new data elements under 40 CFR 98.196(b) to collect the annual average results of the chemical composition analysis of all lime byproducts or wastes not sold (*e.g.,* a single facility average calcium oxide content calculated from the calcium oxide content of all lime byproduct types at the facility), and the annual quantity of all lime byproducts or wastes not sold (*e.g.,* a single facility total calculated as the sum of all quantities, in tons, of all lime byproducts at the facility not sold during the year). These amendments will allow the EPA to build verification checks for the actual inputs entered (*e.g.,* MgO content). Because the final data elements rely on annual averages of the chemical composition measurements and an annual quantity of all lime byproducts or wastes at the facility, they are distinct from the data entered into the EPA's verification software tool. Additional information on these revisions and their supporting basis may be found in section III.I. of the preamble to the 2022 Data Quality Improvements Proposal.

In the 2022 Data Quality Improvements Proposal, the EPA proposed to improve the methodology for calculation of annual CO_2 process emissions from lime production to account for CO_2 that is captured from lime kilns and used on-site. Specifically, we proposed to modify equation S–4 to subtract the CO_2 that is captured and used in on-site processes, with corresponding revisions to the recordkeeping requirements in 40 CFR 98.197(c) (to record the monthly amount of CO_2 from the lime manufacturing process that is captured for use in all on-site processes), minor amendments to the reporting elements in 40 CFR 98.196(b)(1) (to clarify reporting of annual net emissions), 40 CFR 98.196(b)(17) (to clarify reporters do not need to account for CO_2 that was not captured but was used on-site), and to clarify that reporters must account for CO_2 usage from all on-site processes, including for manufacture of other products, in the total annual amount of CO_2 captured. Following consideration of comments received, the EPA is not taking final action at this time on the proposed revisions to equation S–4, or the corresponding revisions to 40 CFR 98.196(b)(1) and 98.197(c). We are finalizing the clarifying revisions to 40 CFR 98.196(b)(17), as proposed. We are also finalizing an editorial correction to equation S–4 to add a missing equation symbol. See section III.K.2. of this preamble for additional information on related comments and the EPA's response.

2. Summary of Comments and Responses on Subpart S

This section summarizes the major comments and responses related to the proposed amendments to subpart S. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart S.

Comment: One commenter opposed the proposed modifications to equation S–4 requiring monthly subtraction of CO_2 used on-site, stating it would be considerably more burdensome for lime producers that currently track and report this usage on an annual basis. The commenter requested that the EPA continue to allow the annual reporting of CO_2 usage, and thus implement an annual subtraction from total process emissions from all lime kilns combined.

Response: The EPA proposed revisions to subparts G (Ammonia Manufacturing), P (Hydrogen Production), and S (Lime Manufacturing) that would have required monthly measurement of captured CO_2 used to manufacture other products on-site or non-CO_2 carbon sent off-site to external users. It would also have modified the subpart-level equations to require that these amounts

be subtracted from the emissions total. However, the EPA needs additional time to consider these comments and whether a consistent approach across these three subparts should be required or whether there are circumstances where alternative approaches might be warranted. Therefore, the EPA is not taking final action on these proposed revisions to subparts G, P, and S for at this time but may consider implementing these or similar revisions in future rulemakings.

L. Subpart U—Miscellaneous Uses of Carbonate

The EPA is finalizing one minor change to subpart U of part 98 (Miscellaneous Uses of Carbonate). The revision in this final rule is a harmonizing change following review of comments received on proposed subpart ZZ to part 98 (Ceramics Manufacturing) (see section III.EE. of this preamble for additional information on the related comments and the EPA's response). We are revising the source category definition for subpart U at 40 CFR 98.210(b) to clarify that ceramics manufacturing is excluded from the source category. Section 98.210(b) excludes equipment that uses carbonates or carbonate-containing materials that are consumed in production of cement, glass, ferroalloys, iron and steel, lead, lime, phosphoric acid, pulp and paper, soda ash, sodium bicarbonate, sodium hydroxide, or zinc. We are adding the text ''or ceramics'' to ensure that there is no duplicative reporting between subpart U and new subpart ZZ.

M. Subpart X—Petrochemical Production

We are finalizing several amendments to subpart X of part 98 (Petrochemical Production) as proposed. This section summarizes the final revisions to subpart X. The EPA received only minor comments on the proposed requirements for subpart X. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart X.

We are finalizing as proposed several amendments to subpart X to improve the quality of data reported and to clarify the calculation, recordkeeping, and reporting requirements. First, we are finalizing a clarification to the emissions calculation requirements for flares in 40 CFR 98.243(b)(3) and (d)(5) to cross-reference 40 CFR 98.253(b) of subpart Y; these revisions clarify that subpart X reporters are not required to report emissions from combustion of pilot gas and from gas released during startup, shutdown, and malfunction (SSM) events of <500,000 standard cubic feet (scf)/day that are excluded from equation Y–3.

Next, we are finalizing as proposed the addition of new reporting requirements intended to improve the quality of the data collected under the GHGRP. First, we are finalizing reporting a new data element in 40 CFR 98.246(b)(7) and (c)(3). For each flare that is reported under the CEMS and optional ethylene combustion methodologies, facilities must report the estimated fractions of the total CO_2, CH_4, and N_2O emissions from each flare that are due to combusting petrochemical off-gas. The final rule will allow the fractions attributed to each petrochemical process unit that routes emissions to the flare to be estimated using engineering judgment. This change will allow more accurate quantification of emissions both from individual petrochemical process units and from the industry sector as a whole. Next, the EPA is finalizing addition of a requirement in 40 CFR 98.246(c)(6) to report the names and annual quantity (in metric tons) of each product produced in each ethylene production process for emissions estimated using the optional ethylene combustion methodology; this improves consistency with the product reporting requirements under the CEMS and mass balance reporting options.

We are finalizing, as proposed, a number of amendments that are intended to remove redundant or overlapping requirements and to clarify the data to be reported, as follows:

- For facilities that use the mass balance approach, we are finalizing amendments to 40 CFR 98.246(a)(2) to remove the requirement to report feedstock and product names, which previously overlapped with reporting requirements in 40 CFR 98.246(a)(12) and (13).
- We are finalizing revisions to 40 CFR 98.246(a)(5) to clarify the petrochemical and product reporting requirements for integrated ethylene dichloride/vinyl chloride monomer (EDC/VCM) process units. The amendments clarify the rule for facilities with an integrated EDC/VCM process unit that withdraw small amounts of the EDC as a separate product stream. The final rule is revised at 40 CFR 98.246(a)(5) to specify that (1) the portion of the total amount of EDC produced that is an intermediate in the production of VCM may be either a measured quantity or an estimate; (2) the amount of EDC withdrawn from the process unit as a separate product (*i.e.,* the portion of EDC produced that is not utilized in the VCM production) is to be measured in accordance with 40 CFR 98.243(b)(2) or (3); and (3) the sum of the two values is to be reported under 40 CFR 98.246(a)(5) as the total quantity of EDC petrochemical from an integrated EDC/VCM process unit.
- We are finalizing a change in 40 CFR 98.246(a)(13) to clarify that the amount of EDC product to report from an integrated EDC/VCM process unit should be only the amount of EDC, if any, that is withdrawn from the integrated process unit and not used in the VCM production portion of the integrated process unit.
- For facilities that use CEMS, we are finalizing amendments to 40 CFR 98.246(b)(8) to clarify the reporting requirements for the amount of EDC petrochemical when using an integrated EDC/VCM process unit, by removing language related to considering the petrochemical process unit to be the entire integrated EDC/VCM process unit.
- For facilities that use the optional ethylene combustion methodology to determine emissions from ethylene production process units, we are finalizing revisions to 40 CFR 98.246(c)(4) to clarify that the names and annual quantities of feedstocks that must be reported will be limited to feedstocks that contain carbon.
- We are finalizing changes to 40 CFR 98.246(a)(15) to more clearly specify that molecular weight must be reported for gaseous feedstocks and products only when the quantity of the gaseous feedstock or product used in equation X–1 is in standard cubic feet; the molecular weight does not need to be reported when the quantity of the gaseous feedstock or product is in kilograms.

Additional information on the EPA's rationale for these revisions may be found in section III.K. of the preamble to the 2022 Data Quality Improvements Proposal.

We are also finalizing as proposed confidentiality determinations for new data elements resulting from the revisions to subpart X, as described in section VI. of this preamble.

N. Subpart Y—Petroleum Refineries

We are finalizing several amendments to subpart Y of part 98 (Petroleum Refineries) as proposed. This section summarizes the final revisions to subpart Y. The EPA received several comment letters on the proposed

requirements for subpart Y. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart Y.

We are also finalizing as proposed confidentiality determinations for new data elements resulting from the revisions to subpart Y, as described in section VI. of this preamble.

1. Revisions To Improve the Quality of Data Collected for Subpart Y

The EPA is finalizing as proposed several amendments to subpart Y of part 98 to improve data collection, clarify rule requirements, and correct an error in the rule. First, we are finalizing amendments to the provisions for delayed coking units (DCU) to add reporting requirements for facilities using mass measurements from company records to estimate the amount of dry coke at the end of the coking cycle in 40 CFR 98.256(k)(6)(i) and (ii). These new paragraphs will require facilities to additionally report, for each DCU: (1) the internal height of the DCU vessel; and (2) the typical distance from the top of the DCU vessel to the top of the coke bed (*i.e.,* coke drum outage) at the end of the coking cycle (feet). These new elements will allow the EPA to estimate and verify the reported mass of dry coke at the end of the cooling cycle as well as the reported DCU emissions.

We are also finalizing revisions to equation Y–18b in 40 CFR 98.253(i)(2), to include a new variable ''f_{coke}'' to allow facilities that do not completely cover the coke bed with water prior to venting or draining to accurately estimate the mass of water in the drum. The ''f_{coke}'' variable is defined as the fraction of coke-filled bed that is covered by water at the end of the cooling cycle just prior to atmospheric venting or draining, where a value of one (1) represents cases where the coke is completely submerged in water. The second term in equation Y–18b represents the volume of coke in the drum, and is subtracted from the water-filled coke bed volume to determine the volume of water. We are also finalizing revisions to the equation terms ''M_{water}'' and ''H_{water}'' to add the phase ''or draining'' to specify that these parameters reflect the mass of water and the height of water, respectively, at the end of the cooling cycle just prior to atmospheric venting or draining. We are finalizing harmonizing revisions to the recordkeeping requirements at 40 CFR 98.257(b)(45) and (46) and a corresponding recordkeeping requirement at 40 CFR 98.257(b)(53).

To help clarify that the calculation methodologies in 40 CFR 98.253(c) and 98.253(e) are specific to coke burn-off emissions, we are finalizing the addition of ''from coke burn-off'' immediately after the first occurrence of ''emissions'' in the introductory text of 40 CFR 98.253(c) and 98.253(e).

We are also finalizing corrections to an inconsistency inadvertently introduced into subpart Y by amendments published on December 9, 2016 (81 FR 89188), which created an apparent inconsistency about whether to include or exclude SSM events less than 500,000 scf/day in equation Y–3. This final rule clarifies in 40 CFR 98.253(b) that SSM events less than 500,000 scf/day may be excluded, but only if reporters are using the calculation method in 40 CFR 98.253(b)(1)(iii). We are also finalizing revisions to remove the recordkeeping requirements in existing 40 CFR 98.257(b)(53) through (56) and to reserve 40 CFR 98.257(b)(54) through (56). These requirements should have been removed in the December 9, 2016 amendments, which removed the corresponding requirement in 40 CFR 98.253(j) to calculate CH_4 emissions from DCUs using the process vent method (equation Y–19). The EPA is also finalizing corrections to an erroneous cross-reference in 40 CFR 98.253(i)(5), which inaccurately defines the term ''M_{stream}'' in equation Y–18f for DCUs, to correct the cross-reference to § 98.253(i)(4) instead of § 98.253(i)(3). Additional information on the EPA's rationale for these revisions may be found in section III.L.1. of the preamble to the 2022 Data Quality Improvements Proposal.

The EPA is finalizing as proposed one additional revision to improve data quality from the 2023 Supplemental Proposal. Specifically, we are finalizing the addition of a requirement to report the capacity of each asphalt blowing unit, consistent with the existing reporting requirements for other emissions units under subpart Y. The final rule requires that facilities provide the maximum rated unit-level capacity of the asphalt blowing unit, measured in mt of asphalt per day, in 40 CFR 98.256(j)(2). Additional information on the EPA's rationale for these revisions may be found in section III.H. of the preamble to the 2023 Supplemental Proposal.

2. Revisions To Streamline and Improve Implementation for Subpart Y

The EPA is finalizing one change to subpart Y to streamline monitoring. We are finalizing an option for reporters to use mass spectrometer analyzers to determine gas composition and molecular weight without the use of a gas chromatograph. The final rule adds the inclusion of direct mass spectrometer analysis as an allowable gas composition method in 40 CFR 98.254(d). This change will allow reporters to use the same analyzers used for process control or for compliance with continuous sampling which are proposed to be provided under the National Emissions Standards for Hazardous Air Pollutants from Petroleum Refineries (40 CFR part 63, subpart CC), to comply with GHGRP requirements in subpart Y. Additional information on these revisions and their supporting basis may be found in section III.L.2. of the preamble to the 2022 Data Quality Improvements Proposal.

Consistent with changes we are finalizing to subpart P of part 98 (Hydrogen Production) from the 2023 Supplemental Proposal, we are finalizing revisions to remove references to non-merchant hydrogen production plants in 40 CFR 98.250(c) and to delete and reserve 40 CFR 98.252(i), 98.255(d), and 98.256(b). We are also finalizing as proposed revisions to remove references to coke calcining units in 40 CFR 98.250(c) and 98.257(b)(16) through (19) and to remove and reserve 40 CFR 98.252(e), 98.253(g), 98.254(h), 98.254(i), 98.256(i), and 98.257(b)(27) through (31). As proposed in the 2023 Supplemental Proposal, we are finalizing the addition of new subpart WW to part 98 (Coke Calciners), and these provisions are no longer necessary under subpart Y. Additional information on these revisions and their supporting basis may be found in section III.H. of the preamble to the 2023 Supplemental Proposal.

O. Subpart AA—Pulp and Paper Manufacturing

We are finalizing the amendments to subpart AA of part 98 (Pulp and Paper Manufacturing) as proposed. The EPA received no comments regarding the proposed revisions to subpart AA. Additional rationale for these amendments is available in the preamble to the 2023 Supplemental Proposal. The EPA is revising 40 CFR 98.273 to add a biogenic calculation methodology for estimation of CH_4, N_2O, and biogenic CO_2 emissions for units that combust biomass fuels (other

than spent liquor solids) from table C–1 to subpart C of part 98 or that combust biomass fuels (other than spent liquor solids) with other fuels. We are also revising 40 CFR 98.276(a) to remove incorrect references to biogenic CH_4 and N_2O and correcting a typographical error at 40 CFR 98.277(d), as proposed. Additional rationale for these amendments is available in the preamble to the 2023 Supplemental Proposal.

P. Subpart BB—Silicon Carbide Production

We are finalizing the amendments to subpart BB of part 98 (Silicon Carbide Production) as proposed. The EPA received no comments regarding the proposed revisions to subpart BB. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal. The EPA is finalizing a reporting requirement at 40 CFR 98.286(c) such that if CH_4 abatement technology is used at silicon carbide production facilities, then facilities must report: (1) the type of CH_4 abatement technology used and the date of installation for each technology; (2) the CH_4 destruction efficiency (percent destruction) for each CH_4 abatement technology; and (3) the percentage of annual operating hours that CH_4 abatement technology was in use for all silicon carbide process units or production furnaces combined. For each CH_4 abatement technology, reporters must either use the manufacturer's specified destruction efficiency or the destruction efficiency determined via a performance test; if the destruction efficiency is determined via a performance test, reporters must also report the name of the test method that was used during the performance test. Following the initial annual report containing this information, reporters will not be required to resubmit this information unless the information changes during a subsequent reporting year, in which case, the reporter must update the information in the submitted annual report. The final revisions to subpart BB also add a recordkeeping requirement at 40 CFR 98.287(d) for facilities to maintain a copy of the reported information. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal. The EPA is also finalizing, as proposed, confidentiality determinations for the additional data elements to be reported as described in section VI. of this preamble.

Q. Subpart DD—Electrical Transmission and Distribution Equipment Use

We are finalizing several amendments to subpart DD of part 98 (Electrical Transmission and Distribution Equipment Use) as proposed. In some cases, we are finalizing the proposed amendments with revisions. Section III.Q.1. of this preamble discusses the final revisions to subpart DD. The EPA received several comments on the proposed subpart DD revisions which are discussed in section III.Q.2. of this preamble. We are also finalizing as proposed confidentiality determinations for new data elements resulting from the final revisions to subpart DD, as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart DD

This section summarizes the final amendments to subpart DD. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other final revisions to 40 CFR part 98, subpart DD can be found in this section and section III.Q.2. of this preamble. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal.

a. Revisions To Improve the Quality of Data Collected for Subpart DD

The EPA is finalizing several revisions to subpart DD to improve the quality of the data collected under this subpart. First, we are generally finalizing the proposed revisions to the calculation, monitoring, and reporting requirements of subpart DD to require reporting of additional F–GHGs, except insulating gases with weighted average GWPs less than or equal to one will remain excluded from reporting under subpart DD. These final amendments will help to account for use and emissions of replacements for SF_6, including fluorinated gas mixtures, with lower but still significant GWPs. We are revising 40 CFR 98.300(a) to redefine the source category to include equipment containing ''fluorinated GHGs (F–GHGs), including but not limited to sulfur-hexafluoride (SF_6) and perfluorocarbons (PFCs).'' These changes include:

- Revising the threshold determination in 40 CFR 98.301 by adding new equations DD–1 and equation DD–2 (see section III.Q.1.b. of this preamble).
- Revising the GHGs to report at 40 CFR 98.302 by adding a new equation DD–3, which is also used in the definition of ''reportable insulating gas,'' discussed below.
- Redesignating equation DD–1 as equation DD–4 at 40 CFR 98.303 and revising the equation to estimate emissions from all F–GHGs within the existing calculation methodology, including F–GHG mixtures. Equation DD–4 will maintain the facility-level mass balance approach of tracking and accounting for decreases, acquisitions, disbursements, and net increase in total nameplate capacity for the facility each year, but will apply the weight fraction of each F–GHG to determine the user emissions by gas. In the final rule, we are making two clarifications to equation DD–4 in addition to the revisions that were proposed. These are discussed further below.
- Updating the monitoring and quality assurance requirements at 40 CFR 98.304(b) to account for emissions from additional F–GHGs.
- To address references to F–GHGs and F–GHG mixtures, we are finalizing the term ''insulating gas'' which is defined as ''any fluorinated GHG or fluorinated GHG mixture, including but not limited to SF_6 and PFCs, that is used as an insulating and/or arc quenching gas in electrical equipment.''
- To clarify which insulating gases are subject to reporting requirements, we are adding the term ''reportable insulating gas,'' which is defined as ''an insulating gas whose GWP, as calculated in equation DD–3, is greater than one. A fluorinated GHG that makes up either part or all of a reportable insulating gas is considered to be a component of the reportable insulating gas.'' In many though not all cases, we are replacing occurrences of the proposed phrase ''fluorinated GHGs, including PFCs and SF_6'' with ''fluorinated GHGs that are components of reportable insulating gases.''
- Adding harmonizing requirements to the term ''facility'' in the definitions section at 40 CFR 98.308 and the requirements at 40 CFR 98.302, 98.305, and 98.306 to require reporters to account for the mass of each F–GHG for each electric power system.

As noted above, following consideration of comments received, the EPA is revising these requirements from proposal to continue to exclude insulating gases with weighted average 100-year GWPs of less than one. Based on a review of the subpart DD data submitted to date, the EPA has concluded that excluding insulating gases with GWPs of less than one from reporting under subpart DD will have little effect on the accuracy or completeness of the GWP-weighted totals reported under subpart DD or

under the GHGRP generally at this time, and will decrease the reporting burden for facilities. See section III.Q.2. of this preamble for a summary of the related comments and the EPA's response.

Also as noted above, we are making two clarifications to equation DD–4 in addition to the revisions that were proposed. First, to account for the possibility that the same fluorinated GHG could be a component of multiple reportable insulating gases, we are inserting a summation sign at the beginning of the right side of equation DD–4 to ensure that emissions of each fluorinated GHG ''i'' are summed across all reportable insulating gases ''j.'' Second, upon further consideration of equation DD–4 and its relationship to the newly defined terms ''new equipment'' and ''retiring equipment,'' we are modifying the terms for acquisitions and disbursements of reportable insulating gas j to account for acquisitions and disbursements of reportable insulating gas that are linked to the acquisition or sale of all or part of an electric power system. These include acquisitions or disbursements of reportable insulating gas inside equipment that is transferred while in use, acquisitions or disbursements of insulating gas inside equipment that is transferred from or to entities other than electrical equipment manufacturers and distributors while the equipment is not in use, and acquisitions or disbursements of insulating gas in bulk from or to entities other than chemical producers or distributors. Accounting for these acquisitions and disbursements in equation DD–4 ensures that the terms for acquisitions and disbursements of reportable insulating gas will be mathematically consistent with other terms in the equation, including the terms for the net increase in total nameplate capacity and the quantity of gas stored in containers at the end of the year. The term for the net increase in the total nameplate capacity will reflect the new definitions of ''new equipment'' and ''retiring equipment,'' which include transfers of equipment while in use. Similarly, the term for the quantity of reportable insulating gas stored in containers at the end of the year will reflect acquisitions or disbursements of reportable insulating gas stored in containers from or to all other entities, including other electric power systems. If these acquisitions or disbursements of gas in equipment or in bulk are not accounted for in the equation, the result will be incorrect. The revised terms are consistent with the definitions of ''new'' and ''retired'' in their treatment of hermetically sealed pressure equipment, with such equipment being included in terms related to equipment that is transferred while not in use, but excluded from terms related to equipment that is transferred while in use. We are also making harmonizing changes to the reporting requirements at 40 CFR 98.306, revising paragraphs (f), (g), and (i) (to be redesignated as paragraph (k)), and adding paragraphs (i), (n), and (o). These harmonizing revisions do not substantively change the reporting requirements as proposed and therefore would not substantively impact the burden to reporters.

With minor changes, we are finalizing the proposed requirements in 40 CFR 98.303(b) for users of electrical equipment to follow certain procedures when they elect to measure the nameplate capacities (in units of mass of insulating gas) of new and retiring equipment rather than relying on the rated nameplate capacities provided by equipment manufacturers. As proposed, this option will be available only for closed pressure equipment with a voltage capacity greater than 38 kilovolts (kV), not for hermetically sealed pressure equipment or smaller closed-pressure equipment. These procedures are intended to ensure that the nameplate capacity values that equipment users measure match the full and proper charges of insulating gas in the electrical equipment. These procedures are similar to and compatible with the procedures for measuring nameplate capacity adopted by the California Air Resources Board (CARB) in its Regulation for Reducing Greenhouse Gas Emissions from Gas Insulated Switchgear.[16]

Specifically, electrical equipment users electing to measure the nameplate capacities of any new or retiring equipment will be required at 40 CFR 98.303(b)(1) to measure the nameplate capacities of all eligible new and retiring equipment in that year and in all subsequent years. For each piece of equipment, the electrical equipment user will be required to calculate the difference between the user-measured and rated nameplate capacities, verifying that the rated nameplate capacity was the most recent available from the equipment manufacturer. Where a user-measured nameplate capacity differs from the rated nameplate capacity by two percent or more, the electrical equipment user will be required at 40 CFR 98.303(b)(2) to adopt the user-measured nameplate capacity for that equipment for the remainder of the equipment's life. Where a user-measured nameplate capacity differs from the rated nameplate capacity by less than two percent, the electrical equipment user will have the option at 40 CFR 98.303(b)(3) to adopt the user-measured nameplate capacity, but if they chose to do so, they must adopt the user-measured nameplate capacities for all new and retiring equipment whose user-measured nameplate capacity differed from the rated nameplate capacity by less than two percent.

With minor changes, the EPA is finalizing the proposed requirements at 40 CFR 98.303(b)(4) and (5) for when electrical equipment users measure the nameplate capacity of new equipment that they install and for when they measure the nameplate capacity of retiring equipment. These final requirements ensure that electrical equipment users:

- Correctly account for the mass of insulating gas contained in new equipment upon delivery from the manufacturer (*i.e.,* the holding charge), and correctly account for the mass of insulating gas contained in equipment upon retirement, measuring the actual temperature-adjusted pressure and comparing that to the temperature-adjusted pressure that reflects the correct filling density of that equipment.
- Use flowmeters or weigh scales that meet certain accuracy and precision requirements to measure the mass of insulating gas added to or recovered from the equipment;
- Use pressure-temperature charts and pressure gauges and thermometers that meet certain accuracy and precision requirements to fill equipment to the density specified by the equipment manufacturer or to recover the insulating gas from the equipment to the correct blank-off pressure, allowing appropriate time for temperature equilibration; and
- Ensure that insulating gas remaining in the equipment, hoses and gas carts is correctly accounted for.

After consideration of comments, we are including a requirement to follow the procedure specified by the equipment manufacturer to ensure that the measured temperature accurately reflects the temperature of the insulating gas, *e.g.,* by measuring the insulating gas pressure and vessel temperature after allowing appropriate time for the temperature of the transferred gas to equilibrate with the vessel temperature. Also after consideration of comments, we are (1) adding a requirement that facilities that use flow meters to measure the mass of insulating gas added to new equipment must keep the

[16] See *https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2020/sf6/fro.pdf.*

mass flow rate within the range specified by the flowmeter manufacturer, and (2) not finalizing the option to use mass flowmeters to measure the mass of the insulating gas recovered from equipment. We are making both changes because the accuracy and precision of flowmeters can decrease significantly when the mass flow rate declines below the minimum specified by the flow meter manufacturer for accurate and precise measurements.

As proposed, we are allowing equipment users to account for any leakage from the equipment using one of two approaches. In both approaches, users must measure the temperature-compensated pressure of the equipment before they remove the insulating gas from that equipment and compare the measured temperature-compensated pressure to the temperature-compensated pressure corresponding to the full and proper charge of the equipment (the design operating pressure). If the measured temperature-compensated pressure is different from the temperature-compensated pressure corresponding to the full and proper charge of the equipment, the equipment user may either (1) add or remove insulating gas to or from the equipment until the equipment reaches its full and proper charge; recover the gas until the equipment reached a pressure of 0.068 pounds per square inch, absolute (psia) (3.5 Torr) or less; and weigh the recovered gas (charge adjustment approach), or (2) if (a) the starting pressure of the equipment is between its temperature-compensated design operating pressure and five (5) pounds per square inch (psi) below that pressure, and (b) the insulating gas is recovered to a pressure no higher than 5 psia (259 Torr),[17] recover the gas that was already in the equipment; weigh it; and account mathematically for the difference between the quantity of gas recovered from the equipment and the full and proper charge (mathematical adjustment approach, equation DD–5).

In the final rule, we are allowing use of the mathematical adjustment approach in somewhat more limited circumstances than proposed. We proposed that to use the mathematical adjustment approach to calculate the nameplate capacity, facilities would need to recover a quantity of insulating gas equivalent to at least 90 percent of the full manufacturer-rated nameplate capacity of the equipment, which would have provided more flexibility on the starting and ending pressures of the equipment during the recovery process. The proposed requirement was based on an analysis of the proposed accuracies and precisions of measuring devices and their impacts on the accuracy and precision of the mathematical adjustment approach, which indicated that 90 percent of the gas must be recovered to limit the uncertainty of the calculation to below 2 percent. We also recognized that departures from the ideal gas law could result in additional, systematic errors in the mathematical adjustment approach and therefore requested comment on the option of adding compressibility factors, which account for these departures, to equation DD–5 (proposed as equation DD–4). Such compressibility factors are not constant but are functions of the pressure and temperature of the insulating gas based on an equation of state specific to that insulating gas. We did not receive any comment on this option, and after considering the matter further, we believe that performing calculations using compressibility factors would prove too complex to implement in the field to obtain accurate nameplate capacity values. Without compressibility factors, departures of the insulating gas from the ideal gas law limit the reliability of the mathematical adjustment approach except within the ranges of starting and ending pressures described above. Consequently, we are finalizing the mathematical adjustment method as proposed but are restricting its use to the specified ranges of starting and ending pressures. Under these circumstances, any systematic errors in the mathematical adjustment approach are generally expected to fall below 0.5 percent, leading to maximum total errors (accounting for both departures from the ideal gas law and limits on the accuracy and precision of measuring devices) of approximately two percent. (For more discussion of this issue, see ''Update to the Technical Support for Proposed Revisions to Subpart DD, Electrical Transmission and Distribution Equipment Use,'' included in the docket for this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424).

Given these restrictions, the mathematical adjustment approach cannot be used to calculate the nameplate capacity of equipment that cannot have the insulating gas inside of it recovered below atmospheric pressure. However, as noted above, the approach can still be used for situations where the blank-off pressure of a gas cart is above 3.5 Torr (0.068 psia) but below 5 psia and/or where the starting pressure of the electrical equipment is no more than 5 psi lower than its temperature-compensated design operating pressure. (Note that equipment whose starting pressure is above the temperature-compensated design operating pressure will need to have the excess gas recovered until it reaches the design operating pressure, at which point the nameplate capacity measurement can begin.)

We are finalizing as proposed requirements at 40 CFR 98.303(b)(6) that allow users to measure the nameplate capacity of electrical equipment earlier during maintenance activities that require opening the gas compartment. The equipment user will still be required to follow the measurement procedures required for retiring equipment at 40 CFR 98.303(b)(5) to measure the nameplate capacity, and the measured nameplate capacity must be recorded, but will not be used in equation DD–3 until that equipment is actually retired.

We are finalizing as proposed requirements at 40 CFR 98.303(b)(7) and (8) to require that, where the electrical equipment user is adopting the user-measured nameplate capacity, the user must affix a revised nameplate capacity label showing the revised nameplate value and the year the nameplate capacity adjustment process was performed to the device by the end of the calendar year in which the process was completed. For each piece of electrical equipment whose nameplate capacity is adjusted during the reporting year, the revised nameplate capacity value must be used in all rule provisions wherein the nameplate capacity is required to be recorded, reported, or used in a calculation.

To ensure that the mass balance method is based on consistent nameplate capacity values throughout the life of the equipment, we are finalizing at 40 CFR 98.303(b)(9) that electrical equipment users are allowed to measure and revise the nameplate capacity value of any given piece of equipment only once, unless the nameplate capacity itself is likely to have changed due to changes to the equipment (*e.g.,* replacement of the equipment bushings).

To help ensure that electrical equipment users obtain accurate measurements of their equipment's nameplate capacities, we are finalizing requirements at 40 CR 98.303(b)(10) that

[17] While the mathematical adjustment approach is expected to yield accurate results if the final pressure is 5 psia or less, facilities are encouraged to recover the insulating gas until they reach the blank-off pressure of the gas cart, which is generally expected to fall below 5 psia. Note that where the final pressure is equal to or less than 0.068 psia, the gas remaining in the equipment is estimated to account for a negligible share of the total and therefore facilities are not required to use the Mathematical Adjustment Method to account for it.

electrical equipment users must use measurement devices that meet the following accuracy and precision requirements when they measure the nameplate capacities of new and retiring equipment:

- Flow meters must be certified by the manufacturer to be accurate and precise to within one percent of the largest value that the flow meter can, according to the manufacturer's specifications, accurately record.
- Pressure gauges must be certified by the manufacturer to be accurate and precise to within 0.5 percent of the largest value that the gauge can, according to the manufacturer's specifications, accurately record.
- Temperature gauges must be certified by the manufacturer to be accurate and precise to within ±1.0 °F; and
- Scales must be certified by the manufacturer to be accurate and precise to within one percent of the true weight.

Additional information on these revisions and their supporting basis may be found in section III.N.1. of the preamble to the 2022 Data Quality Improvements Proposal.

We are finalizing at 40 CFR 98.306(r) and (s) (proposed as 40 CFR 98.306(o) and (p)) requirements for equipment users who measure and adopt nameplate capacity values to report the total rated and measured nameplate capacities across all the equipment whose nameplate capacities were measured and for which the measured nameplate capacities have been adopted in that year.

We are finalizing requirements in 40 CFR 98.307(b) as proposed for equipment users to keep records of certain identifying information for each piece of equipment for which they measure the nameplate capacity: the rated and measured nameplate capacities, the date of the nameplate capacity measurement, the measurements and calculations used to obtain the measured nameplate capacity (including the temperature-pressure curve and/or other information used to derive the initial and final temperature adjusted pressures of the equipment), and whether or not the measured nameplate capacity value was adopted for that piece of equipment.

To clarify the mass balance methodology in 40 CFR 98.303, we are adding definitions for ''energized,'' ''new equipment,'' and ''retired equipment,'' at 40 CFR 98.308 as proposed. We are finalizing the definition of ''energized'' as proposed to mean ''connected through busbars or cables to an electrical power system or fully-charged, ready for service, and being prepared for connection to the electrical power system. Energized equipment does not include spare gas insulated equipment (including hermetically-sealed pressure switchgear) in storage that has been acquired by the facility, and is intended for use by the facility, but that is not being used or prepared for connection to the electrical power system.'' The final definition more clearly designates what equipment is considered to be installed and functioning as opposed to being in storage.

With two minor changes, we are finalizing the proposed definition for ''new equipment.'' ''New equipment'' is defined as ''either (1) any gas insulated equipment, including hermetically-sealed pressure switchgear, that is not energized at the beginning of the reporting year but is energized at the end of the reporting year, or (2) any gas insulated equipment other than hermetically-sealed pressure switchgear that has been transferred while in use, meaning it has been added to the facility's inventory without being taken out of active service (*e.g.,* when the equipment is sold to or acquired by the facility while remaining in place and continuing operation).'' Similarly, we are finalizing the definition for ''retired equipment'' with two minor changes. ''Retired Equipment'' is defined as ''either (1) any gas insulated equipment, including hermetically-sealed pressure switchgear, that is energized at the beginning of the reporting year but is not energized at the end of the reporting year, or (2) any gas insulated equipment other than hermetically-sealed pressure switchgear that has been transferred while in use, meaning it has been removed from the facility's inventory without being taken out of active service (*e.g.,* when the equipment is acquired by a new facility while remaining in place and continuing operation).'' The proposed definitions both included two sentences, where the first sentence specified that the equipment changed from ''not energized'' to ''energized'' (or vice versa), and the second sentence preceded the phrase ''that has been transferred while in use'' with ''This includes.'' Upon review of the proposed definitions, we realized that they could lead to confusion because equipment that is transferred while in use does not change from ''not energized'' to ''energized'' or vice versa, and therefore cannot be ''included'' in the sets of equipment that change from ''not energized'' to ''energized'' or vice versa. We therefore replaced ''This includes'' with ''or.'' We also realized that including hermetically-sealed pressure switchgear in equipment that is transferred while in use would trigger requirements to inventory the acquired (new) or disbursed (retired) hermetically-sealed pressure switchgear for purposes of the mass balance calculation (equation DD–4) and the reporting requirements at 40 CFR 98.306(a)(2) and (4). We did not intend to trigger these requirements for hermetically sealed pressure equipment that is transferred during use. Such requirements would be inconsistent with the intent and effect of the current provision at 40 CFR 98.306(a)(1), which excludes existing hermetically-sealed pressure switchgear from the requirement to report the existing nameplate capacity total at the beginning of the year. We therefore excepted hermetically sealed switchgear from equipment that is transferred while in use in both definitions. With these minor changes, the definitions clarify how the terms ''new'' and ''retired'' should be interpreted for purposes of equation DD–3.

b. Revisions To Streamline and Improve Implementation for Subpart DD

The EPA is finalizing several revisions to subpart DD to streamline requirements. First, we are revising the applicability threshold of subpart DD at 40 CFR 98.301 largely as proposed, in order to align with revisions to include additional F–GHGs in subpart DD. However, as discussed above, insulating gases with weighted average GWPs less than or equal to 1 will remain excluded from reporting under subpart DD. We are replacing the existing nameplate capacity threshold with an emissions threshold of 25,000 $mtCO_2e$ per year of F–GHGs that are components of reportable insulating gases (*i.e.,* insulating gases whose weighted average GWPs, as calculated in equation DD–3, are greater than one (1)). To calculate their F–GHG emissions for comparison with the threshold, electrical equipment users will use one of two new equations finalized in subpart DD at 40 CFR 98.301, equations DD–1 and DD–2. The equations explicitly include not only the nameplate capacity of the equipment but also an updated default emission factor and the GWP of each insulating gas.

We are also finalizing revisions to the existing calculation, monitoring, and reporting requirements of subpart DD to require reporting of additional F–GHGs beyond SF_6 and PFCs that are components of reportable insulating gases. The new equations DD–1 and DD–2 that we are finalizing for the applicability threshold require potential

reporters to account for the total nameplate capacity of all equipment containing reportable insulating gases (located on-site and/or under common ownership or control), including equipment containing F–GHG mixtures, and multiply by the weight fraction of each F–GHG (for gas mixtures), the GWP for each F–GHG, and an emission factor of 0.10 (representing an emission rate of 10 percent).

We are finalizing harmonizing changes in multiple sections of subpart DD to renumber equation DD–1 and maintain cross-references to the equation. We are also finalizing revisions to the existing threshold in 40 CFR 98.301 and table A–3 to subpart A (General Provisions). Additional information on these revisions and their supporting basis may be found in section III.N.2. of the preamble to the 2022 Data Quality Improvements Proposal.

Finally, we are removing an outdated monitoring provision at 40 CFR 98.304(a), which reserves a prior requirement for use of BAMM that applied solely for RY2011.

2. Summary of Comments and Responses on Subpart DD

This section summarizes the major comments and responses related to the proposed amendments to subpart DD. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart DD.

a. Comments on Revisions To Improve the Quality of Data Collected for Subpart DD

Comment: One commenter asked for clarification regarding whether the equipment user needs to account for insulating gas remaining inside gas-insulated equipment (GIE) that are transferred to another entity (vendor) for repair or salvage. The commenter asserted that since the equipment is leaving the inventory with gas inside, it should be counted as both retired equipment and a gas disbursement. The commenter suggested the ''Disbursements'' term in equation DD–3 be modified to include similar language to the ''Acquisitions'' term, to clarify that gas inside equipment that is transferred to another entity for repair or salvage, in addition to equipment that is sold, counts as a disbursement.

Response: The EPA agrees with the commenter and is revising the ''Disbursements'' term in equation DD–3 (being finalized as equation DD–4) to account for gas ''transferred'' as well as ''sold'' to ''other entities.'' As discussed in section III.Q.1. of this preamble, we are making a number of clarifications to the ''Acquisitions'' and ''Disbursements'' terms in equation DD–4 to accommodate the full range of possible acquisitions and disbursements by electric power systems, which will improve the accuracy and completeness of equation DD–4 and the associated reporting and recordkeeping requirements.

Comment: One commenter suggested that the EPA revise the nameplate capacity adjustment text as follows: first, to remove the word ''covered'' prior to ''insulating gas'' in 40 CFR 98.303(b)(4)(ii)(A), since ''covered'' is not included in the EPA's definition of insulating gas.

Response: The EPA agrees with the commenter and is revising 40 CFR 98.303(b)(4)(ii)(A) as suggested to reflect the language which is used in the definitions and to minimize confusion. As discussed in section III.Q.1. of this preamble, we are introducing the term ''reportable insulating gas'' to distinguish between insulating gas that is included in subpart DD (''reportable'') because it has a weighted average GWP greater than 1 and insulating gas that is not reportable because it has a weighted average GWP of 1 or less.

Comment: Two commenters suggested the EPA change the language in 40 CFR 98.303(b)(5)(ii), which was proposed as a requirement to ''convert the initial system pressure to a temperature-compensated initial system pressure by using the temperature/pressure curve for that insulating gas.'' The commenters stated that the temperature/pressure curve is not intended for conversions of initial system pressure to temperature-compensated pressure. The commenters suggested that the requirement should be to compare the measured initial system pressure and vessel temperature to the equipment manufacturer's temperature-pressure curve specific for the equipment to confirm the equipment is at the proper operating pressure, prior to recovery of the insulating gas. One commenter recommended two options for measuring initial gas pressure: (1) use external pressure and temperature gauges according to 40 CFR 98.303(b)(5)(i); or (2) if an integrated temperature-compensated gas pressure gauge was used for the initial gas fill and to monitor and maintain the gas at the proper operating pressure over the service life of the circuit breaker, use the same gauge to determine whether the circuit breaker is at the proper operating pressure.

Response: The EPA agrees with the commenters regarding the language at 40 CFR 98.303(b)(5)(ii) and is finalizing the requirement as follows: ''Compare the initial system pressure and temperature to the equipment manufacturer's temperature/pressure curve for that equipment and insulating gas.'' Regarding allowing use of an integrated temperature-compensated gas pressure gauge, use of such a gauge is allowed if the gauge is certified by the gauge manufacturer to be accurate and precise to within 0.5 percent of the largest value that the gauge can, according to the manufacturer's specifications, accurately record. It is EPA's understanding that many gauges that are built into the electrical equipment do not meet these accuracy and precision requirements. However, if they do, the rule does not prohibit their use in nameplate capacity measurements.

Comment: One commenter objected to the proposed requirement to recover the insulating gas to a blank-off pressure not greater than 3.5 Torr during the nameplate capacity measurement. The commenter noted that not all facilities own gas carts capable of reaching 3.5 Torr, and, for some GIE, that level of pressure is not necessary for an accurate reading. The commenter recommended that the GIE recovery be performed to allow for 99.1 percent or greater recovery of the insulating gas.

Response: As discussed above, the EPA is finalizing a requirement that facilities measuring the nameplate capacity of their equipment recover the gas to a pressure of at most 5 psia (258.6 Torr). This will accommodate gas carts that are not capable of reaching 3.5 Torr. To ensure that the gas remaining in the equipment at pressures above 3.5 Torr is accounted for, facilities that recover the gas to a pressure between 5 psia and 3.5 Torr will be required to use the mathematical adjustment approach (equation DD–5) to calculate the full nameplate capacity. As discussed in the preamble to the proposed rule, the EPA estimates that 0.1 percent of the full and proper charge of insulating gas would remain in the equipment at 3.5 Torr (assuming that a full and proper charge has a pressure of 3800 Torr), a negligible fraction. However, the fraction of gas remaining after recovery of 99.1 percent of the gas, 0.9%, is not negligible, but represents a significant systematic underestimate compared to the 2% tolerance for nameplate capacity measurements. Since it is straightforward to correct for this systematic underestimate by using the

mathematical adjustment approach, we are requiring use of equation DD–5 in such situations.

Comment: One commenter representing manufacturers of electrical equipment recommended that after insulating gas was added to a piece of electrical equipment, facilities should allow at least 24 hours to allow the gas to condition itself to its container in order to confirm the correct density has been met.

Response: The EPA is adding a requirement to 40 CFR 98.303(b)(4)(ii) that facilities follow the procedure specified by the electrical equipment manufacturer to ensure that the measured temperature accurately reflects the temperature of the insulating gas, *e.g.,* by measuring the insulating gas pressure and vessel temperature after allowing appropriate time for the temperature of the transferred gas to equilibrate with the vessel temperature. This allows for the possibility that some electrical equipment, *e.g.,* electrical equipment with smaller charge sizes, may require less than 24 hours for the insulating gas temperature to equilibrate with the temperature of the vessel. Because achieving the correct density of the insulating gas in the equipment is important to the proper functioning of the equipment, the guidance provided by the equipment manufacturer should be sufficient to ensure that the appropriate density is achieved for purposes of the nameplate capacity measurement.

Comment: Commenters representing electrical equipment users and manufacturers provided input on the use of mass flow meters to measure the nameplate capacities of new and retiring electrical equipment. One commenter provided recommended edits to the proposed text to add requirements to ensure that a minimum gas flow is maintained while measuring the mass of insulating gas being added to new equipment. The commenter stated that to ensure that the flowmeter was properly configured for its application, the maximum and minimum flow rates of the meter, as well as the displacement of the pumps and compressors on the gas cart being used, must be taken into consideration. The commenter added that, in general, mass flow meters designed for high flow applications will not be suitable for low flow conditions and meters designed for low flow applications will not be suitable for high flow conditions. This commenter also recommended adding the use of an in-calibration cylinder scale as an alternative option for measuring the gas transferred during the equipment filling process. Two commenters recommended removing the option to use a mass flow meter to measure the mass of insulating gas recovered from retiring equipment due to the potential for errors when a mass flow meter is used in this process. The commenters stated that use of a mass flow meter to measure the insulating gas recovered is not recommended since a mass flow meter does not accurately measure gas at low flow rates. Instead, the commenters recommended that the gas container weighing method should be used to accurately measure the total weight of insulating gas recovered from the equipment. One commenter added that the process of weighing all gas removed from a GIE and transferred into a cylinder includes weighing all the gas trapped in hoses and in gas cart, which would not be accounted for by the flow meter; the commenter pointed out that the gas (trapped in hoses and in the gas cart) would need to be moved into cylinders to be accurately weighed with a cylinder scale.

Response: After consideration of these comments, the EPA is finalizing the proposed provisions for measuring the nameplate capacities of new and retiring equipment with two changes. First, we are requiring that facilities that use mass flow meters to measure the mass of insulating gas added to new equipment must keep the mass flow rate within the range specified by the mass flow meter manufacturer to assure an accurate and precise mass flow meter reading. Second, we are removing the option to use mass flow meters to measure the quantity of gas recovered from retiring equipment. We have analyzed the impact of the uncertainty of flowmeters at low flow rates on overall nameplate capacity measurements, and we have concluded that this impact may lead to large errors under some circumstances. As noted by the commenters, the relative error for flowmeters can increase when the flowmeter is used to measure mass flow rates below a certain fraction of the maximum full-scale value, and the mass flow rate will gradually decline as the insulating gas is transferred from the container to the equipment or vice versa, reducing the density of the gas inside the source vessel. For measuring the quantity of insulating gas added to new equipment, this issue can be addressed by requiring that the mass flow rate be kept within the range specified by the mass flow meter manufacturer, which can be accomplished by, *e.g.,* switching to a full container when the density of the insulating gas in the current container falls below the minimum level. However, for measuring the quantity of insulating gas recovered from retiring equipment, the insulating gas is being transferred from the equipment itself, and the recovery process therefore inevitably lowers the mass flow rate below the minimum level. For this reason, we are not taking final action on the option to use flowmeters to measure the quantity of insulating gas recovered from retiring equipment.

In our analysis of this issue, we reviewed our proposal at 40 CFR 98.303(b)(10) that mass flow meters must be accurate and precise to within one percent of the largest value that the flow meter can, according to the manufacturer's specifications, accurately record, *i.e.,* the maximum full-scale value. This means that the relative error of the flowmeter could rise hyperbolically from one percent of the measured value (when the measured value equals the maximum value) to much higher levels at lower flow rates, *e.g.,* 2 percent of the flow rate at half the maximum, 4 percent of the flow rate at one quarter of the maximum, 10 percent of the flow rate at one tenth the maximum, etc. These rising relative errors lead to overall errors in the mass flow measurement that are far above one percent. Even if the flow meter is accurate to within one percent of the measured value over a ten-fold range of flow rates, errors at lower flow rates can be significant. In an example provided to us by a company that provides insulating gas recovery equipment (gas carts) and insulating gas recovery services to electric power systems, the relative error of the measurement of the flow rate rose by a factor of five when the flow rate fell below 10 percent of the maximum full-scale value. If the error of a flowmeter climbed from 1 percent to 5 percent when the flow rate fell below 10 percent of the maximum full-scale value, the measurement of the total mass recovered would have a maximum uncertainty of 1.4 percent, which can result in overall errors above 2 percent in the nameplate capacity measurement as a whole (accounting also for the uncertainties of measured pressures, etc.).

Regarding one commenter's recommendation that we allow weigh scales to be used to measure the quantity of gas filled into new equipment, we are finalizing our proposal at 40 CFR 98.303(b)(4)(ii)(A) to allow use of weigh scales for this measurement.

Comment: Two commenters requested the EPA remove the term ''precise'' from proposed 40 CFR 98.303(b)(10). Both commenters stressed that accuracy is more important. One commenter stated that equipment certified to be accurate

and precise may be difficult to find, and another additionally asserted there is little value in precision.

Response: In the final rule, we are finalizing as proposed the accuracy and precision requirements for gauges, flow meters, and weigh scales used to measure nameplate capacities. To obtain an accurate measurement of the nameplate capacity of a piece of equipment, measurement devices must be both accurate and precise. As discussed in the technical support document for the proposed rule,[18] the term ''accurate'' indicates that multiple measurements will yield an average that is near the true value, while the term ''precise'' indicates that multiple measurements will yield consistent results. A measurement device that is accurate without being precise may show inconsistent results from measurement to measurement, and these individual inconsistent results may be significantly different from the true value even if their average is not. Since measurements of nameplate capacity are generally expected to be taken only once for a particular piece of equipment, the devices on which the individual measurements are taken must be both accurate and precise for the measurements to yield results that are near the true values.

Comment: One commenter suggested redefining the definition of ''insulating gas'' to including any gas with a GWP greater than one (1) and not any fluorinated GHG or fluorinated GHG mixture. The commenter urged that the proposed definition ignores other potential gases that may come onto the market that are not fluorinated but still have a GWP. The commenter stated that defining insulating gas to include any gas with a GWP greater than 1 used as an insulating gas and/or arc quenching gas in electrical equipment would mirror the threshold implemented by the California Air Resources Board and would provide consistency for reporters across Federal and State reporting rules.

Response: In the final rule, the EPA is not requiring electric power systems to track or report emissions of insulating gases with weighted average 100-year GWPs of one or less. Based on a review of the subpart DD data submitted to date, the EPA has concluded that excluding insulating gases with weighted average GWPs of one or less from reporting under subpart DD will have little effect on the accuracy or completeness of the GWP-weighted totals reported under subpart DD or under the GHGRP generally. Between 2011 and 2021, the highest emitting facilities reporting under subpart DD reported SF_6 emissions ranging from 8 to 23 mt (unweighted) or 190,000 to 540,000 $mtCO_2e$. Over the same period, total emissions across all facilities have ranged from 96 to 171 mt (unweighted) or 2.3 to 4.1 million $mtCO_2e$. At GWPs of one, these weighted totals would be equivalent to the unweighted quantities reported, which constitute approximately 0.004% (1/23,500) of the GWP-weighted totals. This does not account for the fact that for the first few years it is sold, equipment containing insulating gases with weighted average GWPs of one or less will make up a small fraction of the total nameplate capacity of the electrical equipment in use. (Electrical equipment has a lifetime of about 40 years, so only a small fraction of the total stock of equipment is retired and replaced each year.) Even in a worst-case scenario where the annual emission rate of the equipment containing a very low-GWP insulating gas was assumed to equal the total nameplate capacity of all the equipment installed (implying an emission rate of 100 percent, higher than any ever reported under the GHGRP), the total GWP-weighted emissions reported under subpart DD would be considerably smaller than those reported under any other subpart: total unweighted nameplate capacities reported across all facilities to date have ranged between 4,847 and 6,996 mt. At GWPs of 1, these totals would fall under the 15,000 and 25,000 $mtCO_2e$ quantities below which individual facilities are eventually allowed to exit the program under the off-ramp provisions, as applicable.

To monitor trends in the replacement of SF_6 by insulating gases with weighted average GWPs less than one, the EPA will continue to track supplies of such insulating gases under subparts OO and QQ and will track deliveries of such insulating gases in equipment or containers under subpart SS.

b. Comments on Revisions To Streamline and Improve Implementation for Subpart DD

Comment: One commenter supported the proposed threshold for subpart DD but wanted the EPA to clarify that reporters that do not think they will fall below the revised reporting threshold or are not otherwise using F–GHGs other than SF_6 do not need to recalculate their emissions to show they must report.

Response: The applicability threshold is for determining whether entities must initially begin reporting to the GHGRP. Facilities that have reported have calculated their emissions more precisely using the mass balance approach. If those calculations have shown that they are eligible to exit the program under the off-ramp provisions of subpart A of part 98 (40 CFR 98.2(i)), they do not need to report again unless facility emissions exceed 25,000 $mtCO_2e$. On the other hand, if the calculations have shown that the facility does not meet the existing off-ramp conditions to exit the program, they must continue reporting regardless of the results of the threshold calculation at 40 CFR 98.301.

R. Subpart FF—Underground Coal Mines

We are finalizing the amendments to subpart FF of part 98 (Underground Coal Mines) as proposed. The EPA received no comments objecting to the proposed revisions to subpart FF; therefore, there are no changes from the proposal to the final rule. The EPA is finalizing two technical corrections to: (1) correct the term ''MCF_i'' in equation FF–3 to subpart FF to revise the term ''$1\text{-}(fH2O)_1$'' to ''$1\text{-}(fH2O)_i$'', and (2) to correct 40 CFR 98.326(t) to add the word ''number'' after the word ''identification'' to clarify the reporting requirement. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal.

S. Subpart GG—Zinc Production

This section discusses the final revisions to subpart GG. We are finalizing amendments to subpart GG of part 98 (Zinc Production) as proposed. The EPA received only supportive comments for the proposed revisions to subpart GG. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart GG. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal.

The EPA is finalizing one revision to add a reporting requirement at 40 CFR 98.336(a)(6) and (b)(6) for the total amount of electric arc furnace (EAF) dust annually consumed by all Waelz kilns at zinc production facilities. The final data elements will only require segregation and reporting of the mass of EAF dust consumed for all kilns. These requirements apply to reporters using either the CEMS direct measurement or mass balance calculation

[18] See ''Technical Support for Proposed Revisions to Subpart DD (2021),'' available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424.

methodologies. Reporters currently collect information on the EAF dust consumed on a monthly basis as part of their existing operations as a portion of the inputs to equation GG–1 to subpart GG; reporters will only be required to sum all EAF dust consumed on a monthly basis for each kiln and then for all kilns at the facility for reporting and entering the information into e-GGRT. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal. We are also finalizing as proposed confidentiality determinations for new data elements resulting from the final revisions to subpart GG, as described in section VI. of this preamble.

T. Subpart HH—Municipal Solid Waste Landfills

We are finalizing several amendments to subpart HH of part 98 (Municipal Solid Waste Landfills) as proposed. In some cases, we are finalizing the proposed amendments with revisions. In other cases, we are not taking final action on the proposed amendments. Section III.T.1. of this preamble discusses the final revisions to subpart HH. The EPA received several comments on proposed subpart HH revisions which are discussed in section III.T.2. of this preamble. We are also finalizing as proposed confidentiality determinations for new data elements resulting from the final revisions to subpart HH, as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart HH

This section summarizes the final amendments to subpart HH. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart HH can be found in this section and section III.T.2. of this preamble. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

The EPA is finalizing several revisions to subpart HH to improve the quality of data collected under the GHGRP. First, the EPA is finalizing revisions to update the factors used in modeling CH_4 generation from waste disposed at landfills in table HH–1 to subpart HH. As explained in the 2022 Data Quality Improvements Proposal, subpart HH uses a model to estimate CH_4 generation that considers the quantity of MSW landfilled, the degradable organic carbon (DOC) content of that MSW, and the first order decay rate (k) of the DOC. Table HH–1 to subpart HH provides DOC and k values that a reporter must use to calculate their CH_4 generation based on the different categories of waste disposed at that landfill and the climate in which the landfill is located. The EPA previously conducted a multivariate analysis of data reported under subpart HH to estimate updated DOC and k values for each waste characterization option. Details of this analysis are available in the memorandum from Meaghan McGrath, Kate Bronstein, and Jeff Coburn, RTI International, to Rachel Schmeltz, EPA, ''Multivariate analysis of data reported to the EPA's Greenhouse Gas Reporting Program (GHGRP), Subpart HH (Municipal Solid Waste Landfills) to optimize DOC and k values,'' (June 11, 2019), available in the docket for this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424. The EPA is finalizing the following changes as proposed:

- For the Bulk Waste option, amending the bulk waste DOC value in table HH–1 from 0.20 to 0.17.
- For the Modified Bulk Waste option, for bulk MSW waste without inerts and (C&D) waste, amending the DOC value from 0.31 to 0.27.
- For the Waste Composition option, adding a DOC for uncharacterized MSW of 0.32, and revising 40 CFR 98.343(a)(2) to reference using this uncharacterized MSW DOC value rather than the bulk MSW value for waste materials that could not be specifically assigned to the streams listed in table HH–1 for the Waste Composition option.

The EPA is also revising the default decay rate values in table HH–1 for the Bulk Waste option and the Modified Bulk MSW option and adding k value ranges for uncharacterized MSW for the Waste Composition Option. The final k values, which have been revised from those proposed, are shown in table 4 of this preamble. The revised defaults represent the average optimal k values derived through an additional optimization analysis conducted in response to comments where the bulk waste DOC value was set to the revised value of 0.17 and optimal k values were determined for each precipitation category.

TABLE 4—REVISED DEFAULT k VALUES

Factor	Subpart HH default	Units
k values for Bulk Waste option and Modified Bulk MSW option		
k (precipitation plus recirculated leachate <20 inches/year)	0.033	yr^{-1}.
k (precipitation plus recirculated leachate 20–40 inches/year)	0.067	yr^{-1}.
k (precipitation plus recirculated leachate >40 inches/year)	0.098	yr^{-1}.
k value range for Waste Composition option		
k (uncharacterized MSW)	0.033 to 0.098	yr^{-1}.

The revisions to the DOC and k values in table HH–1 reflect the compositional changes in materials that are disposed at landfills. These updated factors will allow MSW landfills to more accurately model their CH_4 generation. We are also clarifying in the final rule that starting in RY2025 these new DOC and k values are to be applied for disposal years 2010 and later, consistent with when the compositional changes occurred. Additional information on these revisions and their supporting basis may be found in section III.Q. of the preamble to the 2022 Data Quality Improvements Proposal and in the memorandum ''Revised Analysis and Calculation of Optimal k Values for Subpart HH MSW Landfills Using a 0.17 DOC Default and Timing Considerations'' included in Docket ID. No. EPA–HQ–OAR–2019–0424.

We are also finalizing, as proposed, revisions to account for CH_4 emission events that are not well quantified under the GHGRP including: (1) a poorly operating or non-operating gas collection system; and (2) a poorly operating or non-operating destruction device. The EPA is finalizing, as proposed, revisions and additions to address these scenarios as follows:

- Revising equations HH–7 and HH–8 to more clearly indicate that the ''f_{Rec}'' term is dependent on the gas collection system, to clarify how the equation

applies to landfills that may have more than one gas collection system and may have multiple measurement locations associated with a single gas collection system.

- Clarifying in ''f_{Rec}'' that the recovery system operating hours only include those hours when the system is operating normally. Facilities should not include hours when the system is shut down or when the system is poorly operating (*i.e.,* not operating as intended). Poorly operating systems can be identified when pressure, temperature, or other parameters indicative of system performance are outside of normal variances for a significant portion of the system's gas collection wells.
- For equations HH–6, HH–7, and HH–8, revising the term ''f_{Dest}'' to clarify that the destruction device operating hours exclude periods when the destruction device is poorly operating. Facilities should only include those periods when flow was sent to the destruction device and the destruction device was operating at its intended temperature or other parameter that is indicative of effective operation. For flares, periods when there is no flame present must be excluded from the annual operating hours.

Following consideration of comments received, the EPA is finalizing two minor clarifications of the term ''$f_{Dest,n}$'' in equations HH–7 and HH–8. First, we are removing the redundant phrase ''as measured at the nth measurement location.'' Second, we are removing the word ''pilot'' to clarify that for flares used as a destruction device, the annual operating hours must exclude any period in which no flame is present, either pilot or main. These changes account for variances in flare operation, *e.g.,* flares which may only use a pilot on startup. See section III.T.2. of this preamble for additional information on related comments and the EPA's response.

In the 2023 Supplemental Proposal, we proposed that facilities that conduct surface-emissions monitoring must use that data and correct the emissions calculated in equations HH–6, HH–7, and HH–8 to account for excess emissions when the measured surface methane concentration exceeded 500 ppm based on a correction term added to those equations. We also proposed for facilities not conducting surface-emissions monitoring to use collection efficiencies that are 10-percentage points lower than the historic collection efficiencies in table HH–3 to subpart HH. Following consideration of comments received, we are not taking final action on the surface-emissions monitoring correction term that was proposed. Instead, we are finalizing the proposed lower collection efficiencies in table HH–3 to subpart HH, but applying the reduced collection efficiencies for all reporters under subpart HH. See section III.T.2. of this preamble for additional information on related comments and the EPA's response.

The EPA is also finalizing several revisions to the reporting requirements for subpart HH, including more clearly identifying reporting elements associated with each gas collection system, each measurement location within a gas collection system, and each control device associated with a measurement location. First, we are finalizing revisions to landfills with gas collection systems consistent with the proposed revisions in the methodology, *i.e.,* to separately require reporting for each gas collection systems and for each measurement location within a gas collection system. We are requiring, for each measurement location that measures gas to an on-site destruction device, certain information be reported about the destruction device, including: type of destruction device; the total annual hours where gas was sent to the destruction device; a parameter indicative of effective operation, such as the annual operating hours where active gas flow was sent to the destruction device and the destruction device was operating at its intended temperature; and the fraction of the recovered methane reported for the measurement location directed to the destruction device. We are also requiring reporting of identifying information for each gas collection system, each measurement location within a gas collection system, and each destruction device. We are also finalizing reporting requirements for landfills with gas collection systems to indicate the applicability of the NSPS (40 CFR part 60, subparts WWW or XXX), state plans implementing the EG (40 CFR part 60, subparts Cc or Cf), and Federal plans (40 CFR part 62, subparts GGG and OOO).

In the 2023 Supplemental Proposal, the EPA also sought comment on how other CH_4 monitoring technologies, *e.g.,* satellite imaging, aerial measurement, vehicle-mounted mobile measurement, or continuous sensor networks, might enhance subpart HH emissions estimates. The EPA did not propose, and therefore is not taking final action on, any amendments to subpart HH to this effect. However, the EPA did seek comment on the availability of existing monitoring technologies, and regulatory approaches and provisions necessary to incorporate such data into subpart HH for estimating annual emissions. We will continue to review the comments received along with other studies and may amend subpart HH to allow the incorporation of additional measurement or monitoring methodologies in the future.

2. Summary of Comments and Responses on Subpart HH

This section summarizes the major comments and responses related to the proposed amendments to subpart HH. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart HH.

Comment: Numerous commentors stated that methane detection technology, specifically top-down direct measurement from aerial studies, has greatly improved the ability to observe and quantify emissions from landfills (*e.g.,* Krautwurst, et al., 2017; Cusworth, et al., 2022).[19] [20] Some commenters noted that, among several studies in California, Maryland, Texas, and Indiana, there are discrepancies between observed data collected from these new detection technologies and the estimated emissions from the models that the EPA currently uses. Several commenters pointed to a recent study (Nesser, et al., 2023) using satellite data that highlighted that at 33 of 70 landfills studied, U.S. GHG Inventory landfill emissions are underestimated by 50 percent when compared to the current top-down approaches.[21] These discrepancies indicate methane emissions from landfills may be considerably higher than currently recorded. Some commenters stated that advanced methane monitoring technology has improved significantly in effectiveness and cost, and provided specific input regarding advanced methane monitoring technologies available for landfills and how their data might enhance subpart

[19] Krautwurst, S., et al., (2017). ''Methane emissions from a Californian landfill, determined from airborne remote sensing and in situ measurements.'' Atmos. Meas. Tech. 10:3429–3452. *https://doi.org/10.5194/amt-10-3429-2017.*

[20] Cusworth, D., et al., (2020). ''Using remote sensing to detect, validate, and quantify methane emissions from California solid waste operations.'' Environ. Res. Lett. 15: 054012.

[21] Nesser, H., et al. 2023. High-resolution U.S. methane emissions inferred from an inversion of 2019 TROPOMI satellite data: contributions from individual states, urban areas, and landfills, *EGUsphere* [preprint], *https://doi.org/10.5194/egusphere-2023-946,* 2023.

HH emissions reporting. The commenters pointed to both screening and close-range technologies that would be beneficial for pinpointing leaks or emission sources, and outlined several technologies including satellite imaging, aerial measurements, vehicle-mounted mobile measurement, and continuous sensor networks. The commenters recommended comprehensive monitoring with both screening and close-range technologies to provide full coverage. The commenters suggested the use of these technologies to catch large emission events that are not accounted for in the existing reporting requirements. Commenters noted that the EPA could review submitted reports and activity data to determine how to best quantify the observed large release events as compared to annual reported emissions (*e.g.,* updating f_{Rec} or f_{Dest} values to account for periods of downtime or poor performance not captured that contributed to a large discrepancy).

Other commenters recommended that the EPA create a mechanism under subpart HH for receiving and considering third-party observational data that the EPA could then use to revise reported emissions as necessary. Some commenters suggested the EPA base a threshold for these sources of 100 kg/hour. Commenters also recommended setting assumptions for the duration of the emissions similar to those proposed for subpart W of part 98 (Petroleum and Natural Gas Systems). Some commenters suggested the EPA should embrace for landfills the same tiered methane emissions monitoring approach as is utilized in its proposed rulemaking for the oil and gas sector. Commenters also suggested a tiered approach that combines continuous monitoring ground systems with periodic remote sensing along with approaches for translating methane concentrations from top-down sources to source-specific emission rates. Commenters urged that the sooner the EPA can move toward top-down or facility-wide measurement of emissions for reporting or validation of reported values, the sooner reported and measured emissions would be reconcilable and verifiable. A few commenters also recommended that the EPA facilitate the flow of information from other agencies (the National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), National Institute of Standards and Technology (NIST), and U.S. Department of Energy (DOE)), third parties, and operators to find and mitigate plumes faster.

Several commenters provided recommendations for additional reporting requirements such as gas collection and capture system (GCCS) type and design, destruction device type and characteristics, monitoring technologies, site cover type, construction periods, and compliance issues which may relate to closures of control devices.

Response: The EPA agrees that recent aerial studies indicate methane emissions from landfills may be considerably higher than bottom-up emissions reported under subpart HH for some landfills. Emissions may be considerably higher due to emissions from poorly operating gas collection systems or destruction devices and leaking cover systems. The supplemental proposal included revisions to the monitoring and calculation methodologies in subpart HH to account for these scenarios. In particular, proposed equations HH–6, HH–7, and HH–8 included modifications to incorporate direct measurement data collected from methane surface-emissions monitoring. In the supplemental proposal, we also requested information about other direct measurement technologies and how their data may enhance emissions reporting under subpart HH. We received many responses to our request. Based on the comments received, we are not taking final action at this time regarding the incorporation of other direct measurement technologies for the following reasons. First, most top-down, facility measurements are taken over limited durations (a few minutes to a few hours) typically during the daylight hours and limited to times when specific meteorological conditions exist (*e.g.,* no cloud cover for satellites; specific atmospheric stability and wind speed ranges for aerial measurements). These direct measurement data taken at a single moment in time may not be representative of the annual CH_4 emissions from the facility, given that many emissions are episodic. If emissions are found during a limited duration sampling, that does not necessarily mean they are present for the entire year. And if emissions are not found during a limited duration sampling, that does not mean significant emissions are not occurring at other times. Extrapolating from limited measurements to an entire year therefore creates risk of either over or under counting actual emissions. Second, while top-down measurement methods, including satellite and aerial methods, have proven their ability to identify and measure large emissions events, their detection limits may be too high to detect emissions from sources with relatively low emission rates or that are spread across large areas, which is common for landfills.[22] This is likely why only seven percent of the landfills in the Duren, et al. (2019) study had detectable emissions. The EPA will continue to review additional information on existing and advanced methodologies and new literature studies, and consider ways to effectively incorporate these methods and data in future revisions under subpart HH for estimating annual emissions.

For the oil and gas sector, the super-emitter program that allows third-party measurement data to be submitted was proposed under 40 CFR part 60, subpart OOOOb (87 FR 74702, December 6, 2022). The GHGRP looked to use this information, but we did not develop or propose such a program under the GHGRP. As such, this type of program is beyond the scope of the proposed rule. We will consider whether developing and implementing a similar super-emitter program within subpart HH of part 98 or the overall GHGRP is appropriate under future rulemakings.

We proposed, and are finalizing, several additional reporting elements including, for landfills with a gas collection system, information on the applicability of the NSPS (40 CFR part 60, subparts WWW or XXX), state plans implementing the EG (40 CFR part 60, subparts Cc or Cf), and Federal plans (40 CFR part 62, subparts GGG and OOO). We note that several of the items suggested are already reporting elements. For example, we already require reporting of a description of the gas collection system, such as the manufacturer, capacity, and number of wells, which provides requested information on GCCS type and design. We also proposed and are finalizing reporting requirements for the type of destruction device. We already require reporting of cover type. We consider the reporting requirements to be sufficient based on the current methodologies used to estimate CH_4 emissions. We will consider the need for additional reporting elements if we incorporate additional measurement or monitoring methodologies in future rulemakings.

Comment: Several commentors expressed limited support for the proposed use of surface emission monitoring data to help account for

[22] Duren, et al. 2019. ''California's methane super-emitters.'' *Nature,* Vol. 575, Issue 7781, pp. 180–184, available at *https://doi.org/10.1038/s41586-019-1720-3.* Available in the docket for this rulemaking, Docket ID. No. EPA–HQ–OAR–2023–0234.

emissions from cover leaks. These commenters either recommended that the EPA use more quantitative emission measurement methods instead of surface-emissions monitoring or to require that the surface-emissions monitoring be conducted at 25-foot intervals consistent with California and other state requirements, and to use a lower leaks definition of 25 parts per million volume (ppmv), rather than using the proposed 30-meter intervals (about 98-foot intervals) with leaks defined as concentrations of 500 ppmv or more above background, to help ensure the surface-emissions monitoring identifies all leaks from the landfill's surface. Other commenters opposed the proposed use of a surface-emissions monitoring correction term in equations HH–6, HH–7, and HH–8. One commenter noted that the correction term that the EPA proposed relied on one study conducted over 20 years ago at one landfill in Canada. This commenter cited several other studies [23] [24] [25] [26] that showed significant variability in correlations between surface methane concentrations and methane emissions and indicated that the EPA should not rely on the results of this limited single study. Another commenter suggested that there is nothing special from a technical perspective of 500 ppmv surface concentration that should drive a step function change in correcting for emissions and surface oxidation, as proposed by the EPA. This commenter indicated that there is already uncertainty in the gas collection efficiencies and that including the proposed surface methane concentration term simply adds to the uncertainty. The commenter recommended mandating the use of lower collection efficiencies when there is evidence of a high number of exceedances or a high surface methane concentration, rather than adding the surface methane concentration term to equations HH–6, HH–7, and HH–8. This commenter also cited the work of Dr. Tarek Abichou (Kormi, et al., 2017 and 2018) for using surface concentration measurements to estimate emissions.[27] [28]

Response: After considering comments received and reviewing additional studies, including those cited by the commenters, we are not taking final action on the proposed surface-emissions monitoring correction term at this time.[29] Upon review of the literature studies cited by one commenter (Abichou, et al., 2011; Abidini, 2014; Lando, et al., 2017; Hettiarachchi, et al., 2023), we confirmed that there is significant variability in measured surface concentrations and methane emissions flux across different landfills. The proposed correction factor, attributed to Heroux, et al. (2010),[30] was the smallest of the correlation factors found across the other cited literature studies we reviewed. Based on a preliminary review of the additional study data, a more central tendency estimate of the correction factor term would be four to six times higher than the correction term proposed.

Due to the high uncertainty in the proposed correction factor, we are assessing whether the correction term proposed for equations HH–6, HH–7, and HH–8 is the most appropriate method for developing a site-specific correction for the overall gas collection efficiency for reporters under subpart HH. The approach presented by Kormi, et al. (2017, 2018) uses a Gaussian plume model in conjunction with surface methane concentration measurements to estimate emissions. This approach appears too complex to incorporate into subpart HH. We are also evaluating other direct measurement technologies for assessing more accurate, landfill-specific gas collection efficiencies. Therefore, we decided not to take final action on the proposed correction term for equations HH–6, HH–7, and HH–8 at this time while we consider and evaluate other options. The EPA will continue to review additional information on existing and advanced methodologies and new literature studies and consider ways to effectively incorporate these methods and data in future revisions under subpart HH for estimating annual emissions.

Comment: Numerous commenters cited studies suggesting that subpart HH underestimates the actual methane emissions released from landfills.[31] [32] These commenters noted that the underestimation in subpart HH emissions is primarily due to high default gas collection efficiencies in subpart HH. Two commenters asserted that gas collection efficiencies over 90 percent should not be used. One of these commenters noted that despite its own two-year study indicating otherwise, the EPA uses a 95 percent collection efficiency for landfills with final covers.[33] Two commenters opposed the EPA's use of the Maryland landfill data to support the proposed 10-percentage point decrease in landfill gas collection efficiencies, noting that these gas collection efficiencies were calculated based on modeled methane generation rather than actual methane emissions measurements. One commenter further suggested that the Maryland study was not properly peer-reviewed and is not suitable for use by the EPA in rulemaking according to the EPA's Summary of General Assessment Factors For Evaluating the Quality of Scientific and Technical Information (hereinafter referred to as ''General Assessment Factors'').[34] The commenter further stated that the Maryland study is based on a small subset of landfills that is likely not representative of the sector and the EPA's reliance on that study to support a change to the default collection efficiency table (table HH–3

[23] Abichou, T., J. Clark, and J. Chanton. 2011. ''Reporting central tendencies of chamber measured surface emission and oxidation.'' *Waste Management,* 31: 1002–1008. *https://doi.org/10.1016/j.wasman.2010.09.014.*

[24] Abedini, A.R. 2014. Integrated Approach for Accurate Quantification of Methane Generation at Municipal Solid Waste Landfills. Ph.D. thesis, Dept. of Civil Engineering, University of British Columbia.

[25] Lando, A.T., H. Nakayama, and T. Shimaoka. 2017. ''Application of portable gas detector in point and scanning method to estimate spatial distribution of methane emission in landfill.'' *Waste Management,* 59: 255–266. *https://doi.org/10.1016/j.wasman.2016.10.033.*

[26] Hettiarachchi, H., E. Irandoost, J.P. Hettiaratchi, and D. Pokhrel. 2023. ''A field-verified model to estimate landfill methane flux using surface methane concentration measurements.'' *J. Hazard. Toxic Radioact. Waste,* 27(4): 04023019. *https://doi.org/10.1061/JHTRBP.HZENG-1226.*

[27] Kormi, T., N.B.H. Ali, T. Abichou, and R. Green. 2017. ''Estimation of landfill methane emissions using stochastic search methods.'' *Atmospheric Pollution Research,* 8(4): 597–605. *https://dx.doi.org/10.1016/j.apr.2016.12.020.*

[28] Kormi, T., et al. 2018. ''Estimation of fugitive landfill methane emissions using surface emission monitoring and Genetic Algorithms optimization.'' *Waste Management* 2018, 72: 313–328. *https://dx.doi.org/10.1016/j.wasman.2016.11.024.*

[29] Irandoost, E. (2020). An Investigation on Methane Flux in Landfills and Correlation with Surface Methane Concentration (Master's thesis, University of Calgary, Calgary, Canada). Retrieved from *https://prism.ucalgary.ca. http://hdl.handle.net/1880/111978.*

[30] Héroux, M., C. Guy and D. Millette. 2010. ''A statistical model for landfill surface emissions.'' *J. of the Air & Waste Management Assoc.* 60:2, 219–228. *https://doi.org/10.3155/1047-3289.60.2.219.*

[31] Oonk, H., 2012. ''Efficiency of landfill gas collection for methane emissions reduction.'' *Greenhouse Gas Measurement and Management,* 2:2–3, 129–145. *https://doi.org/10.1080/20430779.2012.730798.*

[32] Nesser, H., et al., 2023. ''High-resolution U.S. methane emissions inferred from an inversion of 2019 TROPOMI satellite data: contributions from individual states, urban areas, and landfills.'' *EGUsphere* [preprint], *https://doi.org/10.5194/egusphere-2023-946.*

[33] ARCADIS, 2012. Quantifying Methane Abatement Efficiency at Three Municipal Solid Waste Landfills; Final Report. Prepared for U.S. EPA, Office of Research and Development, Research Triangle Park, NC. EPA Report No. EPA/600/R–12/003. January. *https://nepis.epa.gov/Exe/ZyPDF.cgi/P100DGTB.PDF?Dockey=P100DGTB.PDF.*

[34] Available at *https://www.epa.gov/sites/default/files/2015-01/documents/assess2.pdf.* Accessed January 9, 2024.

to subpart HH) is inappropriate and will lead to inaccurate reporting of GHG emissions from the sector. This commenter stated that the EPA should continue to rely on the gas collection efficiencies recommended in the Solid Waste Industry for Climate Solutions (''SWICS'') white paper entitled *Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills.*[35] According to the commenter, the SWICS white paper is more comprehensive and relevant than the Maryland study. The commenters noted that the SWICS white paper is being revised and encouraged the EPA to delay revisions to the gas collection efficiency until the revised SWICS white paper is released.

Response: We reviewed the various studies cited by commenters, including available versions of the SWICS white paper. Upon review of these papers and comments received, we maintain our position that the historical collection efficiencies are overstated and that it is appropriate to apply the lower collection efficiency to all landfills. In our review of the SWICS white paper, which was the basis for the historical gas collection efficiencies, we noted that data were omitted due to poor operation of gas collection system. Thus, we consider the historical gas collection efficiencies to be representative of ideal gas collection efficiencies. In our proposal, we required facilities that conduct surface-emission monitoring data to apply a correction factor that would reduce the overall collection efficiency, clearly indicating that we thought the current collection efficiencies are overstated, even for regulated landfills. While we expected that the surface emission correction factor would result in lower emissions than those calculated using the 10-percentage point decrease in collection efficiency, based on our review of other studies correlating surface methane concentrations with methane flux, a more central tendency correlation factor is projected to yield emissions similar to a 10-percentage point decrease in collection efficiency. All the measurement study data we reviewed suggests that current GHGRP collection efficiencies are overstated on average by 10-percentage points or more (Duan, et al., 2022 and Nesser, et al., 2023).[36] In reviewing the data from Nesser, et al. (2023), including the supplemental information,[37] we found that all 38 landfills for which gas collection systems were reported were subject to the NSPS or EG. Comparing the gas collection efficiencies directly reported in the GHGRP, 35 of the 38 landfills had lower or similar measured gas collection efficiencies to those reported in subpart HH. With a 10-percentage point decrease in the default gas collection efficiencies, measured gas collection efficiencies were still at least 10-percentage points lower for 20 of the 38 landfills, approximately equivalent for 13 landfills, and only higher than subpart HH proposed lower default collection efficiencies for 5 of the landfills. Similar low average collection efficiencies were noted by Duan, et al., (2022). Therefore, based on direct measurement data for landfills, we determined it is appropriate to finalize the lower default gas collection efficiencies and apply the lower gas collection efficiency for all landfills.

While the Maryland study data suggests that the gas collection efficiency for voluntary systems may be lower than for regulated gas collection systems, we agree with commenters that these gas collection efficiencies are based on modeled generation rather than measured emissions. The DOC values for individual landfills can vary significantly and the differences observed could be due to differences in the wastes managed at the different Maryland landfills. We could not identify direct measurement study data by which to support further reductions in gas collection efficiencies for voluntary gas collection systems. Therefore, we are providing a single set of gas collection efficiencies for subpart HH reporters to use.

In conclusion, we are finalizing gas collection efficiencies that are lower than those historically provided in subpart HH by 10-percentage points based on comments received and review of recent landfill methane emission measurement studies for landfills with gas collection systems. We had proposed these collection efficiencies for facilities not conducting surface emission monitoring, but we are now finalizing these lower gas collection efficiencies for all landfills.

Comment: Several commenters provided input on the proposed revisions to equations HH–6 through HH–8 to subpart HH to capture emissions from other large release events. Two commenters suggested that the EPA should require monitoring of both the pilot light and flow rate and that the ''f_{Dest}'' term should be excluded during any period the combustion device is not operating properly. The commenters specified that ''f_{Dest}'' should be excluded during any period when the reporter has operational data indicating that the combustion device is not operating according to manufacturer specifications or when the reporter has received credible monitoring data showing an unlit or malfunctioning control device.

One commenter stated that the proposed revisions would be difficult to implement and tend to capture very limited or marginal data. The commenter asserted that gas collection systems by nature require constant adjustment of temperature, pressure, and other parameters or may be subject to frequent repairs that would not be expected to affect the overall control efficiency. The commenter asked the EPA to remove ''normally'' from the first sentence of the proposed definition of ''f_{Rec}'' and remove ''or poor operation, such as times when pressure, temperature, or other parameters indicative of operation are outside of normal variances,'' from the second sentence.

The commenter also expressed concerns regarding how the proposed revisions to ''f_{Dest}'' applies to flares, stating that a large portion of landfill controls use open flares, or are equipped with automatic shutoffs, which have no parameters for monitoring effective operation other than the presence of a flame. The commenter requested the sentence addressing the pilot flame (''For flares, times when there is no pilot flame present must be excluded from the annual operating hours for the destruction device.'') be removed from the proposed revision of ''f_{Dest},'' because it is confusing, unnecessary, and technically incorrect, as a pilot is typically only required during startup.

One commenter also requested the EPA remove the phrase ''. . . as measured at the nth measurement location'' from the first sentence of ''f_{Dest}'' description; the commenter stated the text adds confusion by implying that the time gas is sent to the nth measurement location is equal to the time gas is sent to the control device, which may be incorrect for measurement locations with more than one control device. The commenter also

[35] SCS Engineers. 2009. Current MSW Industry Position and State-of-the-Practice on LFG Collection Efficiency, Methane Oxidation, and Carbon Sequestration in Landfills. Prepared for Solid Waste Industry for Climate Solutions (SWICS). Version 2.2. *https://www.scsengineers.com/wp-content/uploads/2015/03/Sullivan_SWICS_White_Paper_Version_2.2_Final.pdf.*

[36] Duan, Z., Kjeldsen, P., & Scheutz, C. (2022). Efficiency of gas collection systems at Danish landfills and implications for regulations. Waste management (New York, N.Y.), 139, 269–278. *https://doi.org/10.1016/j.wasman.2021.12.023.*

[37] See *https://egusphere.copernicus.org/preprints/2023/egusphere-2023-946/egusphere-2023-946-supplement.pdf.*

proposed a definition striking out ''The annual operating hours for the destruction device should include only those periods when flow was sent to the destruction device and the destruction device was operating at its intended temperature or other parameter indicative of effective operation.'' The commenter added that because flares and other destruction devices are designed with fail-closed valves or other devices to prevent venting of gas when they are not operating, applying the definition as written overestimates emissions when a measurement location has more than one destruction device and all devices are not operating at the same time.

Response: The EPA agrees with the commenters regarding monitoring the flow rate of the landfill gas; however, a change to the proposed rule is not necessary in this case as the continuous monitoring of the gas flow is already required in 40 CFR 98.343. The EPA disagrees with the comment that ''EPA should likewise specify that f_{Dest} must be excluded during any period when the pilot light and flow rate are not meeting manufacturer specifications for complete combustion.'' Adding this specification to the rule is not necessary as the revision to the definition of f_{Dest} already accounts for this scenario. The proposed revision to the f_{Dest} definition in the supplemental proposal states, ''The annual operating hours for the destruction device should include only those periods when flow was sent to the destruction device and the destruction device was operating at its intended temperature or other parameter indicative of effective operation.'' Thus, if the destruction device has manufacturer specifications for effective operation that are not met during its operation, the revision to the f_{Dest} definition requires those periods to be excluded in the hours for f_{Dest}. We will further evaluate how credible monitoring data may be defined and excluded from f_{Dest} in a future rulemaking.

The EPA disagrees with the proposed edits to the definition of f_{Rec}, which are to remove the word ''normally'' from the first sentence and remove the phrase ''or poor operation, such as times when pressure, temperature, or other parameters indicative of operation are outside of normal variances'' from the second sentence. These edits would allow for all operating hours in the calculation regardless of how the system operated. We asked for comment on what set of parameters should be used to identify poorly operating periods and whether a threshold on the proportion of wells operating outside of their normal operating variance should be included in the definition of f_{Rec} to define periods of poor performance.

With regards to the commenters' input on the definition of f_{Dest}, the EPA agrees with removing ''as measured at the nth measurement location'' from the first sentence of the definition as the commenter notes, ''flares and other destruction devices are designed with fail-closed valves or other devices to prevent venting of gas when they are not operating, keeping that phrase can overestimate emissions when a measurement location has more than one destruction device and all devices are not operating at the same time.'' We are revising this sentence to remove ''as measured at the nth measurement location.'' We disagree with removing from the definition ''For flares, times when there is no pilot flame present must be excluded from the annual operating hours for the destruction device.'' Instead, we are revising this sentence to read ''For flares, times when there is no flame present must be excluded from the annual operating hours for the destruction device.'' We believe the lack of a flame is an indication the flare is not operating effectively. Lastly, we disagree with removing the sentence, ''The annual operating hours for the destruction device should include only those periods when flow was sent to the destruction device and the destruction device was operating at its intended temperature or other parameter indicative of effective operation.'' We believe this sentence is necessary to ensure the calculation of f_{Dest} represents proper operation of the destruction device.

Comment: We received several comments regarding the revised DOC values. Some commenters supported lowering of the default DOC for bulk waste from 0.20 to 0.17, citing similar findings in a 2019 Environmental Research and Education Foundation (EREF) study.[38] These commenters generally opposed the proposed default value of 0.27 for bulk MSW (excluding inerts and construction and demolition (C&D) waste) and the proposed default value of 0.32 for uncharacterized wastes and recommended the use of either the value of 0.19 from the EREF report or the 0.17 value for bulk wastes for these other general waste categories. According to these commenters, the EPA's method for determining the DOC for bulk MSW (excluding inerts and C&D waste) does not comport with how landfills characterize and manage input waste streams, and the high default DOC value for bulk MSW makes the modified bulk MSW option unusable. Other commenters opposed the proposed reduction in bulk waste and bulk MSW default DOC values, indicating that this will lead to lower emissions over the life of the landfill when research indicates emissions inventories of landfill emissions underestimate actual emissions. One commenter referenced a paper (Bahor, et al., 2010) that, according to the commenter, validated the default DOC of MSW to be 0.20.[39] Other commenters noted that many landfill reporters were taking advantage of the composition method by only reporting inerts and uncharacterized wastes. These commenters supported the proposed default value of 0.32 for uncharacterized wastes.

Response: The EPA included a DOC of 0.20 for bulk waste in subpart HH because the data we reviewed circa 2000 to 2010 indicated that was the best fit DOC value.[40] As noted in the memorandum ''Modified Bulk MSW Option Update'' included in Docket ID. No. EPA–HQ–OAR–2019–0424, we have seen a significant decrease in the percentage of paper and paperboard products being landfilled due to increased recycling of these waste streams. This change in the composition of MSW landfilled supports and confirms the drop in DOC from 0.20 to 0.17 over the time period between 2005 and 2011. With respect to the Bahor, et al. (2010) study, it appears that the HHV measurement data was made using data from 1996 to 2006, with biogenic correction factors developed over 2007 and 2008. Based on the timing of the measurements made, agreement with the DOC value of 0.20 is not surprising and consistent with the findings by which we originally used a default DOC value of 0.20. We specifically sought to reassess the average DOC values considering more recent data to account for potential changes in DOC values over the past decade. Based on our analysis, an average DOC value of 0.17 provides a better fit with current landfill practices. Therefore, we are finalizing a revision of the default DOC value to

[38] The Environmental Research & Education Foundation (2019). ''Analysis of Waste Streams Entering MSW Landfills: Estimating DOC Values & the Impact of Non-MSW Materials.'' Available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424.

[39] Bahor, Brian, et al. 2010. ''Life-cycle assessment of waste management greenhouse gas emissions using municipal waste combustor data.'' *Journal of Environmental Engineering* 136.8 (2010): 749–755. *https://doi.org/10.1061/(ASCE)EE.1943-7870.0000189*.

[40] RTI International (2004). Solid Waste Inventory Support—Review Draft: Documentation of Methane Emission Estimates. Prepared for U.S. EPA, Office of Atmospheric Programs, Washington, DC. September 29.

0.17 as proposed. However, we note that the proposed revision was not clear regarding how the new DOC value should be incorporated into the facility's emissions estimate. Some reporters may only begin applying the new DOC value to new wastes being disposed of in 2025 and later years. Other reporters may opt to revise the DOC value for all wastes disposed of in the landfill for all previous disposal years. This could lead to significant discrepancies between emissions reported by reporters with similar landfills and also between the emissions reported for different years by a given reporter. As noted in this discussion, we expect that wastes disposed of prior to 2010 are best characterized using a default DOC value of 0.20 and that wastes disposed of in 2010 and later years are best characterized using a default DOC of 0.17. Therefore, while we are finalizing a revision in the default bulk waste DOC value to 0.17, we are also finalizing clarifications to these revisions to incorporate these revisions consistently across reporters and consistent with the timeframe where the reduction in DOC occurred. Specifically, we are maintaining the historic DOC value of 0.20 for historic disposal years (prior to 2010) and, starting with RY2025, requiring the use of the revised DOC value of 0.17 for disposal years 2010 and later (see memorandum ''Revised Analysis and Calculation of Optimal k values for Subpart HH MSW Landfills Using a 0.17 DOC Default and Timing Considerations'' available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424).

With respect to the proposed DOC value for bulk MSW (excluding inerts and C&D waste), the approach we used to develop the proposed DOC value is consistent with the approach we used when we originally developed and provided the modified bulk waste option following consideration of comments received (75 FR 66450, October 28, 2010). This option was specifically provided to address comments that the waste composition option was too detailed for most landfill operators to use and that landfill operators should have the opportunity to characterize some of the waste received as inerts under the bulk waste option. Because the DOC values for bulk waste option were derived based on the full quantity of waste disposed at landfills, that DOC value for bulk waste intrinsically includes inerts. Therefore, we sought to develop a representative MSW DOC value that excludes inerts for use in the modified bulk MSW option. We disagree that this makes the modified bulk waste option inaccurate or unusable. On the contrary, we find that using the bulk waste DOC value in the modified bulk MSW option would be less accurate for predicting the CH_4 generation for the modified bulk MSW option because the DOC value for bulk waste was determined by the full quantity of waste disposed at landfills including inerts and C&D waste. We also agree with commenters that some reporters are misusing the waste composition option in order to separately account for inerts but then use the bulk waste DOC value for the rest of the MSW. We conducted a multivariant analysis to project the DOC of uncharacterized MSW in landfills for which reporters used the waste composition method and the DOC for this uncharacterized waste was estimated to be 0.32. This agrees well with the proposed DOC value for bulk MSW of 0.27 and confirms that, when facilities separately report inert waste quantities, the DOC for the remaining MSW (excluding inerts and C&D waste) is much higher than suggested by some of the commenters. Consequently, we concluded that our proposed values of 0.27 for bulk MSW (excluding inerts and C&D waste) and 0.32 for uncharacterized waste should be finalized as proposed. Similar to our clarification regarding how the revision in bulk waste DOC must be implemented, we are finalizing requirements to use the current bulk MSW (excluding inerts and C&D waste) DOC value of 0.31 for historic disposal years (prior to 2010) and requiring the use of the revised bulk MSW (excluding inerts and C&D waste) DOC value of 0.27 for disposal years 2010 and later, consistent with the timeline for which these values were determined. Because we have no method to indicate a change in DOC for uncharacterized wastes, we are requiring the use of the new DOC for uncharacterized waste using the composition option of 0.32 for all years for which the composition option was used.

We also disagree with commenters that having a high bulk MSW default DOC value makes the modified bulk MSW method unusable. Based on waste characterization data as reported for RY2022, approximately 23 percent use the modified bulk MSW method, which suggests a quarter of the reports find the modified bulk MSW option useful. While this option was specifically provided for landfills that accept large quantities of C&D waste or inert waste streams, we disagree that its use should be restricted to that scenario. There is significant variability in the DOC of bulk waste from landfill to landfill. There are many cases when the quantity of landfill gas recovered exceeds the modeled methane generation rates. This is a clear indication that the default DOC (and/or k value) is too low. For reporters with high actual CH_4 generation rates, as noted by the quantity of CH_4 recovered at the landfill, we find that the use of the modified bulk MSW option is appropriate for these reporters and would likely provide a more accurate estimate of modeled CH_4 generation, even if these reporters do not have large quantities of inert or C&D wastes. We encourage reporters that have CH_4 recovery rates exceeding their modeled CH_4 generation rates to evaluate and use, as appropriate, the modified bulk MSW or waste composition options in order to more accurately estimate modeled methane generation.

Comment: Several comments supported revisions to decay rate constants (k values) that more closely match the IPCC recommendations. Other comments were critical of the revisions, suggesting the proposed k values were too high. One commenter noted that the original k values were developed using a separate analysis considering the use of the CH_4 generation potential (Lo, analogous to the DOC input for the first order decay model used in subpart HH). The commenter noted that optimizing k and DOC values simultaneously can lead to extreme and unrealistic values because an error in one value causes an offsetting error in the other. The commenter also stated that the EPA allowed an extremely wide range for the ''optimized'' k values (*e.g.,* 0.001 to 0.400 for dry climates) and should have constrained the k values to more realistic values. The commenter also suggested that the EPA rely on its own research as published in PLoS ONE (Jain et al., 2021).[41] Finally, the commenter suggested that multivariant analysis was not peer-reviewed and therefore does not appear to comply with the General Assessment Factors.

Response: The EPA reviewed the documentation supporting the existing DOC and k value defaults used for subpart HH (RTI International, 2004). Importantly, the memorandum documents that the development of the DOC and k values utilized a two-step process. The first step was a

[41] Jain, P., et al. 2021. ''Greenhouse gas reporting data improves understanding of regional climate impact on landfill methane production and collection.'' PLoS ONE, at 1–3, 10–11 (Feb. 26, 2021), available at *https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0246334.*

multivariant analysis, similar to the analysis conducted in 2019 (McGrath et al., 2019), which was used to determine an optimal DOC value. The second step was to determine optimal k values for each precipitation range using the optimal DOC value from the multivariant analysis. At proposal, we used the DOC and k values determined directly from the multivariant analysis. After consideration of the comments received and the approach used historically, we determined that it would be more appropriate to determine optimal k values once the default DOC value is established. We agree with the commenter that using a fixed DOC value (set at the proposed bulk waste DOC value of 0.17), we expect that the optimal k values in a single-variable analysis would have less variability and better predict methane generation across landfills when using the revised DOC default. Therefore, we conducted this second step of the analysis using the original data set for facilities using the bulk waste approach to determine the optimal k values for these landfills, given a default DOC value of 0.17 (the bulk waste DOC value recommended in the McGrath et al. (2019) memo based on the multivariant analysis).

We also reviewed additional literature to assess reasonable ranges for k values. We found that the lowest allowed k value of 0.001 yr^{-1} was unrealistic and much lower than any k value reported in the literature. We identified some studies suggesting a k value of 0.4 yr^{-1} is possible for wet landfills (or landfills using leachate recirculation). After our review of the additional literature, we revised the allowable k value range from 0.001–0.4 yr^{-1} to 0.007–0.3 yr^{-1}. The results of applying this second step of the analysis, consistent with the approach used previously to develop default k values, indicate that the optimal k values for dry, moderate, and wet climates were 0.033, 0.067, and 0.098 yr^{-1}, respectively (see memorandum ''Revised Analysis and Calculation of Optimal k Values for Subpart HH MSW Landfills Using a 0.17 DOC Default and Timing Considerations'' available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424). These values are lower than those developed from the multivariant analysis, but still significantly higher than the current defaults in subpart HH. These values also align well with IPCC recommended k value ranges for moderately decaying waste and the k values reported by Jain, et al. (2021). Table 5 of this preamble presents a comparison of the old subpart HH and revised k values with the values recommended by the IPCC and Jain, et al. (2021).

TABLE 5—COMPARISON OF FINALIZED DECAY RATE CONSTANTS (k VALUES IN YRS^{-1}) BY PRECIPITATION RANGE

Precipitation zone	Historic subpart HH and inventory default decay value (k)	Revised subpart HH default decay value (k)	IPCC default decay value (k) ranges for moderately decaying waste	Jain, et al. (2021), recommended k value (and 95% confidence range)
Dry (<20 inches/year)	0.02	0.033	0.04–0.05	0.043 (0.033–0.054)
Moderate (20–40 inches/year)	0.038	0.067	0.04–0.1	0.074 (0.061–0.088)
Wet (>40 inches/year)	0.057	0.098	0.07–0.17	0.090 (0.077–0.105)

Similar to the incorporation of the new DOC values, we note that the proposed revision was not clear regarding how the new k values for bulk waste under the ''Bulk waste option'' and bulk MSW under the ''Modified bulk MSW option'' should be incorporated into the facility's emissions estimate. While we are finalizing revisions for the default bulk waste k values for dry, moderate, and wet climates as 0.033, 0.067, and 0.098 yr^{-1}, respectively, we are also finalizing clarifications to these revisions to incorporate these revisions consistently across reporters and consistent with the timeframe where the reduction in DOC occurred. Specifically, starting in RY2025, we are maintaining the historic k values of 0.20, 0.038, and 0.057 yr^{-1} for historic disposal years (prior to 2010) and requiring the use of the revised k values of 0.033, 0.067, and 0.098 yr^{-1} for disposal years 2010 and later. We are finalizing requirements under the modified bulk waste MSW option to use the current bulk MSW (excluding inerts and C&D waste) k values of 0.02 to 0.057 yr^{-1} for historic disposal years (prior to 2010) and requiring the use of the revised bulk MSW (excluding inerts and C&D waste) k values of 0.033 to 0.098 yr^{-1} for disposal years 2010 and later, consistent with the timeline for which these values were determined. Because we have no method to indicate a change in k value for uncharacterized wastes, we are requiring the use of the new k values for uncharacterized waste using the composition option of 0.033 to 0.098 for all years for which the composition option was used.

With respect to compliance with the General Assessment Factors, we considered a wide variety of information, including peer-reviewed material, when developing our proposed and final k values. While our technical support documents are not formally peer reviewed at proposal, we consider the proposal/public review process to be an adequate forum for public review of our analysis and conclusions. After considering the public comments received, we revised our analysis to more closely match the original approach used to determine default k values. We also adjusted our allowable range for k values based on public comment and additional literature review. All information we have reviewed indicate that the historic subpart HH k values are too low and that the values we determined in our re-analysis of the data will provide improved methane generation estimates. For these reasons, we are finalizing revised k values for subpart HH of 0.033, 0.067, and 0.098 yr^{-1} for dry, moderate, and wet climates, respectively. These k values apply to bulk waste, bulk MSW, and uncharacterized MSW, as proposed.

U. Subpart OO—Suppliers of Industrial Greenhouse Gases

We are finalizing several amendments to subpart OO of part 98 (Suppliers of Industrial Greenhouse Gases) as proposed. Section III.U.1. of this preamble discusses the final revisions to subpart OO. The EPA received comments on the proposed revisions to subpart OO which are discussed in section III.U.2. of this preamble. We are also finalizing as proposed confidentiality determinations for new data elements resulting from the revisions to subpart OO as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart OO

This section summarizes the final amendments to subpart OO. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart OO can be found in this section and section III.U.2. of this preamble. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

The EPA is finalizing several revisions to subpart OO of part 98 that will improve the quality of the data collection under the GHGRP. First, we are adding a requirement at 40 CFR 98.417(c)(7) for bulk importers of F–GHGs to include, as part of the information required for each import in the annual report, the customs entry number. The customs entry number is provided as part of the U.S. Customs and Border Protection (CBP) Form 7501: Entry Summary and is assigned for each filed CBP entry for each shipment. The EPA has made one minor clarification from proposal. We initially proposed the requirement as the ''customs entry summary number''; the final rule modifies 40 CFR 98.416(a)(7) to clarify the requirement to the ''customs entry number,'' which is associated with the CBP Form 7501, ''Entry Summary.''

As proposed, we are adding a reporting requirement at 40 CFR 98.416(k) that suppliers of N_2O, saturated PFCs, SF_6, and fluorinated HTFs identify the end uses for which the N_2O, SF_6, saturated PFC, or fluorinated HTF is used and the aggregated annual quantities of N_2O, SF_6, each saturated PFC, or each fluorinated HTF transferred to each end use, if known. As discussed in the proposed rules, this requirement is based on a similar requirement in subpart PP to part 98 (Suppliers of Carbon Dioxide) and is intended to provide additional insight into the identities and magnitudes of the uses of these compounds, which are currently less well understood than those of other industrial GHGs such as HFCs, although the GWP-weighted totals supplied are relatively large.

The EPA is also finalizing a clarification to the reporting requirements for importers and exporters of F–GHGs, F–HTFs, or N_2O, to revise the required reporting of ''commodity code,'' which is required for importers at 40 CFR 98.416(c)(6) and for exporters at 40 CFR 98.416(d)(4), to clarify that reporters should submit the Harmonized Tariff System (HTS) code for each F–GHG, F–HTF, or N_2O shipped. Reporters will enter the full 10-digit HTS code with decimals, to extend to the statistical suffix, as it was entered on related customs forms. See section III.S. of the preamble to the 2022 Data Quality Improvements Proposal for additional information on the EPA's rationale for these changes.

As discussed in section III.A.1.b. of this preamble, we are finalizing related revisions to the definition of ''fluorinated HTF,'' previously included in subpart I of part 98 (Electronics Manufacturing), and to move the definition to subpart A of part 98 (General Provisions), to harmonize with the changes to subpart OO.

Finally, we are finalizing revisions to 40 CFR 98.416(c) and (d) to clarify that certain exceptions to the reporting requirements for importers and exporters are voluntary, consistent with our original intent. To implement this change, we are finalizing revisions to insert ''importers may exclude'' between ''except'' and ''for shipments'' in the first sentence of § 98.416(c) and (d), deleting the ''for.'' We are also finalizing revisions to clarify that imports and exports of transshipments will both have to be either included or excluded for any given importer or exporter, and we are finalizing a similar clarification for heels. These changes ensure that importers and exporters treat the exceptions consistently. See section III.K. of the preamble to the 2023 Supplemental Proposal for additional information on these revisions and their supporting basis.

In the 2023 Supplemental Proposal, the EPA proposed a requirement at 40 CFR 98.416(c) for bulk importers of F–GHGs to provide, for GHGs that are not regulated substances under 40 CFR part 84 (Phasedown of Hydrofluorocarbons), copies of the corresponding U.S. CBP entry forms (*e.g.,* CBP Form 7501) in their annual report. Following consideration of public comments received on a similar proposed revision to subpart QQ of part 98 (Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged Equipment and Closed-Cell Foams), including concerns regarding the availability of this information and the potential burden of submitting large volumes of entry forms, the EPA is not taking final action on the proposed revision to subpart OO. See section III.W. of this preamble for additional information.

2. Summary of Comments and Responses on Subpart OO

This section summarizes the major comments and responses related to the proposed amendments to subpart OO. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart OO.

Comment: One commenter requested that we clarify that chemical supply ''end use'' refers to industry category only, such as electronics or semiconductor use, and does not refer to more specific uses. The commenter recommended that specific purchases and purposes of chemical use should be considered industry confidential business information and therefore protected from public disclosure. The commenter also noted that chemical suppliers or distributors do not typically have visibility to end use, particularly specific end use categories.

Response: As discussed in section VI. of this preamble, we are planning to finalize our proposed determination that the two new subpart OO data elements (the end use(s) to which the N_2O, SF_6, each PFC, or each fluorinated HTF is transferred and the aggregated annual quantity of the GHG that is transferred to that end use application) are ''Eligible for Confidential Treatment.'' This will protect the data from public disclosure. Regarding suppliers' knowledge of the uses of compounds within each industry, suppliers are required to report the end uses only ''if known.'' For N_2O, SF_6, and saturated PFCs, the end uses that we identified in the proposed rule coincided with individual industries and not specific uses within those industries. For fluorinated HTFs, the end uses that we identified in the proposed rule coincided with some specific uses within industries, such as cleaning versus temperature control within the electronics industry. This was because different end uses, even within the same industry, have different emission patterns, which affect the relationship between emissions and consumption of these compounds. (For example, end uses that quickly emit the F–HTF, such as cleaning, are expected to have emissions that are close to consumption, whereas end uses that store the F–HTF, such as process cooling, may have emissions that are less than half of consumption.) However, the electronics industry, unlike other industries that

use F–HTFs, reports its F–HTF emissions to EPA. Thus, in the subpart OO electronic reporting form, we are planning to list ''electronics manufacturing'' (including manufacturing of semiconductors, MEMS, photovoltaic cells, and displays), and not specific uses within electronics manufacturing, among the end uses whose consumption of the fluorinated HTF will be reported.

V. Subpart PP—Suppliers of Carbon Dioxide

We are finalizing several amendments to subpart PP of part 98 (Suppliers of Carbon Dioxide) as proposed. This section discusses the final revisions to subpart PP. The EPA received comments on the proposed revisions to subpart PP. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart PP.

The EPA is finalizing several revisions to subpart PP to improve the quality of the data collected from this subpart. As proposed, we are adding new 40 CFR 98.420(a)(4) and a new definition to 40 CFR 98.6 to explicitly include direct air capture (DAC) as a capture option under subpart PP. Unlike conventional capture sources where CO_2 is separated during the manufacturing or treatment phase of product stream, DAC captures CO_2 from ambient air using aqueous or solid sorbents, which is then processed into a concentrated stream for utilization or injection underground. This final rule provides that DAC, ''with respect to a facility, technology, or system, means that the facility, technology, or system uses carbon capture equipment to capture carbon dioxide directly from the air. DAC does not include any facility, technology, or system that captures carbon dioxide (1) that is deliberately released from a naturally occurring subsurface spring or (2) using natural photosynthesis.''

The EPA is also finalizing an amendment to the definition of ''carbon dioxide stream'' in 40 CFR 98.6 to add ''captured from ambient air (*e.g.,* direct air capture)'' to the definition so that it reads, ''Carbon dioxide stream means carbon dioxide that has been captured from an emission source (*e.g.,* a power plant or other industrial facility), captured from ambient air (*e.g.,* direct air capture), or extracted from a carbon dioxide production well plus incidental associated substances either derived from the source materials and the capture process or extracted with the carbon dioxide.''

We are finalizing harmonizing changes to 40 CFR 98.422, 98.423, 98.426, and 98.427 to add references to DAC into the reporting requirements. The final rule also amends 40 CFR 98.426 as proposed to add additional reporting requirements in paragraph (i) to require DAC facilities to report the annual quantities and sources (*e.g.,* non-hydropower renewable sources, natural gas, oil, coal) of on-site and off-site sourced electricity, heat, and combined heat and power used to power the DAC plant. These quantities must represent the electricity and heat used starting from the air intake at the facility and ending with the compressed CO_2 stream (*i.e.,* the CO_2 stream ready for supply for commercial applications or, if maintaining custody of the stream, sequestration or injection of the stream underground). These quantities must be provided per energy source, if known. For electricity provided to the DAC plant from the grid, reporters must additionally provide identifying information for the facility and electric utility company. In addition, for on-site sourced electricity, heat, and combined heat and power, DAC facilities must indicate whether flue gas is also captured by the DAC process unit. These changes will aid the EPA in understanding this emerging technology at facilities that utilize DAC and in better understanding potential net emissions impacts associated with DAC facilities (particularly given that interest in DAC is primarily intended to be a carbon removal technology to achieve climate benefits). See section III.T. of the preamble to the 2022 Data Quality Improvements Proposal for additional information on the EPA's rationale for these changes.

The EPA is finalizing two additional revisions to improve data quality. First, we are finalizing the addition of a data element to 40 CFR 98.426(f) that will require suppliers to report the annual quantity of CO_2 in metric tons that is transferred for use in geologic sequestration with EOR subject to new subpart VV to part 98 (Geologic Sequestration of Carbon Dioxide With Enhanced Oil Recovery Using ISO 27916). To inform the revision of the subpart PP electronic reporting form, the EPA also sought comment on potential end use applications to add to 40 CFR 98.426(f), such as algal systems, chemical production, and mineralization processes, such as the production of cements, aggregates, or bicarbonates. However, because 40 CFR 98.426(f) already includes a reporting category for ''other,'' the existing rule already provides flexibility for this reporting, and we are not taking final action on the addition of specific end-use applications to 40 CFR 98.426 at this time. The EPA may consider the addition of other end-use applications in a future rulemaking.

Second, the EPA is finalizing as proposed that 40 CFR 98.426(h) will apply to any facilities that capture a CO_2 stream from a facility subject to 40 CFR part 98 and supply that CO_2 stream to facilities that are subject to either subpart RR (Geologic Sequestration of Carbon Dioxide) or new subpart VV. The revised paragraph will no longer apply only to suppliers that capture CO_2 from EGUs subject to subpart D (Electricity Generation), but also to suppliers that capture CO_2 from any direct emitting facility that is subject to 40 CFR part 98 and transfer to facilities subject to subparts RR or VV. Reporters must provide the facility identification number associated with the facility that is the source of the captured CO_2 stream, each facility identification number associated with the annual GHG reports for each subpart RR and subpart VV facility to which CO_2 is transferred, and the annual quantity of CO_2 transferred to each subpart RR and VV facility. See section III.L. of the preamble to the 2023 Supplemental Proposal for additional information.

The EPA also requested comment on, but did not propose, expanding the requirement at 40 CFR 98.426(h) such that facilities subject to subpart PP would report transfers of CO_2 to any facilities reporting under 40 CFR part 98, not just those subject to subparts RR and VV. This would include reporting the amount of CO_2 transferred on an annual basis as well as the relevant GHGRP facility identification numbers. The EPA further requested comment on whether information regarding additional end uses would be available to facilities. Following consideration of public comments, we are not extending the reporting requirements at this time but may consider doing so in a future rulemaking.

We are finalizing, with revisions, related confidentiality determinations for data elements resulting from the revisions to subpart PP as described in section VI. of this preamble.

W. Subpart QQ—Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged Equipment and Closed-Cell Foams

We are finalizing the amendments to subpart QQ of part 98 (Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged

Equipment and Closed-Cell Foams) as proposed. In some cases, we are finalizing the proposed amendments with revisions. Section III.W.1. discusses the final revisions to subpart QQ. The EPA received several comments on proposed subpart QQ revisions which are discussed in section III.W.2. We are also finalizing as proposed confidentiality determinations for new data elements resulting from the final revisions to subpart QQ, as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart QQ

This section summarizes the final amendments to subpart QQ. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart QQ can be found in this section and section III.W.2. of this preamble. Additional rationale for these amendments are available in the preamble to the 2023 Supplemental Proposal.

We are finalizing two revisions from the 2023 Supplemental Proposal. We are finalizing requirements for importers and exporters of fluorinated GHGs contained in pre-charged equipment or closed-cell foams to include, for each import and export, the HTS code (for importers, at 40 CFR 98.436(a)(7)) and the Schedule B code (for exporters, at 40 CFR 98.436(b)(7)) used for shipping each equipment type. These requirements are consistent with the final revisions to subpart OO of part 98 (Suppliers of Industrial Greenhouse Gases), which clarify that reporters should submit the HTS code for each shipment, as discussed in section III.U. of this preamble. See section III.S. of the preamble to the 2023 Supplemental Proposal for additional information on the EPA's rationale for these changes.

The EPA also proposed to revise 40 CFR 98.436 to add a requirement to include collecting copies of the U.S. CBP entry form (*e.g.,* CBP form 7501) for each reported import, which are currently maintained as records under 40 CFR 98.437(a). Following consideration of public comments, the EPA is not taking final action on the proposed requirement to submit copies of each U.S. CBP entry form. See section III.W.2. of this preamble for a summary of the related comments and the EPA's response.

2. Summary of Comments and Responses on Subpart QQ

This section summarizes the major comments and responses related to the proposed amendments and supplemental amendments to subpart QQ. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart QQ.

Comment: Several commenters contested the EPA's proposed requirements to collect a copy of the corresponding U.S. CBP entry form (*e.g.,* Form 7501) for each reported import in 40 CFR 98.436. Some commenters asserted that the information available in the forms is currently provided electronically to CBP through the Automated Commercial Environment (ACE) and should be available to the EPA within the need for reporters to develop or submit copies. The commenters noted that this information should be sufficient to identify which entries are subject to data requirements under subpart QQ. Commenters recommended that the EPA should coordinate with CBP through established bodies (*e.g.,* the Border Interagency Executive Council and Commercial Targeting and Analysis Center, to which the EPA already participates) to identify and utilize this data. One commenter specifically recommended that the EPA review the Entry Summary Line Detail Report, which would show the total quantity reported for entry summary lines by tariff number for the reported unit of measure. The commenters stated that such reports capture the actual data in CBP's system, as filed by importers, and should be sufficient to ensure that the Agency is able to improve the verification and accuracy of the data it collects. One commenter expressed that if the EPA is unable to identify applicable entries through more efficient means, importers should only be asked to identify specific entry numbers that will allow the EPA to identify the applicable electronic submissions within ACE.

Commenters objected to the implied submission of hard-copy entry records as an unnecessary administrative burden. Commenters stated that the proposed requirement runs counter to CBP's longstanding effort to collect import data and documents electronically. One commenter stated that submittal of the border crossing document would necessitate a substantial amount of additional work and resources to comply, including gathering documentation from multiple sources prior to annual reporting. Another commenter noted that in some cases, importers could be required to file over 70,000 entries or forms. One commenter stated that this would require at least 1,300 manual searches for the appropriate forms for each entry. Commenters urged that this would be prohibitively expensive and burdensome. One commenter pointed out that this would require substantial modifications to automakers' existing information systems and processes for their GHG and related reporting obligations. Other commenters noted that paper form requirements would obfuscate industry efforts to further automate their record-keeping and reporting systems. One commenter added that the increased volume of documentation would likely put much more pressure on businesses than they can manage based on the current requirement to file data by March 31st of the year following the reporting year.

One commenter stated that the CBP forms would merely confirm the amount of foam board imported or exported and would not validate the F–GHG quantity which is the intent of the report. The commenter continued that, even if border documents were provided, it would be impossible for the EPA to validate the current reports as the calculations involved to provide the volume of F–gas per board foot would require detailed technical knowledge, including density of the foam board.

Some commenters asserted that the entry form requirement runs counter to Executive Order 13659 and 19 U.S.C. 1411(d), as amended by sections 106 and 107 of the Trade Facilitation and Trade Enforcement Act of 2015, which advance the goal of providing for electronic transmission of import data and seek to eliminate the need for duplicative information submissions across U.S. government agencies with regulatory authority related to goods entered or imported into the United States.

Other commenters questioned the EPA's requirements to require reporting of the HTS) code for each type of pre-charged equipment or closed-cell foam imported and/or the Schedule B code for each type of pre-charged equipment or closed-cell foam exported. One commenter questioned whether the inclusion of both HTS codes and Schedule B codes is necessary for validation of the data that is currently collected, as all polystyrene foams use the same codes. The commenter urged that requiring more than one type of document would prove redundant in showing product type; be burdensome for manufacturers and for the EPA; and would not provide any additional

clarity or validation to the current report.

Another commenter stated that only the border crossing document (which includes the customs tariff number, with the first six digits of an HTS and Schedule B number) should be required as part of the annual report. The commenter noted that these border crossing documents share highly sensitive information such as quantity and price, so should be handled securely. One commenter reiterated that all data proposed to be collected is, and would be, considered highly confidential business information. The commenter added that access to this type of information is restricted internally, which adds complexity to who could manage and deal with the processing of this documentation within facilities.

Response: The EPA is revising the final rule to remove the requirement for reporters to submit copies of their U.S. CBP form 7501. Following consideration of comments received, it has been determined that annually reporting these documents could pose a significant burden for many reporters. Therefore, the EPA is not adopting the proposed data reporting requirement in the final rule.

The EPA is finalizing the proposed requirement to report HTS codes (for imports) and Schedule B codes (for exports) to assist the Agency in verification of data. This requirement will allow the EPA to better compare reported GHGRP data with data from other government sources, specifically CBP records. As only one type of code (HTS or Schedule B) will be required based on whether the shipment is an import or export, this will not require the reporting of redundant information to the EPA. Furthermore, we are making ''No Determination'' of confidentiality for this data element. ''No Determination'' means that the EPA is not making a confidentiality determination through rulemaking at this time. If necessary, the EPA will evaluate and determine the confidentiality status of this data on a per-facility basis in accordance with the provisions of 40 CFR part 2, subpart B.

X. Subpart RR—Geologic Sequestration of Carbon Dioxide

We are finalizing amendments to subpart RR of part 98 (Geologic Sequestration of Carbon Dioxide) as proposed. This section discusses the substantive final revisions to subpart RR. The EPA received only one supportive comment for subpart RR. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart RR. Additional rationale for these amendments is available in the preamble to the 2023 Supplemental Proposal.

We are adding a definition for ''offshore'' to 40 CFR 98.449 to mean ''seaward of the terrestrial borders of the United States, including waters subject to the ebb and flow of the tide, as well as adjacent bays, lakes or other normally standing waters, and extending to the outer boundaries of the jurisdiction and control of the United States under the Outer Continental Shelf Lands Act.'' This definition clarifies the applicability of subpart RR to offshore geologic sequestration activities, including on the outer continental shelf. Additional rationale for these amendments is available in the preamble to the 2023 Supplemental Proposal.

Y. Subpart SS—Electrical Equipment Manufacture or Refurbishment

We are finalizing several amendments to subpart SS of part 98 (Electrical Equipment Manufacture or Refurbishment) as proposed. In some cases, we are finalizing the proposed amendments with revisions. Section III.Y.1. of this preamble discusses the substantive final revisions to subpart SS. The EPA received several comments on the proposed revisions to subpart SS which are addressed in section III.Q.2. of this preamble. We are also finalizing as proposed confidentiality determinations for new data elements resulting from the revisions to subpart SS as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart SS

This section summarizes the final amendments to subpart SS. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other final revisions to 40 CFR part 98, subpart SS can be found in this section and section III.Y.2. of this preamble. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal.

a. Revisions To Improve the Quality of Data Collected for Subpart SS

The EPA is finalizing several revisions to subpart SS to improve the quality of the data collected from this subpart. We are generally finalizing as proposed revisions to the calculation, monitoring, and reporting requirements of subpart SS (at 40 CFR 98.452, 98.453, 98.454, and 98.456) to require reporting of additional F–GHGs as defined under 40 CFR 98.6, except electrical equipment manufacturers and refurbishers will not be required to report emissions of insulating gases with weighted average GWPs of one (1) or less. However, they will be required to report the quantities of insulating gases with weighted average GWPs of one or less, as well as the nameplate capacities of the associated equipment, that they transfer to their customers. To implement these revisions, we are finalizing revisions that redefine the source category at 40 CFR 98.450 to include equipment containing ''fluorinated GHGs (F–GHG), including but not limited to sulfur-hexafluoride (SF_6) and perfluorocarbons (PFCs).'' The changes also apply to the threshold in 40 CFR 98.451, which we are revising as discussed in section III.Y.1. of this preamble. Facilities also must consider additional F–GHGs purchased by the facility in estimating emissions for comparison to the threshold.

The revisions to subpart SS include the addition of a new equation SS–1 in the reporting threshold at 40 CFR 98.451 (discussed in section III.Y.b. of this preamble) and a new equation SS–2 in the GHGs to report at 40 CFR 98.452. Equation SS–2 is also used in the definition of ''reportable insulating gas,'' discussed in this section of the preamble. We are also making minor revisions to equations SS–1 through SS–6 (which we are renumbering as SS–3 through SS–8 to accommodate new equations SS–1 and SS–2) to incorporate the estimation of emissions from all F–GHGs within the existing calculation methodology. To account for the possibility that the same fluorinated GHG could be a component of multiple reportable insulating gases, we are inserting in the final rule a summation sign at the beginning of the right side of equation SS–3 to ensure that emissions of each fluorinated GHG i are summed across all reportable insulating gases j. In addition, we are updating the monitoring and quality assurance requirements to account for emissions from additional F–GHGs, and harmonizing revisions to the reporting requirements such that reporters account for the mass of each F–GHG at the facility level.

We are also finalizing the proposed definition of ''insulating gas'' and adding the term ''reportable insulating gas,'' which is defined as ''an insulating gas whose weighted average GWP, as calculated in equation SS–2, is greater

than one. A fluorinated GHG that makes up either part or all of a reportable insulating gas is considered to be a component of the reportable insulating gas.'' This term is intended to distinguish between insulating gases whose emissions must be reported under subpart SS and insulating gases whose emissions are not required to be reported under subpart SS (although, as noted above, the quantities of all insulating gases supplied to customers must be reported). In many though not all cases, we are also replacing occurrences of the proposed phrase ''fluorinated GHGs, including PFCs and SF_6'' with ''fluorinated GHGs that are components of reportable insulating gases.'' In addition, we are finalizing revisions to add reporting of an ID number or descriptor for each insulating gas and the name and weight percent of each insulating gas reported. The EPA has also made one minor clarification from proposal. We initially proposed 40 CFR 98.456(u) to require reporting of an ID number or descriptor for each unique insulating gas. To clarify the applicability of this requirement for those gases mixed on-site, the final rule clarifies that facilities must report an ID number or other appropriate descriptor that is unique to the reported insulating gas, and for each ID number or descriptor reported, the name and weight percent of each fluorinated gas in the insulating gas. See section III.U.1. of the preamble to the 2022 Data Quality Improvements Proposal for additional information on these revisions and their supporting basis.

b. Revisions To Streamline and Improve Implementation for Subpart SS

To account for changes in the usage of certain GHGs and reduce the likelihood that the reporting threshold will cover facilities with emissions well below 25,000 $mtCO_2e$, we are generally finalizing revisions to the applicability threshold of subpart SS as proposed. (The one change is the introduction of the term ''reportable insulating gas,'' as described in this section III.Y. of the preamble.) The revisions remove the consumption-based threshold at 40 CFR 98.451 and instead require facilities to estimate total annual GHG emissions for comparison to the 25,000 $mtCO_2e$ threshold by introducing a new equation, equation SS–1. The equation SS–1 continues to be based on the total annual purchases of insulating gases, but establishes an updated comparison to the threshold, and accounts for the additional fluorinated gases reported by industry. Potential reporters are required to account for the total annual purchases of all reportable insulating gases and multiply the purchases of each reportable insulating gas by the GWP for each F–GHG and the emission factor of 0.10 (or 10 percent). The final rule threshold methodology is more appropriate because it represents the actual fluorinated gases used by a reporter; these revisions also streamline the reporting requirements to focus Agency resources on the substantial emission sources within the sector. Additionally, the changes revise the inclusion of subpart SS in the existing table A–3 to subpart A. Because we are providing a method for direct comparison to the 25,000 $mtCO_2e$ threshold, we are removing subpart SS from table A–3 and including the subpart in table A–4 to subpart A. This will require facilities to determine applicability according to 40 CFR 98.2(a)(2) and consider the combined emissions from stationary fuel combustion sources (subpart C), miscellaneous use of carbonates (subpart U), and other applicable source categories. Including subpart SS in table A–4 to subpart A is consistent with other GHGRP subparts that use the 25,000 $mtCO_2e$ threshold included under 40 CFR 98.2(a)(2) to determine applicability. See section III.U.2. of the preamble to the 2022 Data Quality Improvements Proposal for additional information on these revisions and their supporting basis.

2. Summary of Comments and Responses on Subpart SS

This section summarizes the major comments and responses related to the proposed amendments to subpart SS. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart SS.

Comment: One commenter suggested redefining the definition of ''insulating gas'' to including any gas with a GWP greater than one and not any fluorinated GHG or fluorinated GHG mixture. The commenter urged that the proposed definition ignores other potential gases that may come onto the market that are not fluorinated but still have a GWP potential. The commenter stated that defining insulating gas under subpart SS to include any gas with a GWP greater than one used as an insulating gas and/or arc quenching gas in electrical equipment would mirror the threshold implemented by the California Air Resources Board and would provide consistency for reporters across Federal and State reporting rules.

Response: In the final rule, the EPA is not requiring electrical equipment manufacturers and refurbishers to report emissions of insulating gases with weighted average 100-year GWPs of one or less, but the EPA is requiring such facilities to report the quantities of insulating gases with GWPs of one or less, as well as the nameplate capacity of the associated equipment, that they transfer to their customers. Based on a review of the subpart SS data submitted to date, the EPA has concluded that excluding emissions of insulating gases with weighted average GWPs of one or less from reporting under subpart SS will have little effect on the accuracy or completeness of the GWP-weighted totals reported under subpart SS or under the GHGRP generally. Between 2011 and 2021, total SF_6 and PFC emissions across all facilities reporting under subpart SS have ranged from 5 to 15 mt (unweighted) or 120,000 to 350,000 $mtCO_2e$. At GWPs of one, these weighted totals would be equivalent to the unweighted quantities reported, which constitute approximately 0.004% (1/23,500) of the GWP-weighted totals. Even in a worst-case scenario where the annual manufacturer emissions of a very low-GWP insulating gas were assumed to equal the total quantity of that gas transferred from manufacturers to customers (implying an emission rate of 100%, higher than any ever reported under subpart SS), the total GWP-weighted emissions reported under subpart SS would be considerably smaller than those reported under any other subpart: total unweighted quantities shipped to customers reported across all facilities to date have ranged between 196 and 372 mt. At GWPs of 1, these totals would fall well below the 15,000- and 25,000 $mtCO_2e$ quantities below which individual facilities are eventually allowed to exit the program under the off-ramp provisions of subpart A of part 98 (40 CFR 98.2(i)), as applicable.

While the EPA is not requiring electrical equipment manufacturers and refurbishers to report their emissions of insulating gases with GWPs of one or less, the EPA is requiring such facilities to report the quantities of insulating gases with weighted average GWPs of one or less, as well as the nameplate capacity of the associated equipment, that they transfer to their customers. Tracking such transfers is important to understanding the extent to which substitutes for SF_6 are replacing SF_6 as an insulating gas, which will inform future policies and programs under provisions of the CAA. The EPA

anticipates that tracking transfers to customers will involve a lower burden than tracking emissions and other quantities in addition to transfers.

Z. Subpart UU—Injection of Carbon Dioxide

We are finalizing the amendments to subpart UU of part 98 (Injection of Carbon Dioxide) as revised in the 2023 Supplemental Proposal. This section discusses the final revisions to subpart UU. The EPA received only one supportive comments on the proposed revision to subpart UU in the 2023 Supplemental Proposal. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart UU.

The EPA initially proposed amendments to subpart UU in the 2022 Data Quality Improvements Proposal that were intended to harmonize with revisions to add new subpart VV to part 98 (Geologic Sequestration of Carbon Dioxide With Enhanced Oil Recovery Using ISO 27916). Subpart VV is described further in section III.Z. of this preamble. However, we received comments on the 2022 Data Quality Improvements Proposal saying that the applicability of proposed subpart VV was unclear. The EPA subsequently re-proposed revisions to 40 CFR 98.470 in the 2023 Supplemental Proposal. As described in sections III.O. of the preamble of the 2023 Supplemental Proposal, the EPA proposed, and is finalizing, revisions to § 98.470 of subpart UU of part 98 to clarify the applicability of each subpart when a facility quantifies their geologic sequestration of CO_2 in association with EOR operations through the use of the CSA/ANSI ISO 27916:19 method. Specifically, we are clarifying that facilities with a well or group of wells that must report under subpart VV shall not also report data for those same wells under subpart UU. These changes also clarify how CO_2–EOR projects that may transition to use of the CSA/ANSI ISO 27916:19 method during a reporting year will be required to report for the portion of the reporting year before they began using CSA/ANSI ISO 27916:19 and for the portion after they began using CSA/ANSI ISO 27916:19. Additional rationale for these amendments is available in the preamble to the 2023 Supplemental Proposal.

AA. Subpart VV—Geologic Sequestration of Carbon Dioxide With Enhanced Oil Recovery Using ISO 27916

We are finalizing several amendments to add subpart VV (Geologic Sequestration of Carbon Dioxide With Enhanced Oil Recovery Using ISO 27916) to part 98 as proposed. Section III.Z.1. of this preamble discusses the final requirements of subpart VV. The EPA received several comments on the proposed subpart VV which are discussed in section III.V.2. of this preamble. We are also finalizing as proposed related confidentiality determinations for data elements resulting from the revisions to subpart VV as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart VV

This section summarizes the substantive final amendments to subpart VV. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart VV can be found in this section. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal 2023 Supplemental Proposal.

a. Source Category Definition

In the 2022 Data Quality Improvements Proposal, the EPA proposed adding a new source category, subpart VV, to part 98 to add calculation and reporting requirements for quantifying geologic sequestration of CO_2 in association with EOR operations, which would only apply to facilities that quantify the geologic sequestration of CO_2 in association with EOR operations in conformance with the ISO standard designated as CSA/ANSI ISO 27916:19, *Carbon dioxide capture, transportation and geological storage—Carbon dioxide storage using enhanced oil recovery.*[42] In our initial proposal, the EPA outlined the source category definition, rationale for no threshold, calculation methodology, and monitoring, recordkeeping, and reporting requirements. We noted at that time that under existing GHGRP requirements, facilities that receive CO_2 for injection at EOR operations report under subpart UU (Injection of Carbon Dioxide), and facilities that geologically sequester CO_2 through EOR operations may instead opt-in to subpart RR (Geologic Sequestration of Carbon Dioxide). The EPA proposed to add new subpart VV to require reporting of incidental CO_2 storage associated with EOR based on the CSA/ANSI ISO 27916:19 standard. We subsequently received detailed comments saying that the applicability of proposed subpart VV was unclear, specifically, proposed 40 CFR 98.480 ''Definition of the Source Category.'' The commenters were uncertain whether the EPA had intended to require facilities using CSA/ANSI ISO 27916:19 to report under subpart VV or whether facilities that used CSA/ANSI ISO 27916:19 would have the option to choose under which subpart they would report to: subpart RR, subpart UU, or subpart VV.

In the 2023 Supplemental Proposal, the EPA subsequently reproposed §§ 98.480 and 98.481 of subpart VV to clarify the applicability to each subpart. As explained in section III.P. of the preamble the 2023 Supplemental Proposal, the EPA clarified that if a facility elects to use the CSA/ANSI ISO 27916:19 method for quantifying geologic sequestration of CO_2 in association with EOR operations, then the facility would be required under the GHGRP to report under new subpart VV (unless the facility chooses to report under subpart RR and has received an approved Monitoring, Reporting, and Verification Plan (MRV Plan) from EPA). The EPA further clarified that subpart VV is not intended to apply to facilities that use the content of CSA/ANSI ISO 27916:19 for a purpose other than demonstrating secure geologic storage, such as only as a reference material or for informational purposes. Following review of subsequent comments received on the reproposed source category definition, we are finalizing the definition of the source category as proposed in the 2023 Supplemental Proposal.

b. Reporting Threshold

In the 2022 Data Quality Improvements Proposal, the EPA proposed no threshold for reporting under subpart VV (*i.e.,* that subpart VV would be an ''all-in'' reporting subpart). The EPA also proposed under 40 CFR 98.480(c) that facilities subject only to subpart VV would not be required to report emissions under subpart C or any other subpart listed in 40 CFR 98.2(a)(1) or (2), consistent with the requirements for existing reporters under subpart UU. In the 2023 Supplemental Proposal, the EPA maintained no threshold is required for reporting, but amended the regulatory text to clarify that all CO_2–

[42] Although the title of the standard references only EOR, Clause 1.1 of CSA/ANSI ISO 27916:19 indicates that the standard can apply to enhanced gas recovery as well. Therefore, any reference to EOR in subpart VV also applies to enhanced gas recovery.

EOR projects using CSA/ANSI ISO 27916:19 as a method of quantifying geologic sequestration that do not report under subpart RR would report under subpart VV. We also proposed text at 40 CFR 98.481(c) to clarify how CO_2–EOR projects previously reporting under subpart UU that begin using CSA/ANSI ISO 27916:19 part-way through a reporting year must report. The EPA is finalizing these requirements as reproposed in the 2023 Supplemental Proposal.

Additionally, we are finalizing revisions at 40 CFR 98.481(b) that facilities subject to subpart VV will not be subject to the off-ramp requirements of 40 CFR 98.2(i). Instead, once a facility opts-in to subpart VV, the owner or operator must continue for each year thereafter to comply with all requirements of the subpart, including the requirement to submit annual reports, until the facility demonstrates termination of the CO_2–EOR project following the requirements of CSA/ANSI ISO 27916:19. The operator must notify the Administrator of its intent to cease reporting and provide a copy of the CO_2–EOR project termination documentation prepared for CSA/ANSI ISO 27916:19.

c. Calculation Methods

In the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal, the EPA proposed incorporating the quantification methodology of CSA/ANSI ISO 27916:19 for calculation of emissions. Under CSA/ANSI ISO 27916:19, the mass of CO_2 stored is determined as the total mass of CO_2 received minus the total mass of CO_2 lost from project operations and the mass of CO_2 lost from the EOR complex. The EOR complex is defined as the project reservoir, trap, and such additional surrounding volume in the subsurface as defined by the operator within which injected CO_2 will remain in safe, long-term containment. Specific losses include those from leakage from production, handling, and recycling facilities; from infrastructure (including wellheads); from venting/flaring from production operations; and from entrainment within produced gas/oil/water when this CO_2 is not separated and reinjected. We are finalizing the calculation requirements as proposed.

d. Monitoring, QA/QC, and Verification Requirements

The EPA is finalizing as proposed the requirement for reporters to use the applicable monitoring and quality assurance requirements set forth in CSA/ANSI ISO 27916:19.

e. Procedures for Estimating Missing Data

The EPA is finalizing as proposed the requirement for reporters to use the applicable missing data and quality assurance procedures set forth in CSA/ANSI ISO 27916:19.

f. Data Reporting Requirements

The EPA is finalizing, as proposed, that facilities will report the amount of CO_2 stored, inputs included in the mass balance equation used to determine CO_2 stored using the CSA/ANSI ISO 27916:19 methodology, and documentation providing the basis for that determination as set forth in CSA/ANSI ISO 27916:19. Documentation includes providing the CSA/ANSI ISO 27916:19 EOR Operations Management Plan (OMP), which is required to specify: (1) a geological description of the site and the procedures for field management and operational containment during the quantification period; (2) the initial containment assurance plan to identify potential leakage pathways; (3) the plan for monitoring of potential leakage pathways; and (4) the monitoring methods for detecting and quantifying losses and how this will serve to provide the inputs into site-specific mass balance equations. Reporters must also specify any changes made to containment assurance and monitoring approaches and procedures in the EOR OMP made within the reporting year.

We are also finalizing the reporting of the following information per CSA/ANSI ISO 27916:19: (1) the quantity of CO_2 stored during the year; (2) the formula and data used to quantify the storage, including the quantity of CO_2 delivered to the CO_2–EOR project and losses during the year; (3) the methods used to estimate missing data and the amounts estimated; (4) the approach and method for quantification utilized by the operator, including accuracy, precision and uncertainties; (5) a statement describing the nature of validation or verification, including the date of review, process, findings, and responsible person or entity; and (6) the source of each CO_2 stream quantified as storage. The final rule also requires that reporters provide a copy of the independent engineer or geologist's certification as part of reporting to subpart VV, if such a certification has been made.

Finally, the EPA is finalizing a notification for project termination. The final rule specifies that the time for cessation of reporting under subpart VV is the same as under CSA/ANSI ISO 27916:19; the operator must notify the Administrator of its intent to cease reporting and provide a copy of the CO_2–EOR project termination documentation.

g. Records That Must Be Retained

The EPA is finalizing as proposed the requirement that reporters meet the record retention requirements of 40 CFR 98.3(g) and the applicable recordkeeping retention requirements set forth in CSA/ANSI ISO 27916:19.

2. Summary of Comments and Responses on Subpart VV

The EPA received several comments for subpart VV; the majority of these comments were received on the 2022 Data Quality Improvements Proposal and were previously addressed in the preamble to the 2023 Supplemental Proposal (see section III.P. of the preamble to the 2023 Supplemental Proposal). The EPA received only supportive comments on the proposed revisions to subpart VV in the 2023 Supplemental Proposal; see the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart VV.

BB. Subpart WW —Coke Calciners

We are finalizing the addition of subpart WW to part 98 (Coke Calciners) with revisions in some cases. Section III.BB.1. of this preamble discusses the final requirements of subpart WW. The EPA received several comments on the proposed subpart WW which are discussed in section III.BB.2. of this preamble. We are also finalizing as proposed related confidentiality determinations for data elements resulting from the revisions to subpart WW as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart WW

This section summarizes the substantive final amendments to subpart WW. Major changes in this final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart WW can be found in this section. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

a. Source Category Definition

The EPA is finalizing the source category definition as proposed, with one minor clarification. Specifically, we proposed that the coke calciner source category consists of process units that heat petroleum coke to high temperatures in the absence of air or oxygen for the purpose of removing impurities or volatile substances in the petroleum coke feedstock. Following review of comments received, the EPA is revising the source category definition from that proposed to remove the language ''in the absence of air or oxygen.'' See section III.BB.2. of this preamble for additional information on related comments and the EPA's response. The final definition of the coke calciner source category includes, but is not limited to, rotary kilns or rotary hearth furnaces used to calcine petroleum coke and any afterburner or other equipment used to treat the process gas from the calciner. The source category includes all coke calciners, not just those co-located at petroleum refineries, to provide consistent requirements for all coke calciners.

b. Reporting Threshold

In the 2023 Supplemental Proposal, the EPA proposed no threshold for reporting under subpart WW. Because coke calciners are large emission sources, they are expected to emit over the 25,000 $mtCO_2e$ threshold generally required to report under existing GHGRP subparts with thresholds, and nearly all of them are also projected to exceed the 100,000 $mtCO_2e$ threshold. Therefore, the EPA projects that there are limited differences in the number of reporting facilities based on any of the emission thresholds considered. For this reason, the EPA is finalizing the coke calciner source category as an ''all-in'' subpart (*i.e.,* regardless of their emissions profile).

c. Calculation Methods

Coke calciners primarily emit CO_2, but also have CH_4 and N_2O emissions as part of the process gas emission control combustion device operation. The EPA is finalizing, as proposed in the 2023 Supplemental Proposal, that CO_2, CH_4, and N_2O emissions from each coke calcining unit be estimated.

The EPA reviewed a number of different emissions estimation methods for coke calciners. We subsequently proposed, and are finalizing, to require either one of two separate calculation methods, the use of a CEMS or the carbon mass balance method for estimating emissions. Each of these methodologies are used to estimate CO_2 emissions. We are also finalizing, as proposed, that coke calciners also estimate process CH_4 and N_2O emissions based on the total CO_2 emissions determined for the coke calciner and the ratio of the default CO_2 emission factor for petroleum coke in table C–1 to subpart C of part 98 to the default CH_4 and N_2O emission factors for petroleum products in table C–2 to subpart C of part 98. Under the final methods, petroleum refineries with coke calciners are able to maintain their current calculation methods. Additional detail on the calculation methods reviewed are available in section IV.B. of the preamble to the 2023 Supplemental Proposal.

Direct measurement using CEMS. The CEMS approach directly measures CO_2 concentration and total exhaust gas flow rate for the combined process and combustion source emissions. CO_2 mass emissions are calculated from these measured values using equation C–6 and, if necessary, equation C–7 in 40 CFR 98.33(a)(4).

The EPA proposed that the CEMS method under subpart WW would be implemented consistent with subpart Y of part 98 (Petroleum Refineries), which required reporters to determine CO_2 emissions from auxiliary fuel use discharged in the coke calciner exhaust stack using methods in subpart C of part 98, and to subtract those emissions from the measured CEMS emissions to determine the process CO_2 emissions. We are finalizing this requirement.

Carbon balance method. For those facilities that do not have a qualified CEMS in-place, facilities may use the carbon mass balance method, using data that is expected to be routinely monitored by coke calcining facilities. The carbon mass balance method uses the mass of green coke, calcined coke and petroleum coke dust removed from the dust collection system, along with the carbon content of the green and calcined coke, to estimate process CO_2 emissions; the methodology is the same as current equation Y–13 of 40 CFR 98.253(g)(2) that is used for coke calcining processes co-located at petroleum refineries.

d. Monitoring, QA/QC, and Verification Requirements

The EPA is finalizing the monitoring methods to subpart WW as proposed.

Direct measurement using CEMS. For direct measurement using CEMS, the CEMS method requires both a continuous CO_2 concentration monitor and a continuous volumetric flow monitor. Reporters required to or electing to use CEMS must install, operate, and calibrate the monitoring system according to subpart C (General Stationary Fuel Combustion Sources), which is consistent with the current requirements for coke calciner CO_2 CEMS monitoring requirements within subpart Y. We are finalizing that all CO_2 CEMS and flow rate monitors used for direct measurement of GHG emissions should comply with QA/QC procedures for daily calibration drift checks and quarterly or annual accuracy assessments, such as those provided in Appendix F to part 60 or similar QA/QC procedures. These requirements ensure the quality of the reported GHG emissions and are consistent with the current requirements for CEMS measurements within subparts A (General Provisions) and C of the GHGRP.

Carbon balance method. The carbon mass balance method requires monitoring of mass quantities of green coke fed to the process, calcined coke leaving the process, and coke dust removed from the process by dust collection systems. It also requires periodic determination of carbon content of the green and calcined coke. For coke mass measurements, we are finalizing that the measurement device be calibrated according to the procedures specified by the updated NIST HB 44–2023: *Specifications, Tolerances, and Other Technical Requirements For Weighing and Measuring Devices,* 2023 edition (we have clarified the title and publication date of this method in the final rule) or the procedures specified by the manufacturer. We are requiring the measurement device be recalibrated either biennially or at the minimum frequency specified by the manufacturer. These requirements are to ensure the quality of the reported GHG emissions and to be consistent with the current requirements for coke calciner mass measurements within subpart Y.

For carbon content of coke measurements, the owner or operator must follow approved analytical procedures and maintain and calibrate instruments used according to manufacturer's instructions and to document the procedures used to ensure the accuracy of the measurement devices used. These requirements are to ensure the quality of the reported GHG emissions and to be consistent with the current requirements for coke calciner mass measurements within subpart Y. These determinations must be made monthly. If carbon content measurements are made more often than monthly, all measurements made within the calendar month must be used to determine the average for the month.

e. Procedures for Estimating Missing Data

The EPA is finalizing as proposed the procedures for estimating missing data. For the CEMS methodology, whenever a quality-assured value of a required parameter is unavailable (*e.g.,* if a CEMS malfunctions during unit operation or if a required fuel sample is not taken), a substitute data value for the missing parameter shall be used in the calculations. For missing CEMS data, the missing data procedures in subpart C must be used.

Under the carbon mass balance method, for each missing value of mass or carbon content of coke, reporters must use the average of the data measurements before and after the missing data period. If, for a particular parameter, no quality assured data are available prior to the missing data incident, the substitute data value must be the first quality-assured value obtained after the missing data period. Similarly, if no quality-assured data are available after the missing data incident, the substitute data value must be the most recently acquired quality-assured value obtained prior to the missing data period.

f. Data Reporting Requirements

The EPA is finalizing the data reporting requirements of subpart WW as proposed. For coke calcining units, the owner and operator shall report the coke calciner unit ID number and maximum rated throughput of the unit, the method used to calculate GHG emissions, and the calculated CO_2, CH_4, and N_2O annual emissions for each unit, expressed in metric tons of each pollutant emitted. We are also requiring the owner and operator to report the annual mass of green coke fed to the coke calcining unit, the annual mass of marketable petroleum coke produced by the coke calcining unit, the annual mass of petroleum coke dust removed from the process through the dust collection system of the coke calcining unit, the annual average mass fraction carbon content of green coke fed to the unit, and the annual average mass fraction carbon content of the marketable petroleum coke produced by the coke calcining unit.

g. Records That Must Be Retained

The EPA is finalizing the record retention requirements of subpart WW as proposed. Facilities are required to maintain records documenting the procedures used to ensure the accuracy of the measurements of all reported parameters, including but not limited to, calibration of weighing equipment, flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded, and the technical basis for these estimates must be provided.

For the coke calciners source category, we are finalizing that the verification software specified in 40 CFR 98.5(b) be used to fulfill the recordkeeping requirements for the following five data elements:

- Monthly mass of green coke fed to the coke calcining unit;
- Monthly mass of marketable petroleum coke produced by the coke calcining unit;
- Monthly mass of petroleum coke dust removed from the process through the dust collection system of the coke calcining unit;
- Average monthly mass fraction carbon content of green coke fed to the coke calcining unit; and
- Average monthly mass fraction carbon content of marketable petroleum coke produced by the coke calcining unit.

2. Summary of Comments and Responses on Subpart WW

This section summarizes the major comments and responses related to the proposed subpart WW. The EPA previously requested comment on the addition of coke calciners production source category as a new subpart to part 98 in the 2022 Data Quality Improvements Proposal. The EPA received several comments for subpart WW on the 2022 Data Quality Improvements Proposal; many of these comments were previously addressed in the preamble to the 2023 Supplemental Proposal, wherein the EPA proposed to add new subpart WW for coke calciners (see section IV.B. of the preamble to the 2023 Supplemental Proposal). The EPA received additional comments regarding the proposed subpart WW following the 2023 Supplemental Proposal. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart WW.

Comment: One commenter stated that the description of coke calciners may be overly narrow. The commenter contended that the language ''in the absence of air or oxygen'' is not necessarily accurate. The commenter stated that air/oxygen is necessary for combustion to occur, and that the high temperatures required for proper calcination are from the combustion of volatiles and carbon in the green coke.

Response: We understand that air is introduced in the coke calciner to burn the volatiles from the coke, but the air is introduced in a limited fashion (limited oxygen) so that the complete combustion of coke in the calciner does not occur. However, we agree with the commenter that the phrase ''in the absence of air or oxygen'' may be too restrictive and we have deleted this phrase from the proposed source category description at 40 CFR 98.490(a) in the final rule.

Comment: One commenter stated that coke calciners that use refinery fuel gas or natural gas during startup or during hot standby should be allowed to report emissions from these fuel gases using a methodology from subpart C of part 98, separately from the coke calciner emissions. The commenter stated that where coke calcining and fuel gas combustion are occurring simultaneously, the fuel gas emissions should be subtracted from the emissions that are calculated using CEMS and the proposed stack flow methodology to avoid double counting. The commenter added that the requirements for fuel gas or natural gas composition and heat content use in coke calciners should be the same as required in subpart C.

Response: We agree with the commenter and the issues identified by the commenter were addressed in the 2023 Supplemental Proposal. We are finalizing these provisions for treating GHG emissions from auxiliary fuel use as proposed (see 40 CFR 98.493(b)(1)).

CC. Subpart XX—Calcium Carbide Production

We are finalizing the addition of subpart XX (Calcium Carbide Production) to part 98 as proposed. Section III.CC.1. of this preamble discusses the final requirements of subpart XX. The EPA received comments on the proposed subpart XX which are discussed in section III.CC.2. of this preamble. We are also finalizing as proposed related confidentiality determinations for data elements resulting from the addition of subpart XX as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart XX

This section summarizes the final amendments to subpart XX. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart XX can be found in this section and section III.CC.2. of this preamble.

Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

a. Source Category Definition

The EPA is finalizing the source category definition as proposed. We are defining calcium carbide production to include any process that produces calcium carbide. Calcium carbide is an industrial chemical manufactured from lime (CaO) and carbon, usually petroleum coke, by heating the mixture to 2,000 to 2,100 C (3,632 to 3,812 °F) in an electric arc furnace. During the production of calcium carbide, the use of carbon-containing raw materials (petroleum coke) results in emissions of CO_2.

Although we considered accounting for emissions from the production of acetylene at calcium carbide facilities in the 2022 Data Quality Improvements Proposal, we ultimately determined that acetylene is not produced at the one known plant that produces calcium carbide. For this reason, in the 2023 Supplemental Proposal we did not propose, and as such are not taking final action on, inclusion of reporting of CO_2 emissions from the production of acetylene from calcium carbide under subpart XX.

b. Reporting Threshold

In the 2023 Supplemental Proposal, the EPA proposed no threshold for reporting under subpart XX. The current estimate of emissions from the single known calcium carbide production facility in the United States exceeds 25,000 $mtCO_2e$ by a factor of about 1.9. Therefore we are finalizing, as proposed, the calcium carbide source category as an ''all-in'' subpart. For a full discussion of the threshold analysis, please refer to section IV.C. of the preamble to the 2023 Supplemental Proposal.

c. Calculation Methods

In the 2023 Supplemental Proposal, the EPA reviewed the production processes and available emissions estimation methods for calcium carbide production including a default emission factor methodology, a carbon balance methodology (IPCC Tier 3), and direct measurement using CEMS (see section IV.C.5. of the preamble to the 2023 Supplemental Proposal). We subsequently proposed and are finalizing two different methods for quantifying GHG emissions from calcium carbide manufacturing, depending on current emissions monitoring at the facility. If a qualified CEMS is in place, the CEMS must be used. Otherwise, the facility can elect to either install a CEMS or elect to use the carbon mass balance method.

Direct measurement using CEMS. Facilities with an existing CEMS that meet the requirements outlined in subpart C of part 98 (General Stationary Fuel Combustion) are required to use CEMS to estimate combined process and combustion CO_2 emissions. Facilities are required to follow the requirements of subpart C to estimate all CO_2 emissions from the industrial source. Facilities will be required to follow subpart C to estimate emissions of CO_2, CH_4, and N_2O from stationary combustion.

Carbon balance method. For facilities that do not have CEMS that meet the requirements of 40 CFR part 98 subpart C, the alternate monitoring method is the carbon balance method. For any stationary combustion units included at the facility, facilities will be required to follow the existing requirements at 40 CFR part 98, subpart C to estimate emissions of CO_2, CH_4, and N_2O from stationary combustion. Use of facility specific information is consistent with IPCC Tier 3 methods and is the preferred method for estimating emissions for other GHGRP sectors.

d. Monitoring, QA/QC, and Verification requirements

The EPA is finalizing the monitoring, QA/QC, and verification requirements to subpart XX as proposed. We are finalizing two separate monitoring methods: direct measurement and a mass balance emission calculation.

Direct measurement using CEMS. For facilities where process emissions and/or combustion GHG emissions are contained within a stack or vent, facilities can take direct measurement of the GHG concentration in the stack gas and the flow rate of the stack gas using a CEMS. Under the final rule, if facilities use an existing CEMS to meet the monitoring requirements, they are required to use CEMS to estimate CO_2 emissions. Where the CEMS capture all combustion- and process-related CO_2 emissions, facilities will be required to follow the requirements of subpart C to estimate emissions.

The CEMS method requires both a continuous CO_2 concentration monitor and a continuous volumetric flow monitor. To qualify as a CEMS, the monitors are required to be installed, operated, and calibrated according to subpart C of part 98 (40 CFR 98.33(a)(4)), which is consistent with CEMS requirements in other GHGRP subparts.

Carbon balance method. For facilities using the carbon mass balance method, we are requiring the facility to determine the annual mass for each material used for the calculations of annual process CO_2 emissions by summing the monthly mass for the material determined for each month of the calendar year. The monthly mass may be determined using plant instruments used for accounting purposes, including either direct measurement of the quantity of the material placed in the unit or by calculations using process operating information.

For the carbon content of the materials used to calculate process CO_2 emissions, we are finalizing a requirement that the owner or operator determine the carbon content using material supplier information or collect and analyze at least three representative samples of the material inputs and outputs each year. The final rule will require the carbon content be analyzed at least annually using standard ASTM methods, including their QA/QC procedures. To reduce burden, if a specific process input or output contributes less than one percent of the total mass of carbon into or out of the process, the reporter does not have to determine the monthly mass or annual carbon content of that input or output.

e. Procedures for Estimating Missing Data

We are finalizing as proposed the use of substitute data whenever a quality-assured value of a parameter is used to calculate emissions is unavailable, or ''missing.'' If the carbon content analysis of carbon inputs or outputs is missing, the substitute data value will be based on collected and analyzed representative samples for average carbon contents. If the monthly mass of carbon-containing inputs and outputs is missing, the substitute data value will be based on the best available estimate of the mass of the inputs and outputs from all available process data or data used for accounting purposes, such as purchase records. The likelihood for missing process input or output data is low, as businesses closely track their purchase of production inputs. These missing data procedures are the same as those for the ferroalloy production source category, subpart K of part 98, under which the existing U.S. calcium carbide production facility currently reports.

f. Data Reporting Requirements

The EPA is finalizing, as proposed, that each carbon carbide production facility report the annual CO_2 emissions

from each calcium carbide production process, as well as any stationary fuel combustion emissions. In addition, we are finalizing requirements for facilities to provide additional information that forms the basis of the emissions estimates, along with supplemental data, so that we can understand and verify the reported emissions. All calcium carbide production facilities will be required to report their annual production and production capacity, total number of calcium carbide production process units, annual consumption of petroleum coke, each end use of any calcium carbide produced and sent off site, and, if the facility produces acetylene, the annual production of acetylene, the quantity of calcium carbide used for acetylene production at the facility, and the end use of the acetylene produced on-site. The EPA is also finalizing reporting the end use of calcium carbide sent off site, as well as acetylene production information for current or future calcium carbide production facilities, to inform future Agency policy under the CAA.

As proposed, we are finalizing requirements that if a facility uses CEMS to measure their CO_2 emissions, they will be required to also report the identification number of each process unit; the EPA is clarifying in the final rule that if a facility uses CEMS, emissions are reported from each CEMS monitoring location. If a CEMS is not used to measure CO_2 emissions, the facility will also report the method used to determine the carbon content of each material for each process unit, how missing data were determined, and the number of months missing data procedures were used.

g. Records That Must Be Retained

The EPA is finalizing as proposed the requirement that facilities maintain records of information used to determine the reported GHG emissions, to allow us to verify that GHG emissions monitoring and calculations were done correctly. If a facility uses a CEMS to measure their CO_2 emissions, they will be required to record the monthly calcium carbide production from each process unit and the number of monthly and annual operating hours for each process unit. If a CEMS is not used, the facility will be required to retain records of monthly production, monthly and annual operating hours, monthly quantities of each material consumed or produced, and carbon content determinations.

As proposed, we are finalizing requirements that the owner or operator maintain records of how measurements are made, including measurements of quantities of materials used or produced and the carbon content of process input and output materials. The procedures for ensuring accuracy of measurement methods, including calibration, must be recorded.

The final rule also requires the retention of a record of the file generated by the verification software specified in 40 CFR 98.5(b) including:

- Carbon content (percent by weight expressed as a decimal fraction) of the reducing agent (petroleum coke), carbon electrode, product produced, and nonproduct outgoing materials; and
- Annual mass (tons) of the reducing agent (petroleum coke), carbon electrode, product produced, and nonproduct outgoing materials.

2. Summary of Comments and Responses on Subpart XX

The EPA previously requested comment on the addition of a calcium carbide source category as a new subpart to part 98 in the 2022 Data Quality Improvements Proposal. The EPA received one comment objecting to the addition of the proposed source category and one comment on the potential calculation methodology. Subsequently, the EPA responded to the comments and proposed to add new subpart XX for calcium carbide (see section IV.C. of the preamble to the 2023 Supplemental Proposal). The EPA received no comments regarding proposed subpart XX following the 2023 Supplemental Proposal. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart XX.

DD. Subpart YY—Caprolactam, Glyoxal, and Glyoxylic Acid Production

We are finalizing the addition of subpart YY (Caprolactam, Glyoxal, and Glyoxylic Acid Production) to part 98 with revisions in some cases. Section III.DD.1. of this preamble discusses the final requirements of subpart YY. Major comments, as applicable, are addressed in section III.DD.2. of this preamble. We are also finalizing as proposed related confidentiality determinations for data elements resulting from the revisions to subpart YY as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart YY

This section summarizes the substantive final amendments to subpart YY. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart YY can be found in this section. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

a. Source Category Definition

In the 2023 Supplemental Proposal, the EPA proposed that the caprolactam, glyoxal, or glyoxylic acid source category, as defined under subpart YY, would include any facility that produces caprolactam, glyoxal, or glyoxylic acid.

Caprolactam is a crystalline solid organic compound with a wide variety of uses, including brush bristles, textile stiffeners, film coatings, synthetic leather, plastics, plasticizers, paint vehicles, cross-linking for polyurethanes, and in the synthesis of lysine. Caprolactam is primarily used in the manufacture of synthetic fibers, especially Nylon 6.

Glyoxal is a solid organic compound with a wide variety of uses, including as a crosslinking agent in various polymers for paper coatings, textile finishes, adhesives, leather tanning, cosmetics, and oil-drilling fluids; as a sulfur scavenger in natural gas sweetening processes; as a biocide in water treatment; to improve moisture resistance in wood treatment; and as a chemical intermediate in the production of pharmaceuticals, dyestuffs, glyoxylic acid, and other chemicals. It is also used as a less toxic substitute for formaldehyde in some applications (*e.g.,* in wood adhesives and embalming fluids).

Glyoxylic acid is a solid organic compound exclusively produced by the oxidation of glyoxal with nitric acid. It is used mainly in the synthesis of vanillin, allantoin, and several antibiotics like amoxicillin, ampicillin, and the fungicide azoxystrobin.

We are finalizing the source category definition to include any facility that produces caprolactam, glyoxal, or glyoxylic acid as proposed. The source category will exclude the production of glyoxal through the LaPorte process (*i.e.,* the gas-phase catalytic oxidation of ethylene glycol with air in the presence of a silver or copper catalyst). As explained in the 2023 Supplemental Proposal, the LaPorte process does not

emit N_2O and there are no methods for estimating CO_2 in available literature.

b. Reporting Threshold

In the 2023 Supplemental Proposal, the EPA proposed no threshold for reporting under subpart YY (*i.e.,* that subpart YY would be an ''all-in'' reporting subpart). The EPA noted that the total process emissions from current production of caprolactam, glyoxal, and glyoxylic acid are estimated at 1.2 million $mtCO_2e$, largely from two known caprolactam production facilities; although the known universe of facilities that produce caprolactam, glyoxal, and glyoxylic acid in the United States is four to six total facilities. We proposed that adding caprolactam, glyoxal, and glyoxylic acid production as an ''all-in'' subpart (*i.e.,* regardless of the facility emissions profile) is a conservative approach to gather information from as many facilities that produce caprolactam, glyoxal, and glyoxylic acid as possible, especially if production of glyoxal and glyoxylic acid increase in the near future. The EPA is finalizing these requirements as proposed.

c. Calculation Methods

In the 2023 Supplemental Proposal, the EPA reviewed the production processes and available emissions estimation methods for caprolactam, glyoxal, and glyoxylic acid production and proposed that only N_2O emissions would be estimated from these processes. The EPA also proposed to require the reporting of combustion emissions from facilities that produce caprolactam, glyoxal, and glyoxylic acid, including CO_2, CH_4, and N_2O.

The EPA reviewed two methods from the 2006 IPCC Guidelines,[43] including the Tier 2 and Tier 3 methodologies, for calculating N_2O emissions from the production of caprolactam, glyoxal, and glyoxylic acid, and subsequently proposed the IPCC Tier 2 approach to quantify N_2O process emissions. We are finalizing the N_2O calculation requirements as proposed, with minor revisions. Following the Tier 2 approach established by the IPCC, reporters will apply default N_2O generation factors on a site-specific basis. This requires raw material input to be known in addition to a standard N_2O generation factor, which differs for each of the three chemicals. In addition, Tier 2 requires site-specific knowledge of the use of N_2O control technologies. The volume or mass of each product is measured with a flow meter or weigh scales. The process-related N_2O emissions are estimated by multiplying the generation factor by the production and the destruction efficiency of any N_2O control technology. The EPA is revising the final rule to adjust the N_2O generation factors (proposed in table 1 to subpart YY) for glyoxal and glyoxylic acid production to correctly reflect the conversion of the IPCC default emission factors, which were intended to be converted from metric tons N_2O emitted per metric ton of product produced to kg N_2O per metric ton of product produced using a conversion factor of 1,000 kg per metric ton. The final rule corrects the generation factor for glyoxal from 5,200 to 520 and, for glyoxylic acid, from 1,000 to 100. The EPA is finalizing a minor clarification to equation 1 to 40 CFR 98.513(d)(2) (proposed as equation YY–1) to re-order the defined parameters of the equation to follow their order of appearance in the equation. The EPA is also finalizing an additional equation (equation 3 to 40 CFR 98.513(f)) from the proposed rule, which sums the monthly process emissions estimated by equation 2 to 40 CFR 98.513(e) (proposed as equation YY–2) to an annual value. This additional equation clarifies the methodology for reporting annual emissions and does not require the collection of any additional data.

For any stationary combustion units included at the facility, we proposed that facilities would be required to follow the existing requirements in 40 CFR part 98, subpart C to calculate emissions of CO_2, CH_4 and N_2O from stationary combustion. We are finalizing the combustion calculation requirements as proposed.

d. Monitoring, QA/QC, and Verification Requirements

Monitoring is required to comply with the N_2O calculation methodologies for reporters that produce caprolactam, glyoxal, and glyoxylic acid. In the 2023 Supplemental Proposal, the EPA proposed that reporters that produce caprolactam, glyoxal, and glyoxylic acid are to determine the monthly and annual production quantities of each chemical and to determine the N_2O destruction efficiency of any N_2O abatement technologies in use. The EPA is finalizing as proposed the requirement for reporters to either perform direct measurement of production quantities or to use existing plant procedures to determine production quantities. *E.g.,* the production rate can be determined through sales records or by direct measurement using flow meters or weigh scales.

For determination of the N_2O destruction efficiency, we are finalizing as proposed the requirement that reporters estimate the destruction efficiency for each N_2O abatement technology. The destruction efficiency can be determined by using the manufacturer's specific destruction efficiency or estimating the destruction efficiency through process knowledge. Documentation of how process knowledge was used to estimate the destruction efficiency is required. Examples of information that could constitute process knowledge include calculations based on material balances, process stoichiometry, or previous test results provided that the results are still relevant to the current vent stream conditions.

For the caprolactam, glyoxal, and glyoxylic acid production subpart, we are requiring reporters to perform all applicable flow meter calibration and accuracy requirements and maintain documentation as specified in 40 CFR 98.3(i).

e. Procedures for Estimating Missing Data

For caprolactam, glyoxal, and glyoxylic acid production, the EPA is finalizing as proposed the requirement that substitute data for each missing production value is the best available estimate based on all available process data or data used for accounting purposes (such as sales records). For the control device destruction efficiency, assuming that the control device operation is generally consistent from year to year, the substitute data value should be the most recent quality assured value.

f. Data Reporting Requirements

The EPA is finalizing, as proposed, that facilities must report annual N_2O emissions (in metric tons) from each production line. In addition, facilities must submit the following data to facilitate understanding of the emissions data and verify the reasonableness of the reported emissions: number of process lines; annual production capacity; annual production; number of operating hours in the calendar year for each process line; abatement technology used and installation dates (if applicable); abatement utilization factor for each process line; number of times in the reporting year that missing data procedures were followed to measure production quantities of caprolactam, glyoxal, or glyoxylic acid (months); and

[43] IPCC 2006. IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Industrial Processes and Product Use. Chapter 3, Chemical Industry Emissions. 2006. *www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_3_Ch3_Chemical_Industry.pdf.*

overall percent N_2O reduction for each chemical for all process lines.

g. Records That Must Be Retained

The EPA is finalizing as proposed the requirement that facilities maintain records documenting the procedures used to ensure the accuracy of the measurements of all reported parameters, including but not limited to, calibration of weighing equipment, flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded, and the technical basis for these estimates must be provided. We are also requiring, as proposed, that facilities maintain records documenting the estimate of production rate and abatement technology destruction efficiency through accounting procedures and process knowledge, respectively.

Finally, the EPA is also requiring, as proposed, the retention of a record of the file generated by the verification software specified in 40 CFR 98.5(b) including:

- Monthly production quantities of caprolactam from all process lines;
- Monthly production quantities of glyoxal from all process lines; and
- Monthly production quantities of glyoxylic acid from all process lines.

We are revising the final rule to clarify that these monthly production quantities must be supplied in metric tons and for each process line. Additionally, we are adding a requirement that facilities maintain records of the destruction efficiency of the N_2O abatement technology from each process line, consistent with requirements of equation 2 to 40 CFR 98.513(e). Facilities will enter this information into EPA's electronic verification software in order to ensure proper verification of the reported emission values. Following electronic verification, facilities will be required to retain a record of the file generated by the verification software specified in 40 CFR 98.5(b), therefore, no additional burden is anticipated.

2. Summary of Comments and Responses on Subpart YY

The EPA previously requested comment on the addition of a caprolactam, glyoxal, and glyoxylic acid production source category as a new subpart to part 98 in the 2022 Data Quality Improvements Proposal. The EPA received no comments regarding the addition of the proposed source category. Subsequently, the EPA proposed to add new subpart YY for caprolactam, glyoxal, and glyoxylic acid production (see section IV.D. of the preamble to the 2023 Supplemental Proposal). The EPA received no comments regarding proposed subpart YY following the 2023 Supplemental Proposal.

EE. Subpart ZZ—Ceramics Manufacturing

We are finalizing the addition of subpart ZZ of part 98 (Ceramics Manufacturing) with revisions in some cases. Section III.EE.1. of this preamble discusses the final requirements of subpart ZZ. The EPA received a number of comments on the proposed subpart ZZ which are discussed in section III.EE.2. of this preamble. We are also finalizing as proposed related confidentiality determinations for data elements resulting from the addition of subpart ZZ as described in section VI. of this preamble.

1. Summary of Final Amendments to Subpart ZZ

This section summarizes the final amendments to subpart ZZ. Major changes to the final rule as compared to the proposed revisions are identified in this section. The rationale for these and any other changes to 40 CFR part 98, subpart ZZ can be found in section III.EE.2. of this preamble. Additional rationale for these amendments is available in the preamble to the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal.

a. Source Category Definition

In the 2023 Supplemental Proposal, the EPA defined the ceramics manufacturing source category as any facility that uses nonmetallic, inorganic materials, many of which are clay-based, to produce ceramic products such as bricks and roof tiles, wall and floor tiles, table and ornamental ware (household ceramics), sanitary ware, refractory products, vitrified clay pipes, expanded clay products, inorganic bonded abrasives, and technical ceramics (*e.g.,* aerospace, automotive, electronic, or biomedical applications).

The EPA also proposed that the ceramics source category would apply to facilities that annually consume at least 2,000 tons of carbonates or 20,000 tons of clay heated to a temperature sufficient to allow the calcination reaction to occur, and operate a ceramics manufacturing process unit. The proposed definition of ceramics manufacturers as facilities that use at least the minimum quantity of carbonates or clay (2,000 tons/20,000 tons) was considered consistent with subpart U of part 98 (Miscellaneous Uses of Carbonate). This minimum 2,000 tons of carbonate use was added to subpart U in the 2009 Final Rule based on comments received on the April 10, 2009 proposed rule (74 FR 16448), where commenters requested a carbonate use threshold of 2,000 tons in order to exempt small operations and activities which use carbonates in trace quantities. The proposed source category definition for ceramics manufacturing in the 2023 Supplemental Proposal established a minimum production level as a means to exclude and thus reduce the reporting burden for small artisan-level ceramics manufacturing processes. We defined a ceramics manufacturing process unit as a kiln, dryer, or oven used to calcine clay or other carbonate-based materials for the production of a ceramics product.

The EPA is finalizing the definition of the source category with one change. We are revising the minimum production level in the definition from ''at least 2,000 tons of carbonates or 20,000 tons of clay which is heated to a temperature sufficient to allow the calcination reaction to occur'' to ''at least 2,000 tons of carbonates, either as raw materials or as a constituent in clay, which is heated to a temperature sufficient to allow the calcination reaction to occur.'' These final revisions focus the production level on the carbonates contained within the raw material rather than the total tons of clay; the final revisions will provide a more accurate means of assessing applicability. Facilities will be required to estimate their carbonate usage using available records to determine applicability. For example, facilities that use clay as a raw material input could calculate whether they meet the carbonate use threshold by multiplying the amount of clay they consume (and heat to calcination) annually by the weight fraction of carbonates contained in the clay. These final revisions add two harmonizing edits to 40 CFR 98.523(b)(1) and 98.526(c)(2) to clarify that the carbonate-based raw materials include clay.

b. Reporting Threshold

In the 2023 Supplemental Proposal, the EPA proposed that facilities must report under subpart ZZ if they met the definition of the source category and if their estimated combined emissions (including from stationary combustion and all applicable source categories) exceed a 25,000 $mtCO_2e$ threshold. We are finalizing the threshold as proposed. The final definition of ceramics manufacturers as facilities that use at least the minimum quantity of carbonates (2,000 tons, either as raw materials or as a constituent in clay) and

the 25,000 $mtCO_2e$ threshold are both expected to ensure that small ceramics manufacturers are excluded. It is estimated that over 25 facilities will meet the definition of a ceramics manufacturer and the threshold of 25,000 $mtCO_2e$ for reporting. For a full discussion of this analysis, section IV.E. of the preamble to the 2023 Supplemental Proposal.

c. Calculation Methods

In the 2023 Supplemental Proposal, the EPA reviewed the production processes and available emissions estimation methods for ceramics manufacturing and proposed that only CO_2 emissions would be estimated from these processes. The EPA also proposed to require the reporting of combustion emissions, including CO_2, CH_4, and N_2O from the ceramics manufacturing unit and other combustion sources on site.

In the 2023 Supplemental Proposal, the EPA reviewed the production processes and available emissions estimation methods for ceramics manufacturing including a basic mass balance methodology that assumed a fixed percentage for carbonates consumed (IPCC Tier 1), a carbon balance methodology (IPCC Tier 3) based on carbon content and the mass of materials input, and direct measurement using CEMS (see section IV.C.5. of the preamble to the 2023 Supplemental Proposal). We are finalizing, as proposed, two different methods for quantifying GHG emissions from ceramics manufacturing, depending on current emissions monitoring at the facility. If a qualified CEMS is in place, the CEMS must be used. Otherwise, the facility can elect to either install a CEMS or elect to use the carbon mass balance method.

Direct measurement using CEMS. Facilities with a CEMS that meet the requirements in subpart C of part 98 (General Stationary Fuel Combustion) will be required to use CEMS to estimate the combined process and combustion CO_2 emissions. The CEMS measures CO_2 concentration and total exhaust gas flow rate for the combined process and combustion source emissions. CO_2 mass emissions will be calculated from these measured values using equation C–6 and, if necessary, equation C–7 in 40 CFR 98.33(a)(4). The combined process and combustion CO_2 emissions will be calculated according to the Tier 4 Calculation Methodology specified in 40 CFR 98.33(a)(4). Facilities will be required to use subpart C to estimate emissions of CO_2, CH_4, and N_2O from stationary combustion.

Carbon balance method. For facilities using carbon mass balance method, the carbon content and the mass of carbonaceous materials input to the process must be determined. The facility must measure the consumption of specific process inputs and the amounts of these materials consumed by end-use/product type. Carbon contents of materials must be determined through the analysis of samples of the material or from information provided by the material suppliers. Additionally, the quantities of materials consumed and produced during production must be measured and recorded. CO_2 emissions are estimated by multiplying the carbon content of each raw material by the corresponding mass, by a carbonate emission factor, and by the decimal fraction of calcination achieved for that raw material. We are finalizing the carbonate emission factors provided in table 1 to subpart ZZ of part 98 as proposed. These factors, pulled from table N–1 to subpart N of part 98, and from Table 2.1 of the 2006 IPCC Guidelines,[44] are based on stoichiometric ratios and represent the weighted average of the emission factors for each particular carbonate. Emission factors provided by the carbonate vendor for other minerals not listed in table 1 to subpart ZZ may also be used.

For any stationary combustion units included at the facility, facilities will be required to follow subpart C to estimate emissions of CO_2, CH_4, and N_2O from stationary combustion. Use of facility specific information under the carbon mass balance method is consistent with IPCC Tier 3 methods and is the preferred method for estimating emissions for other GHGRP sectors.

d. Monitoring, QA/QC, and Verification Requirements

The EPA is finalizing, as proposed, two separate monitoring methods: direct measurement and a mass balance emission calculation.

Direct measurement using CEMS. We are finalizing the CEMS monitoring requirements as proposed. In the case of ceramics manufacturing, process and combustion GHG emissions from ceramics process units are typically emitted from the same stack. If facilities use an existing CEMS to meet the monitoring requirements, they will be required to use CEMS to estimate CO_2 emissions. Where the CEMS capture all combustion- and process-related CO_2 emissions, facilities will be required to follow the requirements of subpart C of part 98 to estimate all CO_2 emissions from the industrial source. The CEMS method requires both a continuous CO_2 concentration monitor and a continuous volumetric flow monitor. To qualify as a CEMS, the monitors will be required to be installed, operated, and calibrated according to subpart C of part 98 (40 CFR 98.33(a)(4)), which is consistent with CEMS requirements in other GHGRP subparts.

Carbon balance method. We are finalizing the carbon mass balance method as proposed, with one change. The carbon mass balance method requires monitoring of mass quantities of carbonate-based raw material (*e.g.,* clay) fed to the process, establishing the mass fraction of carbonate-based minerals in the raw material, and an emission factor based on the type of carbonate consumed. The mass quantities of carbonate-based raw materials consumed by each ceramics process unit can be determined using direct weight measurement of plant instruments or techniques used for accounting purposes, such as calibrated scales, weigh hoppers, or weigh belt feeders. The direct weight measurement can then be compared to records of raw material purchases for the year.

For the carbon content of the materials used to calculate process CO_2 emissions, the final rule requires that the owner or operator determine the carbon mass fraction either by using information provided by the raw material supplier, by collecting and sending representative samples of each carbonate-based material consumed to an off-site laboratory for a chemical analysis of the carbonate content (weight fraction), or by choosing to use the default value of 1.0. The use of 1.0 for the mass fraction assumes that the carbonate-based raw material comprises 100 percent of one carbonate-based mineral. We are revising the final rule to also state that where it is determined that the mass fraction of a carbonate-based raw material is below the detection limit of available testing standards, the facility must assume a default of 0.005 for that material.

We are revising the final rule to allow facilities that determine the carbonate-based mineral mass fractions of a carbonate-based material to use additional sampling and chemical analysis methods to provide additional flexibility for facilities. Specifically, we are revising 40 CFR 98.524(b) from requiring sampling and chemical analysis using consensus standards that specify x-ray fluorescence to requiring that facilities use an ''x-ray fluorescence test, x-ray diffraction test, or other enhanced testing method published by an industry consensus standards

[44] IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Industrial Processes and Product Use, Mineral Industry Emissions. 2006. *https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_2_Ch2_Mineral_Industry.pdf.*

organization'' (*e.g.,* ASTM, American Society of Mechanical Engineers (ASME), American Petroleum Institute (API)). The final rule requires the carbon content be analyzed at least annually to verify the mass fraction data provided by the supplier of the raw material.

For the ceramics manufacturing source category, we are finalizing the QA/QC requirements as proposed. Reporters must calibrate all meters or monitors and maintain documentation of this calibration as documented in subpart A of part 98 (General Provisions). These meters or monitors should be calibrated prior to the first reporting year, using a suitable method published by a consensus standards organization, and will be required to be recalibrated either annually or at the minimum frequency specified by the manufacturer. In addition, any flow rate monitors used for direct measurement will be required to comply with QA/QC procedures for daily calibration drift checks and quarterly or annual accuracy assessments, such as those provided in Appendix F to part 60 or similar QA/QC procedures. We are finalizing these requirements to ensure the quality of the reported GHG emissions and to be consistent with the current requirements for CEMS measurements within subparts A (General Provisions) and C of the GHGRP. For measurements of carbonate content, reporters will assess representativeness of the carbonate content received from suppliers with laboratory analysis.

e. Procedures for Estimating Missing Data

We are finalizing the procedures for estimation of missing data as proposed. The final rule requires the use of substitute data whenever a quality-assured value of a parameter that is used to calculate emissions is unavailable, or ''missing.'' For example, if the CEMS malfunctions during unit operation, the substitute data value would be the average of the quality-assured values of the parameter immediately before and immediately after the missing data period. For missing data on the amounts of carbonate-based raw materials consumed, we are finalizing that reporters must use the best available estimate based on all available process data or data used for accounting purposes, such as purchase records. For missing data on the mass fractions of carbonate-based minerals in the carbonate-based raw materials, reporters will assume that the mass fraction of each carbonate-based mineral is 1.0. The use of 1.0 for the mass fraction assumes that the carbonate-based raw material comprises 100 percent of one carbonate-based mineral. Missing data procedures will be applicable for CEMS measurements, mass measurements of raw material, and carbon content measurements.

f. Data Reporting Requirements

The EPA is finalizing the data reporting requirements for subpart ZZ as proposed, with one minor revision. Each ceramics manufacturing facility must report the annual CO_2 process emissions from each ceramics manufacturing process, as well as any stationary fuel combustion emissions. In addition, facilities must report additional information that forms the basis of the emissions estimates so that we can understand and verify the reported emissions. For ceramic manufacturers, the additional information will include: the total number of ceramics process units at the facility and the total number of units operating; annual production of each ceramics product for each process unit and for all ceramics process units combined; the annual production capacity of each ceramics process unit; and the annual quantity of carbonate-based raw material charged to each ceramics process unit and for all ceramics process units combined. The EPA has revised the final rule to clarify at 40 CFR 98.526(c) that facilities that use the carbon balance method must also report the annual quantity of each carbonate-based raw material (including clay) charged to each ceramics process unit. This change is consistent with the requirements the EPA proposed for facilities conducting direct measurement using CEMS, and is not anticipated to substantively impact the burden to reporters as proposed. For ceramic manufacturers with non-CEMS units, the finalized rules will also require reporting of the following information: the method used for the determination for each carbon-based mineral in each raw material; applicable test results used to verify the carbonate based mineral mass fraction for each carbonate-based raw material charged to a ceramics process unit, including the date of test and test methods used; and the number of times in the reporting year that missing data procedures were used.

g. Records That Must Be Retained

The EPA is finalizing the record retention requirements of subpart ZZ as proposed. All facilities are required to maintain monthly records of the ceramics manufacturing rate for each ceramics process unit and the monthly amount of each carbonate-based raw material charged to each ceramics process unit.

For facilities that use the carbon balance procedure, the final rule requires facilities to also maintain monthly records of the carbonate-based mineral mass fraction for each mineral in each carbonate-based raw material. Additionally, facilities that use the carbon balance procedure will be required to maintain (1) records of the supplier-provided mineral mass fractions for all raw materials consumed annually; (2) results of all analyses used to verify the mineral mass fraction for each raw material (including the mass fraction of each sample, the date of test, test methods and method variations, equipment calibration data, and identifying information for the laboratory conducting the test); and (3) annual operating hours for each unit. If facilities use the CEMS procedure, they are required to maintain the CEMS measurement records.

Procedures for ensuring accuracy of measurement methods, including calibration, must be recorded. The final rule requires records of how measurements are made, including measurements of quantities of materials used or produced and the carbon content of minerals in raw materials.

Finally, the final rule requires the retention of a record of the file generated by the verification software specified in 40 CFR 98.5(b) including:

- Annual average decimal mass fraction of each carbonate-based mineral per carbonate-based raw material for each ceramics process unit (percent by weight expressed as a decimal fraction);
- Annual mass of each carbonate-based raw material charged to each ceramics process unit (tons); and
- The decimal fraction of calcination achieved for each carbonate-based raw material for each ceramics process unit (percent by weight expressed as a decimal fraction).

2. Summary of Comments and Responses on Subpart ZZ

This section summarizes the major comments and responses related to the proposed subpart ZZ. The EPA previously requested comment on the addition of ceramics manufacturing sources category as a new subpart to part 98 in the 2022 Data Quality Improvements Proposal. The EPA received some comments for subpart ZZ on the 2022 Data Quality Improvements Proposal; the majority of these comments were previously addressed in the preamble to the 2023 Supplemental Proposal, wherein the EPA proposed to add new subpart ZZ for ceramics manufacturing (see section III.E. of the

preamble to the 2023 Supplemental Proposal). The EPA received additional comments regarding the proposed subpart ZZ following the 2023 Supplemental Proposal. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to subpart ZZ.

Comments: One commenter objected to the EPA's inclusion of the brick manufacturing industry in proposed subpart ZZ. The commenter asserted that GHG emissions from the brick industry represent only about 0.027 percent of U.S. anthropogenic emissions, stating that any relative improvement in accuracy of emissions would not change the fact that GHG emissions from brick manufacturing are a very small fraction of the national total.

The commenter provided a number of reasons to exclude brick manufacturing from subpart ZZ. First, the commenter contested the EPA's assumption that all ceramics manufacturing use materials with significant carbonate content. The commenter stated that the materials used for the production of brick are low carbonate clay and shale materials that should not be characterized as ''carbonate-based materials,'' and that the various processes used to prepare raw materials and to form and fire brick are such that higher carbonate materials cannot be used. The commenter added that high carbonate materials can result in durability problems of the brick, ranging from cosmetic ''lime pops'' to scenarios where the brick can actually fail in service. The commenter further stated that the majority production of brick in the United States is red bodied brick, and therefore the use of carbonates including limestone are undesirable, due to bleaching of the red color during firing.

The commenter explained that the EPA's proposal assumes a carbonate content of 10–15 percent, whereas tested averages for brick making materials average 0.58 percent. The commenter provided a table of carbonate brick values based on testing from the NBRC (National Brick Research Center at Clemson University). The commenter stated that, as such, the actual brick making carbonate percentages are only about 3.8–5.8 percent (0.58 percent divided by 10 percent and 15 percent, respectively) of the carbonate material percentages in the proposed rule. The commenter estimated that based on this determination, the inclusion of carbonate process emissions would only increase reported emissions from a facility by about 2.10 percent, and few, if any, additional sites not already reporting exceeding the 25,000 $mtCO_2e$ reporting threshold would be required to report. The commenter added that even if facilities do not meet the threshold, the added requirements would impose on all sites additional testing and measurement requirements to determine if they exceed the reporting threshold. The commenter stated that the associated costs do not justify the requirements.

The commenter stated that a limited number of brickmaking sites add small amounts of carbonates to some of their products for various reasons. The commenter explained that some manufacturers add barium carbonate to the brick body mix to prevent soluble salts from forming on the final product. In such cases, the commenter noted that barium carbonate is added typically in the range of 0.05 to 0.1 percent. The commenter also stated that sodium carbonate (added in the range of 0.5 percent) is sometimes used to improve the uptake of water during the brick forming process. The commenter asserted that in such cases, if the additional usages of carbonates are significant, they already would be reported under subpart U.

The commenter noted that the EPA's existing methods for estimating GHG emissions from the brick manufacturing industry are good enough to adequately inform the Agency's policy/regulatory decision making and to satisfy the EPA's desire and obligation to maintain an accurate national GHG emissions inventory. The commenter suggested that the EPA could, in lieu of annual reporting, issue a one-time information collection request.

Response: The EPA has considered the information provided by the commenter and is finalizing the addition of the ceramics category to include the brick industry. Consistent with the other source categories of 40 CFR part 98, requiring annual reporting of data for ceramics facilities is preferred to a one-time information collection request. The collection of annual data will help the EPA to understand changes in industry emissions and trends over time. The snapshot of information provided by a one-time information collection request would not provide the type of ongoing information which could inform potential legislation or EPA policy. Collecting annual data also allows us to incorporate accurate time-series emissions changes for the ceramics industry in the GHG Inventory and other EPA analyses. Further, including brick manufacturing in the ceramics source category is consistent with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.[45] While the commenter asserts that brick manufacturing is a small percentage of the total national GHG emissions, the ceramics subpart would cover more industries than just brick manufacturing and is anticipated to cover emissions comparable to other existing subparts. We have included both an emissions threshold and a carbonate use threshold in order to exempt small facilities or those with minor emissions.

Rather than exempting the brick industry from the ceramics subpart entirely, we have taken the commenter's concerns into account and are modifying the definition of the source category such that the subpart ''would apply to facilities that annually consume at least 2,000 tons of carbonates, either as raw materials or as a constituent in clay . . .''. This is in contrast to the original proposed definition which included the phrase ''or 20,000 tons of clay.'' This revised carbonate use threshold will exclude and thus avoid the reporting burden for facilities that use low annual quantities of carbonates, such as brick manufacturers that use low-carbonate clay. Facilities could estimate their carbonate usage to determine their applicability for whether they meet this carbonate use threshold by multiplying the annual amount of clay consumed as a raw material (and heated to calcination) by the weight fraction of carbonates contained in the clay.

Comment: One commenter objected to the proposed measurement protocols of subpart ZZ and indicated that the methods are infeasible for brick manufacturing materials. The commenter stated that the proposal cites ''suitable chemical analysis methods include using an x-ray fluorescence standard method.'' The commenter asserted that the use of x-ray fluorescence requires a minimum of at least 2.0 percent of any single carbonate material to speciate and determine an amount, which is higher than the total of all carbonates in brick making material, which the commenter

[45] IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Industrial Processes and Product Use, Mineral Industry Emissions. 2006. Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan. *www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_2_Ch2_Mineral_Industry.pdf.*

provided as 0.58 percent based on testing.

The commenter stated that for brick manufacturing, an alternate measurement of total carbonates such as ASTM E1915 *Standard Test Methods for Analysis of Metal Bearing Ores and Related Materials for Carbon, Sulfur, and Acid-Base Characteristics* (2020) [46] and CO_2e calculation would be a necessary option. The commenter suggested a simpler option would be to develop a default percentage of carbonate in brickmaking raw materials, or an AP–42, Compilation of Air Pollutant Emissions Factors type metric allowing a direct calculation of CO_2e emissions per product throughput tonnage. The commenter contended that this would still yield sufficiently accurate results and suggested that the historical testing data could be the basis for this option.

Response: Upon careful review and consideration, the EPA has considered the information provided by the commenter and will finalize 40 CFR 98.524(b) to allow for other industry standards (*i.e.,* x-ray fluorescence test, x-ray diffraction test, or other enhanced testing method published by an industry consensus standards organization (*e.g.,* ASTM, ASME, API)) as described in 40 CFR 98.524(d) to allow for the flexibility of using the most appropriate standard test method. Furthermore, following consideration of the commenter's recommendation that the EPA include a default carbonate percentage, we are revising 40 CFR 98.524(b) to include a default value of 0.005 for each carbonate material where it is determined that the mass fraction is below the detection limit of available testing standards. The 0.005 value (0.5 percent) is consistent with the example limestone mass fraction that was provided by the Brick Industry Association.[47] Furthermore, the EPA's research into carbonate testing standards revealed that 0.01 (1 percent) is an example detection limit for existing standards (*e.g.,* ASTM F3419–22, *Standard Test Method for Mineral Characterization of Equine Surface Materials by X-Ray Diffraction (XRD) Techniques* (2022) [48]). In scientific settings, it is a common practice to assume that a value of one half the detection limit when concentrations are too low to accurately measure.

Comment: One commenter stated that the proposed rule requirements to report on a unit-by-unit basis instead of facility wide reporting would impose unnecessary burdens on the brick industry. The commenter asserted that most activities (natural gas billing, clay hauling deliveries, material preparation logs, etc.) are done on a per-site basis. The commenter added that there is no benefit to requiring reporting to be done on a per unit basis, and a per site basis should be adequate for determining if emissions exceed the 25,000 metric ton CO_2e reporting threshold.

Response: The EPA routinely collects unit-level capacity data for process equipment in 40 CFR part 98. These unit-level data are essential for quantifying actual GHG emissions from the facility (*e.g.,* the carbon balance method for estimating emissions relies on the actual quantities of carbonate-based raw materials charged to the ceramics process units, not just those delivered to the facility). Furthermore, we use these data to perform statistical analyses as part of our verification process, which allows us to develop ranges of expected emissions by emission source type and successfully identify outliers in the reported data. We disagree that there will be no benefit to reporting on a unit-level basis, as this information will improve the EPA's verification of reported emissions and will provide a more accurate facility-level and national-level emissions profile for the industry.

IV. Final Revisions to 40 CFR Part 9

The EPA is finalizing the proposed amendment to 40 CFR part 9 to include the OMB control number issued under the PRA for the ICR for the GHGRP. The EPA is amending the table in 40 CFR part 9 to list the OMB approval number (OMB No. 2060–0629) under which the ICR for activities in the existing part 98 regulations that were previously approved by OMB have been consolidated. The EPA received no comments on the proposed amendments to 40 CFR part 9 and is finalizing the change as proposed. This codification in the CFR satisfies the display requirements of the PRA and OMB's implementing regulations at 5 CFR part 1320.

V. Effective Date of the Final Amendments

As proposed in the 2023 Supplemental Proposal, the final amendments will become effective on January 1, 2025. As provided under the existing regulations at 40 CFR 98.3(k), the GWP amendments to table A–1 to subpart A will apply to reports submitted by current reporters that are submitted in calendar year 2025 and subsequent years (*i.e.,* starting with reports submitted for RY2024 on or before March 31, 2025). The revisions to GWPs do not affect the data collection, monitoring, or calculation methodologies used by these existing reporters. All other final revisions, which apply to both existing and new reporters, will be implemented for reports prepared for RY2025 and submitted March 31, 2026. Reporters who are newly subject to the rule (facilities that have not previously reported to the GHGRP), either due to final revisions that change what facilities must report under the rule (*e.g.,* newly subject to subparts I or P or subparts WW, XX, YY, or ZZ), or due to the revisions to GWPs in table A–1 to subpart A, will be required to implement all requirements to collect data, including any required monitoring and recordkeeping, on January 1, 2025.

This final rule includes new and revised requirements for numerous provisions under various aspects of GHGRP, including revisions to applicability and updates to reporting, recordkeeping, and monitoring requirements. Further, as explained in section I.B. and this section of this preamble, it amends numerous sections of part 98 for various specific reasons. Therefore, this final rule is a multifaceted rule that addresses many separate things for independent reasons, as detailed in each respective section of this preamble. We intended each portion of this rule to be severable from each other, though we took the approach of including all the parts in one rulemaking rather than promulgating multiple rules to amend each part of the GHGRP. For example, the following portions of this rulemaking are mutually severable from each other, as numbered: (1) revisions to General Provisions, including updates to GWPs in table A–1 to subpart A of part 98 in section III.A.1. of this preamble, (2) revisions to applicability to subparts G (Ammonia Manufacturing), P (Hydrogen Production), and Y (Petroleum Refineries) to address non-merchant hydrogen production in sections III.E., III.I., and III.M.; (3) revisions to applicability to subparts Y and WW (Coke Calciners) to address stand-alone coke calcining operations; (4) revisions to subparts PP (Carbon Dioxide Suppliers) and new subpart VV (Geologic Sequestration of Carbon Dioxide with Enhanced Oil Recovery Using ISO 27916) in sections III.V. and III.Z.; (5) revisions to applicability in subparts UU (Injection of Carbon Dioxide) and subpart VV in sections

[46] Available at *https://www.astm.org/e1915-20.html.* Accessed January 9, 2024.

[47] See Docket ID. No. EPA–HQ–OAR–2019–0424–0332 at *www.regulations.gov.*

[48] Available at *https://www.astm.org/f3419-22.html.* Accessed January 9, 2024.

III.Z. and III.AA., (6) other regulatory amendments discussed in section III. and IV. of this preamble, and (7) confidentiality determinations as discussed in section VI. of this preamble. Each of the regulatory amendments in section III. is severable from all the other regulatory amendments in that section, and each of the confidentiality determinations in section VI. is also severable from all the other determinations in that section. If any of the above portions is set aside by a reviewing court, then we intend the remainder of this action to remain effective, and the remaining portions will be able to function absent any of the identified portions that have been set aside. Moreover, this list is not intended to be exhaustive, and should not be viewed as an intention by the EPA to consider other parts of the rule not explicitly listed here as not severable from other parts of the rule.

VI. Final Confidentiality Determinations

This section provides a summary of the EPA's final confidentiality determinations and emission data designations for new and substantially revised data elements included in these final amendments, certain existing part 98 data elements for which no determination has been previously established, certain existing part 98 data elements for which the EPA is amending or clarifying the existing confidentiality determination, and the EPA's final reporting determinations for inputs to equations included in the final amendments. This section also summarizes the major comments and responses related to the proposed confidentiality determinations, emission data designations, and reporting determinations for these data elements.

The EPA is not taking final action on any requirements for subpart W (Petroleum and Natural Gas Systems) in this final rule, therefore, we are not taking any action on confidentiality determinations or reporting determinations proposed for data elements in subpart W of part 98 in the 2022 Data Quality Improvements Proposal. See section I.C. of this preamble for a discussion of the EPA's actions regarding subpart W. Additionally, we are not taking any final action on proposed subpart B (Energy Consumption) in this final rule; therefore we are not taking any action on confidentiality determinations proposed in the 2023 Supplemental Proposal for subpart B. See section III.B. of this preamble for additional information on subpart B.

For all remaining data elements included in the 2022 Data Quality Improvements Proposal or 2023 Supplemental Proposal, this section identifies any changes to the proposed confidentiality determinations, emissions data designations, or reporting determinations in the final rule.

A. EPA's Approach To Assess Data Elements

In the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal, the EPA proposed to assess data elements for eligibility of confidential treatment using a revised approach, in response to *Food Marketing Institute* v. *Argus Leader Media,* 139 S. Ct. 2356 (2019) (hereafter referred to as *Argus Leader*).[49] The EPA proposed that the *Argus Leader* decision did not affect our approach to designating data elements as ''inputs to emission equations'' or our previous approach for designating new and revised reporting requirements as ''emission data.'' We proposed to continue identifying new and revised reporting elements that qualify as ''emission data'' (*i.e.,* data necessary to determine the identity, amount, frequency, or concentration of the emission emitted by the reporting facilities) by evaluating the data for assignment to one of the four data categories designated by the 2011 Final CBI Rule (76 FR 30782, May 26, 2011) to meet the CAA definition of ''emission data'' in 40 CFR 2.301(a)(2)(i) (hereafter referred to as ''emission data categories''). Refer to section II.B. of the July 7, 2010 proposal (75 FR 39094) for descriptions of each of these data categories and the EPA's rationale for designating each data category as ''emission data.'' For data elements designated as ''inputs to emission equations,'' the EPA maintained the two subcategories, data elements entered into e-GGRT's Inputs Verification Tool (IVT) and those directly reported to the EPA. Refer to section VI.C. of the preamble of the 2022 Data Quality Improvements Proposal for further discussion of ''inputs to emission equations.''

In the 2022 Data Quality Improvements Proposal, for new or revised data elements that the EPA did not propose to designate as ''emission data'' or ''inputs to emission equations,'' the EPA proposed a revised approach for assessing data confidentiality. We proposed to assess each individual reporting element according to the new *Argus Leader* standard. So, we evaluated each data element individually to determine whether the information is customarily and actually treated as private by the reporter and proposed a confidentiality determination based on that evaluation.

The EPA received several comments on its proposed approach in the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal. The commenters' concerns and the EPA's responses thereto are provided in the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424. Following consideration of the comments received, the EPA is not revising this approach and is continuing to assess data elements for confidentiality determinations as described in the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal. We are also finalizing the specific confidentiality determinations and reporting determinations as described in section VI.B. and VI.C. of this preamble.

B. Final Confidentiality Determinations and Emissions Data Designations

1. Summary of Final Confidentiality Determinations

a. Final Confidentiality Determinations for New and Revised Data Elements

The EPA is making final confidentiality determinations and emission data designations for new and substantially revised data elements included in these final amendments. Substantially revised data elements include those data elements where the EPA is, in this final action, substantially revising the data elements as compared to the existing requirements. Please refer to the preamble to the 2022 Data Quality Improvements Proposal or the 2023 Supplemental Proposal for additional information regarding the proposed confidentiality determinations for these data elements.

For subparts A (General Provisions), C (General Stationary Fuel Combustion), F (Aluminum Production), G (Ammonia Manufacturing), H (Cement Production), P (Hydrogen Production), S (Lime Manufacturing), HH (Municipal Solid Waste Landfills), OO (Suppliers of Industrial Greenhouse Gases), and QQ (Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged Equipment or Closed-Cell Foams), the EPA is not finalizing the proposed confidentiality determinations for certain data elements because the

[49] Available in the docket for this rulemaking (Docket ID. No. EPA–HQ–OAR–2019–0424).

EPA is not taking final action on the requirements to report these data elements at this time (see section III. of this preamble for additional information). These data elements are listed in table 5 of the memorandum ''Confidentiality Determinations and Emission Data Designations for Data Elements in the 2024 Final Revisions to the Greenhouse Gas Reporting Rule,'' available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424.

For subparts C (General Stationary Fuel Combustion) and PP (Suppliers of Carbon Dioxide), the EPA has revised its final confidentiality determinations or emissions data designations for certain data elements from proposal. For subpart PP, following consideration of public comments, the EPA has revised its final confidentiality determination for eight data elements that were proposed as ''Not Eligible'' to ''Eligible for Confidential Treatment.'' See section VI.B.2. of this preamble for a summary of the related comments and the EPA's response. For subpart C, we identified two revised data elements where the EPA had inadvertently proposed to place the revised version of the data elements into a different emissions data category than the existing version of the data elements (*i.e.,* proposed moving the data elements from one category of emissions data into a different category of emissions data). The EPA has corrected the placement of these data elements from ''Facility and Unit Identifier Information'' to ''Emissions.'' Table 6 of this preamble lists the data elements where the EPA has revised its final confidentiality determinations or emissions data designations as compared to the 2022 Data Quality Improvements Proposal.

TABLE 6—DATA ELEMENTS FOR WHICH THE EPA IS REVISING THE FINAL CONFIDENTIALITY DETERMINATIONS OR EMISSION DATA DESIGNATIONS

Subpart	Citation in 40 CFR part 98	Data element description
C [1]	98.36(c)(1)(vi)	When reporting using aggregation of units, if any of the stationary fuel combustion units burn biomass, the annual CO_2 emissions from combustion of all biomass fuels combined (metric tons).
C [1]	98.36(c)(3)(vi)	When reporting using the common pipe configuration, if any of the stationary fuel combustion units burn biomass, the annual CO_2 emissions from combustion of all biomass fuels combined (metric tons).
PP [2]	98.426(i)(1)	If you capture a CO_2 stream at a facility with a direct air capture (DAC) process unit and electricity (excluding combined heat and power (CHP)) is provided to a dedicated meter for the DAC process unit: annual quantity of electricity (generated on-site or off-site) consumed for the DAC process unit (MWh).
PP [2]	98.426(i)(1)(i)(C)	If you capture a CO_2 stream at a facility with a DAC process unit and electricity (excluding CHP) is provided to a dedicated meter for the DAC process unit: if the electricity is sourced from a grid connection, the name of the electric utility company that supplied the electricity as shown on the last monthly bill issued by the utility company during the reporting period.
PP [2]	98.426(i)(1)(i)(D)	If you capture a CO_2 stream at a facility with a DAC process unit and electricity (excluding CHP) is provided to a dedicated meter for the DAC process unit: if the electricity is sourced from a grid connection, the name of the electric utility company that delivered the electricity.
PP [2]	98.426(i)(1)(i)(E)	If you capture a CO_2 stream at a facility with a DAC process unit and electricity (excluding CHP) is provided to a dedicated meter for the DAC process unit: if the electricity is sourced from a grid connection, the annual quantity of electricity consumed for the DAC process unit (MWh).
PP [2]	98.426(i)(1)(ii)	If you capture a CO_2 stream at a facility with a DAC process unit and electricity (excluding CHP) is provided to a dedicated meter for the DAC process unit: if electricity is sourced from on-site or through a contractual mechanism for dedicated off-site generation, the annual quantity of electricity consumed per applicable source (MWh), if known.
PP [2]	98.426(i)(2)	If you capture a CO_2 stream at a facility with a DAC process unit and you use heat, steam, or other forms of thermal energy (excluding CHP) for the DAC process unit: the annual quantity of heat, steam, or other forms of thermal energy sourced from on-site or through a contractual mechanism for dedicated off-site generation per applicable energy source (MJ), if known.
PP [2]	98.426(i)(3)(i)	If you capture a CO_2 stream at a facility with a DAC process unit and electricity from CHP is sourced from on-site or through a contractual mechanism for dedicated off-site generation: the annual quantity of electricity consumed for the DAC process unit per applicable energy source (MWh), if known.
PP [2]	98.426(i)(3)(ii)	If you capture a CO_2 stream at a facility with a DAC process unit and you use heat from CHP for the DAC process unit: the annual quantity of heat, steam, or other forms of thermal energy from CHP sourced from on-site or through a contractual mechanism for dedicated off-site generation per applicable energy source (MJ), if known.

[1] In the May 26, 2011, final rule (76 FR 30782), this data element was assigned to the ''Emissions Data'' data category and determined to be ''Emissions Data.'' In the 2022 Data Quality Improvements Proposal, the data element was significantly revised, and the EPA proposed that the revised data element would be assigned to the data category ''Facility and Unit Identifier'' and would have a determination of ''Emissions Data.'' We have subsequently determined that the revisions to the data element (revising the language ''if any units burn both fossil fuels and biomass'' with ''if any of the units burn biomass'') is a clarifying change and that the data element was incorrectly assigned to a new data category. Therefore we are finalizing the revised data element in the ''Emissions Data'' data category and determining that it is ''Emissions Data.''

[2] Revised from ''Not Eligible'' to ''Eligible for Confidential Treatment''; see section VI.B.2. of this preamble.

For subparts I (Electronics Manufacturing), P (Hydrogen Production), and ZZ (Ceramics Manufacturing), the EPA is finalizing revisions that include new data elements for which the EPA did not propose a determination. These data elements are listed in table 7 of this preamble and table 6 of the memorandum, ''Confidentiality Determinations and Emission Data Designations for Data Elements in the 2024 Final Revisions to the Greenhouse Gas Reporting Rule,'' available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424. Because the EPA has not proposed or solicited public comment on a determination for

these data elements, we are not finalizing confidentiality determinations for these data elements at this time.

TABLE 7—NEW DATA ELEMENTS FROM PROPOSAL TO FINAL FOR WHICH THE EPA IS NOT FINALIZING CONFIDENTIALITY DETERMINATIONS OR EMISSION DATA DESIGNATIONS

Subpart	Citation in 40 CFR part 98	Data element description
I	98.96(y)(2)(iv)	For electronics manufacturing facilities, for the technology assessment report required under 40 CFR 98.96(y), for any destruction or removal efficiency data submitted, if you choose to use an additional alternative calculation methodology to calculate and report the input gas emission factors and by-product formation rates: a complete, mathematical description of the alternative method used (including the equation used to calculate each reported utilization and by-product formation rate).
P	98.166(d)(10)	For each hydrogen production process unit, an indication (yes or no) if best available monitoring methods used in accordance with 40 CFR 98.164(c) to determine fuel flow for each stationary combustion unit directly associated with hydrogen production (*e.g.,* reforming furnace and hydrogen production process unit heater).
P	98.166(d)(10)(i)	For each hydrogen production process unit, if best available monitoring methods were used in accordance with 40 CFR 98.164(c) to determine fuel flow for each stationary combustion unit directly associated with hydrogen production, the beginning date of using best available monitoring methods.
P	98.166(d)(10)(ii)	For each hydrogen production process unit, if best available monitoring methods were used in accordance with 40 CFR 98.164(c) to determine fuel flow for each stationary combustion unit directly associated with hydrogen production, the anticipated or actual end date of using best available monitoring methods.
ZZ	98.526(c)(2)	For a facility containing a ceramics manufacturing process, for each ceramics manufacturing process unit, if process CO_2 emissions are calculated according to the procedures specified in 40 CFR 98.523(b), annual quantity of each carbonate-based raw material (including clay) charged (tons) (no CEMS).

In a handful of cases, the EPA has made minor revisions to data elements in this final action as compared to the proposed data element included in either the 2022 Data Quality Improvements Proposal or the 2023 Supplemental Proposal. For certain proposed data elements, we have revised the citations from proposal to final. In other cases, the minor revisions include clarifications to the text. The EPA evaluated these data elements and how they have been clarified in the final rule to verify that the information collected has not substantially changed since proposal. These data elements are listed in table 7 of the memorandum ''Confidentiality Determinations and Emission Data Designations for Data Elements in the 2024 Final Revisions to the Greenhouse Gas Reporting Rule,'' available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424. Because the information to be collected has not substantially changed since proposal, we are finalizing the confidentiality determinations or emission data designations for these data elements as proposed. For additional information on the rationales for the confidentiality determinations for these data elements, see the preamble to the 2022 Data Quality Improvements Proposal or the 2023 Supplemental Proposal and the memoranda ''Proposed Confidentiality Determinations and Emission Data Designations for Data Elements in Proposed Revisions to the Greenhouse Gas Reporting Rule'' and ''Proposed Confidentiality Determinations and Emission Data Designations for Data Elements in Proposed Supplemental Revisions to the Greenhouse Gas Reporting Rule,'' available in the docket for this rulemaking (Docket ID. No. EPA–HQ–OAR–2019–0424).

For all other confidentiality determinations for the new or substantially revised data reporting elements for these subparts, the EPA is finalizing the confidentiality determinations as they were proposed. Please refer to the preamble to the 2022 Data Quality Improvements Proposal or the 2023 Supplemental Proposal for additional information regarding these confidentiality determinations.

b. Final Confidentiality Determinations and Emission Data Designations for Existing Data Elements for Which EPA Did Not Previously Finalize a Confidentiality Determination or Emission Data Designation

The EPA is finalizing all confidentiality determinations as they were proposed for other part 98 data reporting elements for which no determination has been previously established. The EPA received no comments on the proposed determinations. Please refer to the preamble to the 2022 Data Quality Improvements Proposal or the 2023 Supplemental Proposal for additional information regarding the proposed confidentiality determinations.

c. Final Confidentiality Determinations for Existing Data Elements for Which the EPA is Amending or Clarifying the Existing Confidentiality Determination

The EPA is finalizing as proposed all confidentiality determinations for other part 98 data reporting elements for which the EPA proposed to amend or clarify the existing confidentiality determinations. The EPA received no comments on the proposed determinations. Please refer to the preamble to the 2022 Data Quality Improvements Proposal for additional information regarding the proposed confidentiality determinations.

2. Summary and Response to Public Comments on Proposed Confidentiality Determinations

The EPA received several comments related to the proposed confidentiality determinations. The EPA received minimal comments on the proposed confidentiality determinations for all new or substantially revised data elements, except certain data elements in subparts PP (Suppliers of Carbon Dioxide) and VV (Geologic Sequestration of Carbon Dioxide With Enhanced Oil Recovery Using ISO 27916) as described in this section. Additional comments may be found in the EPA's comment response document in Docket ID. No. EPA–HQ–OAR–2019–

0424. For subparts PP and VV, we received comments questioning the proposed confidentiality determination of certain new and substantially revised data elements in each subpart, including requests that the data elements be treated as confidential. Summaries of the major comments and the EPA's responses thereto are provided below. Additional comments and the EPA's responses may be found in the comment response document noted above.

Comment: One commenter contended that public disclosure of the annual quantity of electricity consumed to power the DAC process unit and natural gas used for thermal energy could undermine the commercial deployment of DAC. The commenter stated that this information should be kept as confidential. The commenter explained that power in a DAC facility is one of the main operating expenses and power consumption is directly related to power cost. The commenter stated that a comprehensive understanding of a DAC unit's power demand, coupled with a basic understanding of the clean power markets in the region where the DAC facility is located, could be used to estimate the DAC power cost. The commenter contended that this knowledge, if available to a competitor or provider of clean power, would affect business-to-business contract negotiations, allow for speculation on potential profit margins on captured CO_2 volumes, and negatively impact the ability of a DAC operator to procure clean power at competitive rates.

The commenter added that many carbon capture technologies will utilize natural gas to provide the thermal energy needed to drive the CO_2 capture process, including DAC facilities. The commenter explained contract negotiations for the supply of natural gas for DAC facilities are competitive and a major operating cost for a DAC facility and information on the annual amount of natural gas consumed by a DAC facility, if available to a competitor or natural gas supplier, will affect the ability of a DAC operator to contract for responsibly sourced natural gas supply at a competitive cost. The commenter requested that natural gas consumption be declared CBI. The commenter added that they still supported the requirement to report on whether flue gas is also captured by the DAC process unit as this requirement allows for a clear distinction of CO_2 captured from the process versus CO_2 captured from the air, increasing public trust in reported CO_2 volumes.

Response: The EPA proposed that 12 new subpart PP data elements in 40 CFR 98.426(i) specific to DAC facilities would not be eligible for confidential treatment. These data elements included: the annual quantities of on-site and off-site electricity consumed for the DAC process unit; the annual quantities of heat, steam, other forms of thermal energy, and combined heat and power (CHP) consumed by the DAC process unit; the state and county where the facility with the DAC process unit is located; the name of the electric utility company that supplied and delivered the electricity if electricity is sourced from a grid connection; the annual quantity of electricity consumed by the DAC process unit supported by billing statements; the annual quantity of electricity, heat, and CHP consumed for the DAC process unit by each applicable source; and whether flue gas is also captured by the DAC process unit when electricity or CHP is generated on-site from natural gas, coal, or oil.

The EPA's proposed determinations were based on research that indicated the proposed data elements are not customarily and actually treated as private by the reporter. We note that this, rather than competitive harm, is now the standard for treating reported data elements as ''Eligible for Confidential Treatment'' or ''Not Eligible'' based on the decision in *Food Marketing Institute* v. *Argus Leader Media,* 139 S. Ct. 2356 (2019). While the commenter explains that there may be competitive harm from releasing electricity and natural gas consumption data in 40 CFR 98.426, they do not clearly demonstrate whether such data are customarily and actually treated as confidential. Following receipt of public comment, the EPA conducted additional research on the public availability of energy use data for DAC and other facilities, and determined that, with the exception of the state and county where the DAC facility is located, the other proposed data elements are not consistently available to the public at this time. As DAC is a nascent field, there are not yet many examples of such facilities to support a determination as to whether the other proposed data elements are typically and actually held confidential. The EPA, therefore, partially agrees with the commenter that certain data elements for DAC process unit energy requirements in 40 CFR 98.426(i) may be treated as confidential by certain facilities. The EPA is, therefore, making a determination of ''Eligible for Confidential Treatment'' for certain data elements. Specifically, the EPA is finalizing the rule with all new data elements in 40 CFR 98.426(i) having the categorical determination of ''Eligible for Confidential Treatment'' except for proposed 40 CFR 98.426(i)(1)(i)(A) and (B), the state and county where the DAC process unit is located, and certain information reported under 40 CFR 98.426(i)(1) through (3), which requires the reporter to indicate each applicable energy source type (*e.g.,* natural gas, oil, coal, nuclear) and provide an indication of whether flue gas is captured (proposed 40 CFR 98.426(i)(1)), respectively. The rule is being finalized with the determination that these four data elements are not eligible for confidential treatment. The requirements to report the state and county are similar to data required to be reported under 40 CFR 98.3(c)(1) that was designated as ''emission data,'' which under CAA section 114 is not entitled to confidential treatment (76 FR 30782, May 26, 2011; CBI Memo, April 29, 2011). Furthermore, the EPA has previously determined that indication of source is not confidential (77 FR 48072, August 13, 2012). Regarding reporting whether flue gas is captured, the EPA has previously determined that an indication of flue gas is ''Not Eligible'' (76 FR 30782, May 26, 2011). While the source of energy would be ''Not Eligible'' for confidential treatment, the actual quantities of energy reported under 40 CFR 98.426(i)(1) through (3) would be ''Eligible for Confidential Treatment.'' The EPA will consider revising the confidentiality status of the energy consumption data elements in the future, as more DAC facilities begin operating and we have a better understanding of how these data are customarily treated. For example, if DAC facilities begin customarily sharing their energy consumption information to advertise their energy efficiency, we may consider revising the confidentiality status to ''No Determination'' or ''Not Eligible for Confidential treatment.''

Comment: The EPA received several comments regarding the confidential treatment of the proposed EOR OMP at 40 CFR 98.488. Several commenters strongly supported the publishing of non-confidential data related to anthropogenic CO_2 volumes permanently stored in in CO_2–EOR operations, including the EOR OMP. Commenters compared the EOR OMP to the MRV plan issued or required under subpart RR, noting that the plans serve very similar purposes and include a geologic characterization of the storage location, information about wells within the storage site area, operations history, monitoring programs, and calculation and quantification methods used to determine the total amount of CO_2

stored in the storage site. One commenter strongly objected to the public disclosure of the OMP. The commenter stated that, unlike an MRV which must receive approval by the EPA under subpart RR, there is no such approval required for an OMP under subpart VV, which is appropriate given the differences in the subpart methodologies. The commenter added that reporting entities are currently free to exercise discretion to publicly disclose their OMPs.

Response: The EPA disagrees with the commenter. The EPA's review and approval of a document does not determine whether the document is eligible for confidential treatment. The EPA proposed that the OMP is not eligible for confidential treatment because it does not consider the data elements in the OMP to be customarily and actually treated as confidential. We note that this, rather than whether the EPA reviews and approves a submission, is the standard for confidentiality of reported data elements based on the *Argus Leader* decision. For example, the OMP shall include geologic characterization of the EOR complex, a description of the facilities within the CO_2–EOR project, a description of all wells and other engineered features in the CO_2–EOR project, the operations history of the project reservoir, descriptions of containment assurance and the monitoring plan, mass of CO_2 previously injected and other information required in the CSA/ANSI ISO 27916:19 standard. This information is normally available to the public through geologic records, construction and operating permitting files, well permits, tax records, and other public records. Furthermore, such information is available in EPA-approved subpart RR MRV plans which have been determined to be not-confidential and are consistently made publicly available on the EPA's website. That the EPA does not have a role in approving the OMP does not mean that the content itself is typically and actually held confidential.

C. Final Reporting Determinations for Inputs to Emission Equations

In the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal, the EPA proposed to assign several data elements to the ''Inputs to Emission Equation'' data category. As discussed in section VI.B.1. of the preamble to the 2022 Data Quality Improvements Proposal, the EPA determined that the *Argus Leader* decision does not affect our approach for handling of data elements assigned to the ''Inputs to Emission Equations'' data category. Data assigned to the ''Inputs to Emission Equations'' data category are assigned to one of two subcategories, including ''inputs to emission equations'' that must be directly reported to the EPA, and ''inputs to emission equations'' that are not reported but are entered into the EPA's Inputs Verification Tool (IVT). The EPA received no comments specific to the proposed reporting determinations for inputs to emission equations in the proposed rules. Additional information regarding these reporting determinations may be found in section VI.C. of the preamble to the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal.

The EPA is finalizing the reporting determinations for data elements that the EPA proposed to assign to the ''Inputs to the Emission Equation'' data category as they were proposed for all subparts with the exception of certain records proposed for subparts G (Ammonia Production), P (Hydrogen Production), S (Lime Production), and HH (Municipal Solid Waste Landfills). For subparts G, P, and S, the new and substantially revised data elements were not proposed to be included in the reporting section of those subparts but were instead to be retained as records to be input into the EPA's IVT, and the EPA did not evaluate these data elements further. The EPA is not taking final action on these inputs into IVT because the EPA is not taking final action on the requirement to retain these data elements as records (see section III. of this preamble for additional information.) For subpart HH, the EPA is not finalizing the proposed reporting determinations for certain data elements because the EPA is not taking final action on the requirements to report these data elements at this time (see section III. of this preamble for additional information). These data elements are listed in table 3 of the memorandum ''Reporting Determinations for Data Elements Assigned to the Inputs to Emission Equations Data Category in the 2024 Final Revisions to the Greenhouse Gas Reporting Rule,'' available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424.

In a handful of cases, the EPA has made minor revisions to data elements assigned to the ''Inputs to Emissions Equations'' data category in this final action as compared to the proposed data element included in the 2022 Data Quality Improvements Proposal or the 2023 Supplemental Proposal. For certain proposed data elements, we have revised the citations from proposal to final. In other cases, the minor revisions include clarifications to the text. The EPA evaluated these inputs to emissions equations and how they have been clarified in the final rule to verify that the data element has not substantially changed since proposal. These data elements and how they have been clarified in the final rule are listed in table 4 of the memorandum ''Reporting Determinations for Data Elements Assigned to the Inputs to Emission Equations Data Category in the 2024 Final Revisions to the Greenhouse Gas Reporting Rule,'' available in the docket to this rulemaking, Docket ID. No. EPA–HQ–OAR–2019–0424. Because the input has not substantially changed since proposal, we are finalizing the proposed reporting determinations for these data elements as proposed. For additional information on the rationale for the reporting determinations for the data elements, see the preamble to the 2022 Data Quality Improvements Proposal or the 2023 Supplemental Proposal and the memorandums ''Proposed Reporting Determinations for Data Elements Assigned to the Inputs to Emission Equations Data Category in Proposed Revisions to the Greenhouse Gas Reporting Rule'' and ''Proposed Reporting Determinations for Data Elements Assigned to the Inputs to Emission Equations Data Category in Proposed Supplemental Revisions to the Greenhouse Gas Reporting Rule,'' available in the docket for this rulemaking (Docket ID. No. EPA–HQ–OAR–2019–0424).

For all other reporting determinations for the data elements assigned to the ''Inputs to Emission Equations'' data category, the EPA is finalizing the reporting determinations as they were proposed. Please refer to the preamble to the 2022 Data Quality Improvements Proposal or the 2023 Supplemental Proposal for additional information.

VII. Impacts and Benefits of the Final Amendments

This section of the preamble examines the costs and economic impacts of the final rule and the estimated impacts of the rule on affected entities, in addition to the benefits of the final rule. The revisions in this final rule are anticipated to increase burden in cases where the amendments expand the applicability, monitoring, or reporting requirements of part 98. In some cases, the final amendments are anticipated to decrease burden where we streamlined the rule to remove notification or reporting requirements or simplify monitoring and reporting requirements. The final rule consolidates amendments

from the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal that revise 32 subparts that directly affect 30 industries—including revisions to update the GWPs in table A–1 to subpart A of part 98 that affect the number of facilities required to report under part 98; revisions to implement five new source categories or to expand existing source categories that may require facilities to newly report or to report under new provisions; and revisions to add new reporting requirements to a number of subparts that will improve the quality of the data collected under part 98. The bulk of costs associated with the final rule includes those costs to facilities that would be required to newly report under part 98 (subparts I, P, W, DD, HH, II, OO, TT, WW, XX, YY, and ZZ). However, the majority of subparts affected will reflect a modest increase in burden to individual reporters. As discussed in the preamble to the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal, in several cases the final rule amendments are anticipated to result in a decrease in burden. In some cases we have quantified where the final rule would result in a decrease in burden for certain reporters, but in other cases we were unable to quantify this decrease. The final revisions also include minor amendments, corrections, and clarifications, including simple revisions of requirements such as clarifying changes to definitions, calculation methodologies, monitoring and quality assurance requirements, and reporting requirements. These revisions clarify part 98 to better reflect the EPA's intent, and do not present any additional burden on reporters. The impacts of the final rule generally reflect an increase in burden for most subparts.

The EPA received a number of comments on the proposed revisions and the impacts of the proposed revisions in both the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal. See the document ''Summary of Public Comments and Responses for 2024 Final Revisions and Confidentiality Determinations for Data Elements under the Greenhouse Gas Reporting Rule'' in Docket ID. No. EPA–HQ–OAR–2019–0424 for a complete listing of all comments and responses related to the impacts of the proposed rules. Following consideration of these comments, the EPA has, in some cases, revised the final rule requirements and updated the impacts analysis to reflect these changes.

As noted in section I.C. of this preamble, although the EPA proposed amendments to subpart W (Petroleum and Natural Gas Systems) in the 2022 Data Quality Improvements Proposal, this final rule does not address implementation of these revisions to subpart W, which the EPA is reviewing in concurrent rulemakings. Additionally, as stated in section III.B. of this preamble, the EPA is not taking final action on its proposed amendments to add a source category for collection of data on energy consumption (subpart B) at this time. Accordingly, the impacts of the final rule do not reflect the costs for these proposed revisions.

For some subparts, we are not taking final action on revisions to calculation, monitoring, or reporting requirements that would have required reporters to collect or submit additional data. For example, for subpart C (General Stationary Fuel Combustion), we are not taking final action on proposed revisions to (1) add new reporting for the unit type, maximum rated heat input capacity, and an estimate of the fraction of the total annual heat input from each unit in either an aggregation of units or common pipe configuration (excluding units less than 10 mmBtu/hour); and (2) add new reporting to identify whether any unit in the configuration (individual units, aggregation of units, common stack, or common pipe) is an EGU, and, for multi-unit configurations, an estimated decimal fraction of total emissions from the group that are attributable to EGU(s) included in the group. For subparts G (Ammonia Production), P (Hydrogen Production), S (Lime Production), and HH (Municipal Solid Waste Landfills) we are not taking final action on certain revisions to the calculation methodologies that would have revised how data is collected and reported in e-GGRT. Similarly, we are not taking final action on certain data elements that were proposed to be added to subparts A (General Provisions), F (Aluminum Production), G (Ammonia Production), H (Cement Production), P, S (Lime Production), HH, OO (Suppliers of Industrial Greenhouse Gases), and QQ (Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged Equipment and Closed-Cell Foams). Therefore, the final burden for these subparts has been revised to reflect only those requirements that are being finalized, and is lower than proposed.

In a few cases, the EPA has adjusted the burden of the final rule to account for additional costs associated with the final rule. In these cases, we have made minor adjustments to the reporting and recordkeeping requirements in the final rule. Specifically, we are finalizing changes from the proposed rule that would add 8 new data elements to subparts I, P, DD, and ZZ (see section III. of this preamble for additional information). The final rule burden estimate has been adjusted to include additional time and labor for these activities, which the EPA estimates is minimal for the reasons described in section III. of this preamble. Finally, the burden for the activities in the final rule has been adjusted to reflect updates to the estimated number of affected reporters based on a review of data from RY2022 reporting.

As discussed in section V. of this preamble, the final rule will be implemented on January 1, 2025, and will apply to RY2025 reports. Costs have been estimated over the three years following the year of implementation. One-time implementation costs are incorporated into first year costs, while subsequent year costs represent the annual burden that will be incurred in total by all affected reporters. The incremental implementation labor costs for all subparts include $2,684,681 in RY2025, and $2,671,831 in each subsequent year (RY2026 and RY2027). The incremental implementation labor costs over the next three years (RY2025 through RY2027) total $8,028,343. There is an additional incremental burden of $2,733,937 for capital and O&M costs in RY2025 and in each subsequent year (RY2026 and RY2027), which reflects changes to applicability and monitoring for subparts I, P, W, V, Y, DD, HH, II, OO, TT, UU and new subparts VV, WW, XX, YY, and ZZ. The incremental non-labor costs for RY2025 through RY2027 total $8,201,812 over the next three years. The incremental burden is summarized by subpart for the rule changes that are finalized for initial and subsequent years in table 8 of this preamble. Note that subparts A, U, FF, and RR only include revisions that are clarifications or harmonizing changes that would not result in any changes to burden, and are not included in table 8 of this preamble.

TABLE 8—ANNUAL INCREMENTAL BURDEN OF THE FINAL RULE, BY SUBPART

Subpart	Number of affected facilities	Labor costs		Capital and O&M
		Initial year	Subsequent years	
C—General Stationary Fuel Combustion Sources [a]	.....	.....	.....	.....
Facilities Reporting only to Subpart C	133	($1,446)	($1,446)	.....
Facilities Reporting to Subpart C plus another subpart	177	(979)	(979)	.....
G—Ammonia Manufacturing	29	119	119	.....
H—Cement Production	94	1,999	1,999	.....
I—Electronics Manufacturing [b c]	48	19,651	18,023	$62
N—Glass Production	101	2,074	2,074	.....
P—Hydrogen Production [b]	114	7,497	7,497	2,561
Q—Iron and Steel Production	121	1,485	1,485	.....
S—Lime Manufacturing	71	1,186	1,186	.....
V—Nitric Acid Production [d e]	1	(2,680)	(2,680)	(11,085)
W—Petroleum and Natural Gas Systems [d]	188	2,433,058	2,433,058	2,717,864
X—Petrochemical Production	31	618	618	.....
Y—Petroleum Refineries [f]	57	(6,133)	(6,133)	(3,930)
AA—Pulp and Paper Manufacturing	1	104	104	.....
BB—Silicon Carbide Production	1	20	20	.....
DD—Electrical Transmission [b]	95	15,278	15,278	3,119
GG—Zinc Production	5	20	20	.....
HH—Municipal Solid Waste Landfills [b]	1,129	84,651	81,793	374
II—Industrial Wastewater Treatment [d]	2	5,288	4,713	3,077
OO—Suppliers of Industrial Greenhouse Gases [a]	121	6,884	6,884	62
PP—Suppliers of Carbon Dioxide	22	872	872	.....
QQ—Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged Equipment or Closed-Cell Foams	33	249	249	.....
SS—Electrical Equipment Manufacture or Refurbishment	5	358	358	.....
TT—Industrial Waste Landfills [b d]	1	4,853	3,934	62
UU—Injection of Carbon Dioxide [g]	2	(1,886)	(1,886)	(125)
VV—Geologic Sequestration of Carbon Dioxide with Enhanced Oil Recovery Using ISO 27916 [g]	2	1,882	3,443	250
WW—Coke Calciners	15	37,847	34,525	19,649
XX—Calcium Carbide Production	1	2,849	2,627	62
YY—Caprolactam, Glyoxal, and Glyoxylic Acid Production	6	12,285	11,089	374
ZZ—Ceramics Manufacturing	25	56,678	52,987	1,559
Total	.....	2,684,681	2,671,831	2,733,937

[a] Reflects reduced burden due to revisions to simplify calculation methods and remove reporting requirements.
[b] Applies to reporters that may currently report under existing subparts of part 98 and that are newly subject to reporting under part 98.
[c] Average subsequent year costs for subpart I. Subpart I subsequent year costs include $17,794 in Year 2 and $18,252 in Year 3.
[d] Reflects burden to reporters estimated to be affected due to revisions to table A–1 to subpart A only.
[e] Reflects changes to the number of reporters able to off-ramp from reporting under the part 98 source category.
[f] Reflects changes to the number of reporters with coke calciners reporting under subpart Y that would be required to report under proposed subpart WW.
[g] Reflects changes to the number of reporters reporting under subpart UU who will begin submitting reports under new subpart VV in each year.

Additional details on the EPA's review of the impacts may be found in the memorandum, ''Assessment of Burden Impacts for Final Revisions to the Greenhouse Gas Reporting Rule,'' available in Docket ID. No. EPA–HQ–OAR–2019–0424.

The implementation of the final rule will provide numerous benefits for stakeholders, the Agency, industry, and the general public. The final revisions include improvements to the calculation, monitoring, and reporting requirements, incorporate new data and reflect updated scientific knowledge; provide coverage of new emissions sources and additional sectors; improve analysis and verification of collected data; provide additional data to complement or inform other EPA programs; and streamline calculation, monitoring, or reporting to provide flexibility or increase the efficiency of data collection. The revisions will maintain the quality of the data collected under part 98 where continued collection of information assists in evaluation and support of EPA programs and policies under provisions of the CAA. In some cases, the amendments improve the EPA's ability to assess compliance by revising or adding recordkeeping or reporting elements that will allow the EPA to more thoroughly verify GHG data and advance the ability of the GHGRP to provide access to quality data on greenhouse gas emissions by adding or updating emission factors, revising or adding calculation methodologies, or adding key data elements to improve the usefulness of the data.

Because part 98 is a reporting rule, the EPA did not quantify estimated emission reductions or monetize the benefits from such reductions that could be associated with the final rule. The benefits of the final rule are based on its relevance to policy making, transparency, and market efficiency. The improvements to the GHGRP will benefit the EPA, other policymakers, and the public by increasing the completeness and accuracy of facility emissions data. Public data on emissions allows for accountability of emitters to the public. Improved facility-specific emissions data will aid local, state, and national policymakers as they evaluate and consider future climate change policy decisions and other policy decisions for criteria pollutants, ambient air quality standards, and toxic

air emissions. For example, GHGRP data on petroleum and natural gas systems (subpart W of part 98) were previously analyzed to inform targeted improvements to the 2016 NSPS for the oil and gas industry and to update emission factor and activity data used for that proposal and the final NSPS, as updated in the Inventory (83 FR 52056; October 15, 2018). Similarly, GHGRP data on municipal solid waste landfills (subpart HH of part 98) were previously used to inform the development of the 2016 NSPS and EG for landfills; the EPA was able to update its internal landfills data set and consider the technical attributes of over 1,200 landfills based on data reported under subpart HH. The benefits of improved reporting also include enhancing existing voluntary programs, such as the Landfill Methane Outreach Program (LMOP), which uses GHGRP data to supplement the LMOP Landfill and Landfill Gas Energy Project Database and includes data collected from LMOP Partners about landfill gas energy projects or potential for project development.

The final rule would additionally benefit states by providing improved facility-specific emissions data. Several states use GHGRP data to inform their own policymaking. For example, the state of Hawaii uses GHGRP data to establish an emissions baseline for each facility subject to their GHG Reduction Plan and to assess whether facilities meet their targets in future years.

GHGRP data are also used to improve estimates of GHG emissions internationally. Data collected through the GHGRP complements the Inventory and are used to significantly improve our understanding of key emissions sources by allowing the EPA to better reflect changing technologies and emissions from a wide range of industrial facilities. Specifically, GHGRP data have been used to inform several of the updates to emission estimation methods included in the 2019 Refinement.

Benefits to industry of improved GHG emissions monitoring and reporting from the amendments include the value of having standardized emissions data to present to the public to demonstrate appropriate environmental stewardship, and a better understanding of their emission levels and sources to identify opportunities to reduce emissions. For example, the final rule updates the global warming potential values used under the GHGRP to reflect values from the IPCC AR5 and AR6, which are consistent with the values used under several voluntary standards and frameworks such as the GHG Protocol and Sustainability Accounting Standards Board (SASB), and will provide consistency for company reporting. Businesses and other innovators can use the data to determine and track their GHG footprints, find cost-saving efficiencies that reduce GHG emissions and save product, foster technologies to protect public health and the environment, and to reduce costs associated with fugitive emissions. The final rule will continue to allow for facilities to benchmark themselves against similar facilities to understand better their relative standing within their industry and achieve and disseminate information about their environmental performance.

In addition, transparent, standardized public data on emissions allows for accountability of polluters to the public who bear the cost of the pollution. The GHGRP serves as a powerful data resource and provides a critical tool for communities to identify nearby sources of GHGs and provide information to state and local governments. As discussed in section II. of this preamble, GHGRP data are easily accessible to the public via the EPA's FLIGHT, which allows users to view and sort GHG data by location, industrial sector, and type of GHG emitted, and includes demographic data. Although the emissions reported to the EPA by reporting facilities are global pollutants, many of these facilities also release pollutants that have a more direct and local impact in the surrounding communities. Citizens, community groups, and labor unions have made use of public pollutant release data to negotiate directly with emitters to lower emissions, avoiding the need for additional regulatory action. The final rule would improve the quality and transparency of this reported data to affected communities.

VIII. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review and 14094: Modernizing Regulatory Review

This action is not a significant regulatory action as defined in Executive Order 12866, as amended by Executive Order 14094, and was therefore not subject to a requirement for Executive Order 12866 review.

B. Paperwork Reduction Act

The information collection activities in this rule have been submitted for approval to the OMB under the PRA. The Information Collection Request (ICR) document that the EPA prepared has been assigned OMB number 2060–0748, EPA ICR number 2773.02. You can find a copy of the ICR in the docket for this rule, and it is briefly summarized here. The information collection requirements are not enforceable until OMB approves them.

The EPA has estimated that the final rule will result in an increase in burden, specifically in cases where the amendments expand the applicability, monitoring, or reporting requirements of part 98. In some cases, the final amendments are anticipated to decrease burden where we streamlined the rule to remove notification or reporting requirements or simplify monitoring and reporting requirements. The final rule consolidates amendments from the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal that revise 31 subparts that directly affect 30 industries—including revisions to update the GWPs in table A–1 to subpart A of part 98 that affect the number of facilities required to report under part 98; revisions to implement five new source categories or to expand existing source categories that may require facilities to newly report; and revisions to add new reporting requirements that will improve the quality of the data collected under part 98. The costs associated with the final rule largely reflect the costs to facilities that would be required to newly report under part 98. However, the majority of subparts affected will reflect a modest increase in burden to existing individual reporters.

Further information on the EPA's assessment on the impact on burden can be found in the memorandum ''Assessment of Burden Impacts for Final Revisions for the Greenhouse Gas Reporting Rule,'' available in the docket for this rulemaking (Docket ID. No. EPA–HQ–OAR–2019–0424).

Respondents/affected entities: Owners and operators of facilities that must report their GHG emissions and other data to the EPA to comply with 40 CFR part 98.

Respondent's obligation to respond: The respondent's obligation to respond is mandatory and the requirements in this rule are under the authority provided in CAA section 114.

Estimated number of respondents: 2,701.

Frequency of response: Initially, annually.

Total estimated burden: 25,647 hours (annual average per year). Burden is defined at 5 CFR 1320.3(b).

Total estimated cost: $5,410,000 (annual average per year), includes $2,734,000 annualized capital or operation and maintenance costs.

An agency may not conduct or sponsor, and a person is not required to

respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for the EPA's regulations in 40 CFR are listed in 40 CFR part 9. When OMB approves this ICR, the Agency will announce that approval in the **Federal Register** and publish a technical amendment to 40 CFR part 9 to display the OMB control number for the approved information collection activities contained in this final rule.

C. Regulatory Flexibility Act (RFA)

I certify that this final action will not have a significant economic impact on a substantial number of small entities under the RFA. The small entities subject to the requirements of this action are small businesses across all sectors encompassed by the rule, small governmental jurisdictions, and small non-profits. In the development of 40 CFR part 98, the EPA determined that some small entities are affected because their production processes emit GHGs that must be reported, because they have stationary combustion units on site that emit GHGs that must be reported, or because they have fuel supplier operations for which supply quantities and GHG data must be reported. Small governments and small non-profits are generally affected because they have regulated landfills or stationary combustion units on site, or because they own a local distribution company (LDC).

The EPA previously conducted screening analyses to identify impacts to small entities during the development of the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal. The EPA conducted small entity analyses that assessed the costs and impacts to small entities in three areas, including: (1) amendments that revise the number or types of facilities required to report (*i.e.,* updates of the GHGRP's applicability to certain sources), (2) changes to refine existing monitoring or calculation methodologies that require collection of additional data, and (3) revisions to reporting and recordkeeping requirements for data provided to the program. The analyses provided the subparts affected, the number of small entities affected, and the estimated impact to these entities based on the total annualized reporting costs of the proposed rules. Details of these analyses are presented in the memoranda, *Assessment of Burden Impacts for Proposed Revisions for the Greenhouse Gas Reporting Rule* (May 2022) and *Assessment of Burden Impacts for Proposed Supplemental Revisions for the Greenhouse Gas Reporting Rule* (April 2023), available in the docket for this rulemaking (Docket ID. No. EPA–HQ–OAR–2019–0424). Based on the results of these analyses, we concluded that the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal will have no significant regulatory burden for any directly regulated small entities and thus would not have a significant economic impact on a substantial number of small entities.

As discussed in sections III. and VII. of this preamble, this action finalizes revisions to part 98 as proposed in the 2022 Data Quality Improvements Proposal and the 2023 Supplemental Proposal, or with minor revisions, and we have revised the cost impacts to reflect the final rule requirements and more recent data. For example, we have updated the impacts to better reflect the number of affected reporters that would be subject to the final requirements, based on a review of RY2022 data. These updates also predominantly include removing or adjusting costs where the EPA is not taking final action on specific proposed revisions, including costs associated with the addition of proposed subpart B (Energy Consumption), certain costs associated with proposed revisions to subpart W (Petroleum and Natural Gas Systems) included in the 2022 Data Quality Improvements Proposal,[50] and costs associated with certain revisions to calculations, monitoring, or reporting requirements for subparts A (General Provisions), C (General Stationary Fuel Combustion), F (Aluminum Production), G (Ammonia Production), H (Cement Production), S (Lime Production), HH (Municipal Waste Landfills), OO (Suppliers of Industrial Greenhouse Gases), and QQ (Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged Equipment and Closed-Cell Foams). Accordingly, the burden of the final rule is reduced, as compared to the proposals, for facilities that may report for these source categories, including all direct emitting facilities previously proposed to report under subpart B.

The EPA has also adjusted the burden to account for additional costs from changes adopted in the final rule. Specifically, we have adjusted the reporting and recordkeeping requirements for subparts I (Electronics Manufacturing), P (Hydrogen Production), DD (Electrical Transmission and Distribution Equipment Use), HH (Municipal Solid Waste Landfills), and ZZ (Ceramics Manufacturing) to add new data elements for annual reporting across these subparts. The estimated costs associated with the revisions to these subparts for regulated entities are minimal (less than $100 annually), and would not result in costs exceeding more than one percent of sales in any firm size category. Details of this analysis are presented in the memorandum ''Assessment of Burden Impacts for Final Revisions for the Greenhouse Gas Reporting Rule,'' available in Docket ID. No. EPA–HQ–OAR–2019–0424.

The remaining revisions to the final rule include minor clarifications or adjustments to the proposed requirements that are not anticipated to increase the burdens estimated for the 2022 Data Quality Improvements Proposal and 2023 Supplemental Proposal which we previously determined would not have a significant impact on a significant number of small businesses. For these reasons, we have determined that these final revisions are consistent with our prior small entity analyses, and would impose no significant regulatory burden on any directly regulated small entities, and thus would not have a significant economic impact on a substantial number of small entities.

Refer to the memorandum ''Assessment of Burden Impacts for Final Revisions for the Greenhouse Gas Reporting Rule,'' available in Docket ID. No. EPA–HQ–OAR–2019–0424 for further discussion. The EPA continues to conduct significant outreach on the GHGRP and maintains an ''open door'' policy for stakeholders to help inform the EPA's understanding of key issues for the industries.

D. Unfunded Mandates Reform Act (UMRA)

This action does not contain an unfunded mandate of $100 million or more as described in UMRA, 2 U.S.C. 1531–1538, and does not significantly or uniquely affect small governments.

E. Executive Order 13132: Federalism

This action does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.

[50] The EPA is not taking final action on any revisions to requirements for subpart W (Petroleum and Natural Gas Systems) in this final rule. See sections I.C. and VII. of this preamble for additional information regarding the EPA's actions regarding subpart W and the impacts included in this final rule.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

This action has tribal implications. However, it will neither impose substantial direct compliance costs on federally recognized tribal governments, nor preempt tribal law. This regulation will apply directly to facilities emitting and supplying GHGs that may be owned by tribal governments that emit GHGs. However, it will only have tribal implications where the tribal entity owns a facility that directly emits GHGs above threshold levels; therefore, relatively few (approximately 10) tribal facilities will be affected. This regulation is not anticipated to impact facilities or suppliers of additional sectors owned by tribal governments.

In evaluating the potential implications for tribal entities, we first assessed whether tribes would be affected by any final revisions that expanded the universe of facilities that would report GHG data to the EPA. The final rule amendments will implement requirements to collect additional data to understand new source categories, new sources of GHG emissions or supply for specific sectors; improve the existing emissions estimation methodologies; and improve the EPA's understanding of the sector-specific processes or other factors that influence GHG emission rates and improve verification of collected data. Of the 254 facilities that we anticipate will be newly required to report under the final revisions, we do not anticipate that there are any tribally owned facilities. As discussed in section VII. of this preamble, we expect the final revisions to table A–1 to part 98 to result in a change to the number of facilities required to report under subparts W (Petroleum and Natural Gas Systems), V (Nitric Acid Production), DD (Electrical Transmission and Distribution Equipment Use), HH (MSW Landfills), II (Industrial Wastewater Treatment), OO (Suppliers of Industrial GHGs), and TT (Industrial Waste Landfills). However, we did not identify any potential sources in these source categories that are owned by tribal entities not already reporting to the GHGRP. Similarly, although we are finalizing amendments that will require some facilities in select source categories not currently subject to the GHGRP to begin implementing requirements under the program, we have not identified, and do not anticipate that any of these affected facilities are owned by tribal governments.

As a second step to evaluate potential tribal implications, we evaluated whether there were any tribally owned facilities that are currently reporting under the GHGRP that will be affected by the final revisions. Tribally owned facilities currently subject to part 98 will only be subject to changes that are improvements or clarifications of requirements and that, for the most part, do not significantly change the existing requirements or result in substantial new activities because they do not require new equipment, sampling, or monitoring. Rather, tribally owned facilities would only be subject to new requirements where reporters would provide data that is readily available from company records. As such, the final revisions will not substantially increase reporter burden, impose significant direct compliance costs for tribal facilities, or preempt tribal law.

Specifically, we identified ten facilities currently reporting to part 98 that are owned by six tribal parent companies. For these six parent companies, we identified facilities in the stationary fuel combustion (subpart C), cement production (subpart H), petroleum and natural gas (subpart W), electrical transmission and distribution equipment use (subpart DD), and MSW landfill (subpart HH) source categories that may be affected by the final revisions.

For stationary fuel combustion, the EPA is not taking final action on proposed revisions to add reporting requirements to subpart C, but is retaining revisions that would remove certain reporting requirements. Therefore, the costs for any tribally-owned facilities currently reporting to subpart C are anticipated to decrease and no facilities are anticipated to be negatively impacted. For petroleum and natural gas facilities, the EPA is not including any revisions to subpart W in this final rule (see section I.C. of this document); therefore, any tribally-owned facilities currently reporting to subpart W are not anticipated to be impacted. Three parent companies include existing facilities that report only under subparts C or W, which are not anticipated to have significant impacts under this rule for the reasons discussed in this section. Therefore, the remaining facilities that could be affected by the final revisions are those that report to subparts H, DD, and HH. For the remaining three parent companies, we reviewed publicly available sales and revenue data to assess whether the costs of the final rule would be significant. Under the final rule, the costs for facilities currently reporting under subparts H, DD, or HH are anticipated to increase by less than $100 per year per subpart. Therefore, we were able to confirm that the costs of the final revisions would not have a significant impact for these sources. Further, based on our review of our small entity analyses (discussed in VIII.C. of this preamble), we do not anticipate the final revisions to subparts H, DD, or HH will impose substantial direct compliance costs on the remaining tribally owned entities.

Although few facilities subject to part 98 are likely to be owned by tribal governments, the EPA previously sought opportunities to provide information to tribal governments and representatives during the development of the proposed and final rules for part 98 subparts that were promulgated on October 30, 2009 (74 FR 52620), July 12, 2010 (75 FR 39736), November 30, 2010 (75 FR 74458), and December 1, 2010 (75 FR 74774 and 75 FR 75076). Consistent with the 2011 EPA Policy on Consultation and Coordination with Indian Tribes,[51] the EPA previously consulted with tribal officials early in the process of developing part 98 regulations to permit them to have meaningful and timely input into its development and to provide input on the key regulatory requirements established for these facilities. A summary of these consultations is provided in section VIII.F. of the preamble to the final rule published on October 30, 2009 (74 FR 52620), section V.F. of the preamble to the final rule published on July 12, 2010 (75 FR 39736), section IV.F. of the preamble to the re-proposal of subpart W (Petroleum and Natural Gas Systems) published on April 12, 2010 (75 FR 18608), and section IV.F. of the preambles to the final rules published on December 1, 2010 (75 FR 74774 and 75 FR 75076). As described in this section, the final rule does not significantly revise the established regulatory requirements and will not substantially change the equipment, monitoring, or reporting activities conducted by these facilities, or result in other substantial impacts for tribal facilities.

G. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

The EPA interprets Executive Order 13045 as applying only to those regulatory actions that concern environmental health or safety risks that the EPA has reason to believe may disproportionately affect children, per the definition of ''covered regulatory

[51] EPA Policy on Consultation and Coordination with Indian Tribes, May 4, 2011. Available at: *www.epa.gov/sites/default/files/2013-08/documents/cons-and-coord-with-indian-tribes-policy.pdf.*

action'' in section 2–202 of the Executive order. This action is not subject to Executive Order 13045 because it does not concern an environmental health risk or safety risk.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

This action is not subject to Executive Order 13211, because it is not a significant regulatory action under Executive Order 12866.

I. National Technology Transfer and Advancement Act and 1 CFR Part 51

This action involves technical standards. The EPA has decided to incorporate by reference several standards in establishing monitoring requirements in these final amendments.

The EPA currently allows for the use of the *Protocol for Measuring Destruction or Removal Efficiency (DRE) of Fluorinated Greenhouse Gas Abatement Equipment in Electronics Manufacturing, Version 1,* EPA–430–R–10–003, March 2010 (EPA 430–R–10–003) in other sections of part 98, including subpart I (Electronics Manufacturing). The EPA is adding the use of EPA 430–R–10–003 to subpart I for use for measurement of DREs from abatement systems, including HC fuel CECS, purchased and installed on or after January 1, 2025. EPA 430–R–10–003 provides methods for measuring abatement system inlet and outlet mass or volume flows for single or multi-chamber process tools, accounting for dilution. Anyone may access EPA 430–R–10–003 at *https://www.epa.gov/sites/default/files/2016-02/documents/dre_protocol.pdf.* This standard is available to everyone at no cost; therefore, the method is reasonably available for reporters.

The EPA is allowing the use of an alternate method, ASTM E415–17, *Standard Test Method for Analysis of Carbon and Low-Alloy Steel by Spark Atomic Emission Spectrometry* (2017), for the purposes of subpart Q (Iron and Steel Production) monitoring and reporting. The EPA currently allows for the use of ASTM E415–17 in other sections of part 98, including under 40 CFR 98.144(b) where it can be used to determine the composition of coal, coke, and solid residues from combustion processes by glass production facilities. Therefore, the EPA is allowing ASTM E415–17 to be used in subpart Q. ASTM E415–17 uses spark atomic emission vacuum spectrometry to determine 21 alloying and residual elements in carbon and low-alloy steels. The method is designed for chill-cast, rolled, and forged specimens. (See the end of section VIII.I. of this preamble for availability information.)

The EPA is adding new subpart VV to part 98 for certain EOR operations that choose to use the co-published ISO/CSA standard designated as CSA/ANSI ISO 27916:19, *Carbon dioxide capture, transportation and geological storage—Carbon dioxide storage using enhanced oil recovery (CO_2–EOR),* as a means of quantifying geologic sequestration. The EPA is also clarifying in subpart UU at 40 CFR 98.470(c) and subpart VV at 40 CFR 98.481 that CO_2–EOR projects previously reporting under subpart UU that begin using CSA/ANSI ISO 27916:19 part-way through a reporting year must report under subpart UU for the portion of the year before CSA/ANSI ISO 27916:19 was used and report under subpart VV for the portion of the year once CSA/ANSI ISO 27916:19 began to be used and thereafter. CSA/ANSI ISO 27916:19 identifies and quantifies CO_2 losses (including fugitive emissions) and quantifies the amount of CO_2 stored in association with the CO_2-EOR project. It also shows how allocation rations can be used to account for the anthropogenic portion of the stored CO_2. Anyone may access the standard on the CSA group website (*www.csagroup.org/store*) for additional information. The standard is available to everyone at a cost determined by CSA Group ($225). CSA Group also offers memberships or subscriptions for reduced costs. Because the use of the standard is optional, the cost of obtaining this standard is not a significant financial burden.

The EPA is adding new subpart WW to part 98 (Coke Calciners) and is allowing the use of any one of the following standards for coke calcining facilities: (1) ASTM D3176–15 *Standard Practice for Ultimate Analysis of Coal and Coke,* (2) ASTM D5291–16 *Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants,* and (3) ASTM D5373–21 *Standard Test Methods for Determination of Carbon, Hydrogen, and Nitrogen in Analysis Samples of Coal and Carbon in Analysis Samples of Coal and Coke.* These methods are used to determine the carbon content of petroleum coke. The EPA currently allows for the use of an earlier version of these standard methods for the instrumental determination of carbon content in laboratory samples of petroleum coke in other sections of part 98, including the use of ASTM D3176–89, ASTM D5291–02, and ASTM D5373–08 in 40 CFR 98.244(b) (subpart X—Petrochemical Production) and 40 CFR 98.254(i) (subpart Y—Petroleum Refineries). The EPA is allowing the use of the updated versions of these standards (ASTM D3176–15, ASTM D5291–16, and ASTM D5373–21) to determine the carbon content of petroleum coke for subpart WW (Coke Calciners). ASTM D3176–15 provides direction for a convenient and uniform system of analysis of the ash content and the content of organic constituents in coal and coke; this method references the appropriate ASTM methods for sample collection, preparation, content determination, and provides consistency measures for calculation and reporting of results. ASTM D5291–16 provides a series of test methods for the simultaneous instrumental determination of carbon, hydrogen, and nitrogen in petroleum products and lubricants such as crude oils, fuel oils, additives, and residues; the method allows for a variety of instrumental components and configurations for measurement and calculation of concentrations of carbon, hydrogen, and nitrogen. ASTM D5373–21 provides a methodology for the determination of carbon, hydrogen, and nitrogen content in coal or carbon in coke using furnace combustion and instrument detection systems; the method addresses the determination of carbon in the range of 54.9 percent m/m to 84.7 percent m/m, hydrogen in the range of 3.26 percent m/m to 5.08 percent m/m, and nitrogen in the range of 0.57 percent m/m to 1.76 percent m/m in the analysis sample of coal. (See the end of section VIII.I. of this preamble for availability information.)

We are allowing the use of the following standard for coke calciners subject to subpart WW: NIST HB 44–2023, NIST Handbook 44: *Specifications, Tolerances, and Other Technical Requirements For Weighing and Measuring Devices,* 2023 edition. The EPA currently allows for the use of an earlier version of the proposed standard method, *Specifications, Tolerances, and Other Technical Requirements For Weighing and Measuring Devices, NIST Handbook 44* (2009), for the calibration and maintenance of instruments used for weighing of mass of samples of petroleum coke in other sections of part 98, including 40 CFR 98.244(b) (subpart X). The EPA is allowing the use of the updated version of this standard, NIST HB 44–2023: *Specifications, Tolerances, and Other Technical Requirements For Weighing and Measuring Devices,* 2023 edition, for performing mass measurements of petroleum coke for subpart WW (Coke Calciners). This

standard includes specifications on design of equipment, tolerances to limit the allowable error, sensitivity requirements, and other technical requirements for weighing and measuring devices. Anyone may access the standards on the NIST website (*www.nist.gov/index.html*) for additional information. These standards are available to everyone at no cost; therefore the methods are reasonably available for reporters.

The EPA is adding new subpart XX to part 98 (Calcium Carbide Production) and is allowing the use of one of the following standards for calcium carbide production facilities: (1) ASTM D5373–08 *Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Laboratory Samples of Coal,* or (2) ASTM C25–06, *Standard Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime.* ASTM D5373–08 addresses the determination of carbon in the range of 54.9 percent m/m to 84.7 percent m/m, hydrogen in the range of 3.25 percent m/m to 5.10 percent m/m, and nitrogen in the range of 0.57 percent m/m to 1.80 percent m/m in the analysis sample of coal. The EPA currently allows for the use of ASTM D5373–08 in other sections of part 98, including in 40 CFR 98.244(b) (subpart X—Petrochemical Production), 40 CFR 98.284(c) (subpart BB—Silicon Carbide Production), and 40 CFR 98.314(c) (subpart EE—Titanium Production) for the instrumental determination of carbon content in laboratory samples. Therefore, we are allowing the use of ASTM D5373–08 for determination of carbon content of materials consumed, used, or produced at calcium carbide facilities.

The EPA currently allows for the use of ASTM C25–06 in other sections of part 98, including in 40 CFR 98.194(c) (subpart S—Lime Production) for chemical composition analysis of lime products and calcined byproducts and in 40 CFR 98.184(b) (subpart R—Lead Production) for analysis of flux materials such as limestone or dolomite. ASTM C25–06 addresses the chemical analysis of high-calcium and dolomitic limestone, quicklime, and hydrated lime. We are allowing the use of ASTM C25–06 for determination of carbon content of materials consumed, used, or produced at calcium carbide facilities, including analysis of materials such as limestone or dolomite.

Anyone may access the standards on the ASTM website (*www.astm.org/*) for additional information. These standards are available to everyone at a cost determined by the ASTM (between $48 and $92 per standard). The ASTM also offers memberships or subscriptions that allow unlimited access to their methods. The cost of obtaining these methods is not a significant financial burden, making the methods reasonably available for reporters.

The EPA will also make a copy of these documents available in hard copy at the appropriate EPA office (see the **FOR FURTHER INFORMATION CONTACT** section of this preamble for more information) for review purposes only. The EPA is not requiring the use of specific consensus standards for new subparts YY (Caprolactam, Glyoxal, and Glyoxylic Acid Production) or ZZ (Ceramics Manufacturing), or for other amendments to part 98.

The following standards appear in the amendatory text of this document and were previously approved for the locations in which they appear:

- ASTM D3176–89 (Reapproved 2002) Standard Practice for Ultimate Analysis of Coal and Coke;
- ASTM D5291–02 (Reapproved 2007) Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants;
- ASTM E1019–08 Standard Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel, Iron, Nickel, and Cobalt Alloys by Various Combustion and Fusion Techniques;
- Specifications, Tolerances, and Other Technical Requirements For Weighing and Measuring Devices, NIST Handbook 44 (2009);
- ASTM D6866–16 Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis).
- ASTM D7459–08 Standard Practice for Collection of Integrated Samples for the Speciation of Biomass (Biogenic) and Fossil-Derived Carbon Dioxide Emitted from Stationary Emissions Sources.
- ASTM D2505–88 (Reapproved 2004)e1 Standard Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by Gas Chromatography.
- T650 om–05 Solids Content of Black Liquor, TAPPI.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

The EPA believes that this type of action does not directly concern human health or environmental conditions and therefore cannot be evaluated with respect to potentially disproportionate and adverse effects on communities with environmental justice concerns. This action does not affect the level of protection provided to human health or the environment, but instead, addresses information collection and reporting procedures. Although this action does not concern human health or environmental conditions, the EPA identified and addressed environmental justice concerns by promoting meaningful engagement from communities in developing the action, and in developing requirements that improve the quality of data available to communities. The EPA provided multiple public comment periods on the proposed 2022 Data Quality Improvements Proposal (from June 21, 2022 to October 6, 2022) and the 2023 Supplemental Proposal (May 22, 2023 to July 21, 2023), and provided opportunities for virtual public hearing(s) for members of the public to share information or concerns and participate in the decision-making process. Further, the EPA has developed improvements to the GHGRP that benefit the public by increasing the completeness and accuracy of facility emissions data. The data collected through this action will provide an important data resource for communities and the public to understand GHG emissions, including requiring reporting of GHG data from additional emission sources and providing more comprehensive coverage of U.S. GHG emissions. Transparent, standardized public data on emissions allows for accountability of polluters to the public who bear the cost of the pollution. Although the emissions reported to the EPA by reporting facilities are global pollutants, many of these facilities also release pollutants that have a more direct and local impact in the surrounding communities. GHGRP data are easily accessible to the public via the EPA's online data publication tool (FLIGHT), which allows users to view and sort GHG data from over 8,000 entities in a variety of ways including by location, industrial sector, type of GHG emitted, and provides supplementary demographic data that may be useful to communities with environmental justice concerns. As described further in sections II. and III. of this preamble, the final rule improves the quality and transparency of this reported data to affected communities and enables members of the public to have access to and improve their understanding of GHG emissions and pollutants that may impact them.

K. Congressional Review Act (CRA)

This action is subject to the CRA, and the EPA will submit a rule report to each House of the Congress and to the

Comptroller General of the United States. This action is not a ''major rule'' as defined by 5 U.S.C. 804(2).

L. Judicial Review

Under CAA section 307(b)(1), any petition for review of this final rule must be filed in the U.S. Court of Appeals for the District of Columbia Circuit by June 24, 2024. This final rule establishes requirements applicable to owners and operators of facilities and suppliers in many industry source categories located across the United States that are subject to 40 CFR part 98 and therefore is ''nationally applicable'' within the meaning of CAA section 307(b)(1).

Further, pursuant to CAA section 307(d)(1)(V), the Administrator has determined that this rule is subject to the provisions of CAA section 307(d). See CAA section 307(d)(1)(V) (the provisions of section 307(d) apply to ''such other actions as the Administrator may determine''). Under CAA section 307(d)(7)(B), only an objection to this final rule that was raised with reasonable specificity during the period for public comment can be raised during judicial review. CAA section 307(d)(7)(B) also provides a mechanism for the EPA to convene a proceeding for reconsideration, ''[i]f the person raising an objection can demonstrate to EPA that it was impracticable to raise such objection within [the period for public comment] or if the grounds for such objection arose after the period for public comment (but within the time specified for judicial review) and if such objection is of central relevance to the outcome of the rule.'' Any person seeking to make such a demonstration should submit a Petition for Reconsideration to the Office of the Administrator, Environmental Protection Agency, Room 3000, William Jefferson Clinton Building, 1200 Pennsylvania Ave. NW, Washington, DC 20460, with an electronic copy to the person listed in **FOR FURTHER INFORMATION CONTACT**, and the Associate General Counsel for the Air and Radiation Law Office, Office of General Counsel (Mail Code 2344A), Environmental Protection Agency, 1200 Pennsylvania Ave. NW, Washington, DC 20004. Note that under CAA section 307(b)(2), the requirements established by this final rule may not be challenged separately in any civil or criminal proceedings brought by the EPA to enforce these requirements.

List of Subjects

40 CFR Part 9

Environmental protection, Administrative practice and procedure, Reporting and recordkeeping requirements.

40 CFR Part 98

Environmental protection, Greenhouse gases, Incorporation by reference, Reporting and recordkeeping requirements, Suppliers.

Michael S. Regan,

Administrator.

For the reasons stated in the preamble, the Environmental Protection Agency amends title 40, chapter I, of the Code of Federal Regulations as follows:

PART 9—OMB APPROVALS UNDER THE PAPERWORK REDUCTION ACT

■ 1. The authority citation for part 9 continues to read as follows:

Authority: 7 U.S.C. 135 *et seq.,* 136–136y; 15 U.S.C. 2001, 2003, 2005, 2006, 2601–2671; 21 U.S.C. 331j, 346a, 31 U.S.C. 9701; 33 U.S.C. 1251 *et seq.,* 1311, 1313d, 1314, 1318, 1321, 1326, 1330, 1342, 1344, 1345(d) and (e), 1361; E.O. 11735, 38 FR 21243, 3 CFR, 1971–1975 Comp. p. 973; 42 U.S.C. 241, 242b, 243, 246, 300f, 300g, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–1, 300j–2, 300j–3, 300j–4, 300j–9, 1857 *et seq.,* 6901–6992k, 7401–7671q, 7542, 9601–9657, 11023, 11048.

■ 2. Amend § 9.1 by adding an undesignated center heading and an entry for ''98.1–98.528'' in numerical order to read as follows:

§ 9.1 OMB approvals under the Paperwork Reduction Act.

* * * * *

40 CFR citation	OMB control No.
* * * * *	
Mandatory Greenhouse Gas Reporting	
98.1–98.528	2060–0629
* * * * *	

PART 98—MANDATORY GREENHOUSE GAS REPORTING

■ 3. The authority citation for part 98 continues to read as follows:

Authority: 42 U.S.C. 7401–7671q.

Subpart A—General Provision

■ 4. Amend § 98.2 by:
■ a. Revising paragraphs (f)(1) and (i)(1) and (2); and
■ b. Adding paragraph (k).

The revisions and addition read as follows:

§ 98.2 Who must report?

* * * * *

(f) * * *

(1) Calculate the mass in metric tons per year of CO_2, N_2O, each fluorinated GHG, and each fluorinated heat transfer fluid that is imported and the mass in metric tons per year of CO_2, N_2O, each fluorinated GHG, and each fluorinated heat transfer fluid that is exported during the year.

* * * * *

(i) * * *

(1) If reported CO_2e emissions, calculated in accordance with § 98.3(c)(4)(i), are less than 25,000 metric tons per year for five consecutive years, then the owner or operator may discontinue complying with this part provided that the owner or operator submits a notification to the Administrator that announces the cessation of reporting and explains the reasons for the reduction in emissions. The notification shall be submitted no later than March 31 of the year immediately following the fifth consecutive year of emissions less than 25,000 tons CO_2e per year. The owner or operator must maintain the corresponding records required under § 98.3(g) for each of the five consecutive years prior to notification of discontinuation of reporting and retain such records for three years following the year that reporting was discontinued. The owner or operator must resume reporting if annual CO_2e emissions, calculated in accordance with paragraph (b)(4) of this section, in any future calendar year increase to 25,000 metric tons per year or more.

(2) If reported CO_2e emissions, calculated in accordance with § 98.3(c)(4)(i), were less than 15,000 metric tons per year for three consecutive years, then the owner or operator may discontinue complying with this part provided that the owner or operator submits a notification to the Administrator that announces the cessation of reporting and explains the reasons for the reduction in emissions. The notification shall be submitted no later than March 31 of the year immediately following the third consecutive year of emissions less than 15,000 tons CO_2e per year. The owner or operator must maintain the corresponding records required under § 98.3(g) for each of the three consecutive years and retain such records for three years prior to notification of discontinuation of reporting following the year that reporting was discontinued. The owner

or operator must resume reporting if annual CO_2e emissions, calculated in accordance with paragraph (b)(4) of this section, in any future calendar year increase to 25,000 metric tons per year or more.

* * * * *

(k) To calculate GHG quantities for comparison to the 25,000 metric ton CO_2e per year threshold under paragraph (a)(4) of this section for facilities that destroy fluorinated GHGs or fluorinated heat transfer fluids, the owner or operator shall calculate the mass in metric tons per year of CO_2e destroyed as described in paragraphs (k)(1) through (3) of this section.

(1) Calculate the mass in metric tons per year of each fluorinated GHG or fluorinated heat transfer fluid that is destroyed during the year.

(2) Convert the mass of each destroyed fluorinated GHG or fluorinated heat transfer fluid from paragraph (k)(1) of this section to metric tons of CO_2e using equation A–1 to this section.

(3) Sum the total annual metric tons of CO_2e in paragraph (k)(2) of this section for all destroyed fluorinated GHGs and destroyed fluorinated heat transfer fluids.

■ 5. Amend § 98.3 by:

■ a. Revising paragraphs (b)(2), (h)(4), and (k)(1) through (3); and

■ b. Revising and republishing paragraph (l).

The revisions and republication read as follows:

§ 98.3 What are the general monitoring, reporting, recordkeeping and verification requirements of this part?

* * * * *

(b) * * *

(2) For a new facility or supplier that begins operation on or after January 1, 2010 and becomes subject to the rule in the year that it becomes operational, report emissions starting the first operating month and ending on December 31 of that year. Each subsequent annual report must cover emissions for the calendar year, beginning on January 1 and ending on December 31.

* * * * *

(h) * * *

(4) Notwithstanding paragraphs (h)(1) and (2) of this section, upon request by the owner or operator, the Administrator may provide reasonable extensions of the 45-day period for submission of the revised report or information under paragraphs (h)(1) and (2) of this section. If the Administrator receives a request for extension of the 45-day period, by email to an address prescribed by the Administrator prior to the expiration of the 45-day period, the extension request is deemed to be automatically granted for 30 days. The Administrator may grant an additional extension beyond the automatic 30-day extension if the owner or operator submits a request for an additional extension and the request is received by the Administrator prior to the expiration of the automatic 30-day extension, provided the request demonstrates that it is not practicable to submit a revised report or information under paragraphs (h)(1) and (2) of this section within 75 days. The Administrator will approve the extension request if the request demonstrates to the Administrator's satisfaction that it is not practicable to collect and process the data needed to resolve potential reporting errors identified pursuant to paragraph (h)(1) or (2) of this section within 75 days. The Administrator will only approve an extension request for a total of 180 days after the initial notification of a substantive error.

* * * * *

(k) * * *

(1) A facility or supplier that first becomes subject to part 98 due to a change in the GWP for one or more compounds in table A–1 to this subpart, Global Warming Potentials, is not required to submit an annual GHG report for the reporting year during which the change in GWPs is published in the **Federal Register** as a final rulemaking.

(2) A facility or supplier that was already subject to one or more subparts of this part but becomes subject to one or more additional subparts due to a change in the GWP for one or more compounds in table A–1 to this subpart, is not required to include those subparts to which the facility is subject only due to the change in the GWP in the annual GHG report submitted for the reporting year during which the change in GWPs is published in the **Federal Register** as a final rulemaking.

(3) Starting on January 1 of the year after the year during which the change in GWPs is published in the **Federal Register** as a final rulemaking, facilities or suppliers identified in paragraph (k)(1) or (2) of this section must start monitoring and collecting GHG data in compliance with the applicable subparts of part 98 to which the facility is subject due to the change in the GWP for the annual greenhouse gas report for that reporting year, which is due by March 31 of the following calendar year.

* * * * *

(l) *Special provision for best available monitoring methods in 2014 and subsequent years.* This paragraph (l) applies to owners or operators of facilities or suppliers that first become subject to any subpart of this part due to an amendment to table A–1 to this subpart, Global Warming Potentials.

(1) *Best available monitoring methods.* From January 1 to March 31 of the year after the year during which the change in GWPs is published in the **Federal Register** as a final rulemaking, owners or operators subject to this paragraph (l) may use best available monitoring methods for any parameter (*e.g.,* fuel use, feedstock rates) that cannot reasonably be measured according to the monitoring and QA/QC requirements of a relevant subpart. The owner or operator must use the calculation methodologies and equations in the ''Calculating GHG Emissions'' sections of each relevant subpart, but may use the best available monitoring method for any parameter for which it is not reasonably feasible to acquire, install, and operate a required piece of monitoring equipment by January 1 of the year after the year during which the change in GWPs is published in the **Federal Register** as a final rulemaking. Starting no later than April 1 of the year after the year during which the change in GWPs is published, the owner or operator must discontinue using best available methods and begin following all applicable monitoring and QA/QC requirements of this part, except as provided in paragraph (l)(2) of this section. Best available monitoring methods means any of the following methods:

(i) Monitoring methods currently used by the facility that do not meet the specifications of a relevant subpart.

(ii) Supplier data.

(iii) Engineering calculations.

(iv) Other company records.

(2) *Requests for extension of the use of best available monitoring methods.* The owner or operator may submit a request to the Administrator to use one or more best available monitoring methods beyond March 31 of the year after the year during which the change in GWPs is published in the **Federal Register** as a final rulemaking.

(i) *Timing of request.* The extension request must be submitted to EPA no later than January 31 of the year after the year during which the change in GWPs is published in the **Federal Register** as a final rulemaking.

(ii) *Content of request.* Requests must contain the following information:

(A) A list of specific items of monitoring instrumentation for which the request is being made and the locations where each piece of

monitoring instrumentation will be installed.

(B) Identification of the specific rule requirements (by rule subpart, section, and paragraph numbers) for which the instrumentation is needed.

(C) A description of the reasons that the needed equipment could not be obtained and installed before April 1 of the year after the year during which the change in GWPs is published in the **Federal Register** as a final rulemaking.

(D) If the reason for the extension is that the equipment cannot be purchased and delivered by April 1 of the year after the year during which the change in GWPs is published in the **Federal Register** as a final rulemaking, include supporting documentation such as the date the monitoring equipment was ordered, investigation of alternative suppliers and the dates by which alternative vendors promised delivery, backorder notices or unexpected delays, descriptions of actions taken to expedite delivery, and the current expected date of delivery.

(E) If the reason for the extension is that the equipment cannot be installed without a process unit shutdown, include supporting documentation demonstrating that it is not practicable to isolate the equipment and install the monitoring instrument without a full process unit shutdown. Include the date of the most recent process unit shutdown, the frequency of shutdowns for this process unit, and the date of the next planned shutdown during which the monitoring equipment can be installed. If there has been a shutdown or if there is a planned process unit shutdown between November 29 of the year during which the change in GWPs is published in the **Federal Register** as a final rulemaking and April 1 of the year after the year during which the change in GWPs is published, include a justification of why the equipment could not be obtained and installed during that shutdown.

(F) A description of the specific actions the facility will take to obtain and install the equipment as soon as reasonably feasible and the expected date by which the equipment will be installed and operating.

(iii) *Approval criteria.* To obtain approval, the owner or operator must demonstrate to the Administrator's satisfaction that it is not reasonably feasible to acquire, install, and operate a required piece of monitoring equipment by April 1 of the year after the year during which the change in GWPs is published in the **Federal Register** as a final rulemaking. The use of best available methods under this paragraph (l) will not be approved beyond December 31 of the year after the year during which the change in GWPs is published.

■ 6. Amend § 98.5 by revising paragraph (b) to read as follows:

§ 98.5 How is the report submitted?

* * * * *

(b) For reporting year 2014 and thereafter, unless a later year is specified in the applicable recordkeeping section, you must enter into verification software specified by the Administrator the data specified as verification software records in each applicable recordkeeping section. For each data element entered into the verification software, if the software produces a warning message for the data value and you elect not to revise the data value, you may provide an explanation in the verification software of why the data value is not being revised.

■ 7. Amend § 98.6 by:

■ a. Revising the definitions ''ASTM'', ''Bulk'', and ''Carbon dioxide stream'';

■ b. Adding the definitions ''Cyclic'' and ''Direct air capture (DAC)'' in alphabetical order;

■ c. Removing the definition ''Fluorinated greenhouse gas'';

■ d. Adding the definition ''Fluorinated greenhouse gas (GHG)'' in alphabetical order;

■ e. Revising the definition ''Fluorinated greenhouse gas (GHG) group'';

■ f. Adding the definition ''Fluorinated heat transfer fluids'' in alphabetic order;

■ g. Revising the definition ''Greenhouse gas or GHG'';

■ h. Removing the definition ''Other fluorinated GHGs'';

■ i. Revising the definition ''Process vent''; and

■ j. Adding definitions ''Remaining fluorinated GHGs'', ''Saturated chlorofluorocarbons (CFCs)'', ''Unsaturated bromochlorofluorocarbons (BCFCs)'', ''Unsaturated bromofluorocarbons (BFCs)'', ''Unsaturated chlorofluorocarbons (CFCs)'', ''Unsaturated hydrobromochlorofluorocarbons (HBCFCs)'', and ''Unsaturated hydrobromofluorocarbons (HBFCs)'' in alphabetic order.

The revisions and additions read as follows:

§ 98.6 Definitions.

* * * * *

ASTM means ASTM, International.

* * * * *

Bulk, with respect to industrial GHG suppliers and CO_2 suppliers, means a transfer of gas in any amount that is in a container for the transportation or storage of that substance such as cylinders, drums, ISO tanks, and small cans. An industrial gas or CO_2 that must first be transferred from a container to another container, vessel, or piece of equipment in order to realize its intended use is a bulk substance. An industrial GHG or CO_2 that is contained in a manufactured product such as electrical equipment, appliances, aerosol cans, or foams is not a bulk substance.

* * * * *

Carbon dioxide stream means carbon dioxide that has been captured from an emission source (*e.g.,* a power plant or other industrial facility), captured from ambient air (*e.g.,* direct air capture), or extracted from a carbon dioxide production well plus incidental associated substances either derived from the source materials and the capture process or extracted with the carbon dioxide.

* * * * *

Cyclic, in the context of fluorinated GHGs, means a fluorinated GHG in which three or more carbon atoms are connected to form a ring.

* * * * *

Direct air capture (DAC), with respect to a facility, technology, or system, means that the facility, technology, or system uses carbon capture equipment to capture carbon dioxide directly from the air. Direct air capture does not include any facility, technology, or system that captures carbon dioxide:

(1) That is deliberately released from a naturally occurring subsurface spring; or

(2) Using natural photosynthesis.

* * * * *

Fluorinated greenhouse gas (GHG) means sulfur hexafluoride (SF_6), nitrogen trifluoride (NF3), and any fluorocarbon except for controlled substances as defined at part 82, subpart A of this subchapter and substances with vapor pressures of less than 1 mm of Hg absolute at 25 degrees C. With these exceptions, ''fluorinated GHG'' includes but is not limited to any hydrofluorocarbon, any perfluorocarbon, any fully fluorinated linear, branched or cyclic alkane, ether, tertiary amine or aminoether, any perfluoropolyether, and any hydrofluoropolyether.

Fluorinated greenhouse gas (GHG) group means one of the following sets of fluorinated GHGs:

(1) Fully fluorinated GHGs;

(2) Saturated hydrofluorocarbons with two or fewer carbon-hydrogen bonds;

(3) Saturated hydrofluorocarbons with three or more carbon-hydrogen bonds;

(4) Saturated hydrofluoroethers and hydrochlorofluoroethers with one carbon-hydrogen bond;

(5) Saturated hydrofluoroethers and hydrochlorofluoroethers with two carbon-hydrogen bonds;

(6) Saturated hydrofluoroethers and hydrochlorofluoroethers with three or more carbon-hydrogen bonds;

(7) Saturated chlorofluorocarbons (CFCs);

(8) Fluorinated formates;

(9) Cyclic forms of the following: unsaturated perfluorocarbons (PFCs), unsaturated HFCs, unsaturated CFCs, unsaturated hydrochlorofluorocarbons (HCFCs), unsaturated bromofluorocarbons (BFCs), unsaturated bromochlorofluorocarbons (BCFCs), unsaturated hydrobromofluorocarbons (HBFCs), unsaturated hydrobromochlorofluorocarbons (HBCFCs), unsaturated halogenated ethers, and unsaturated halogenated esters;

(10) Fluorinated acetates, carbonofluoridates, and fluorinated alcohols other than fluorotelomer alcohols;

(11) Fluorinated aldehydes, fluorinated ketones and non-cyclic forms of the following: unsaturated PFCs, unsaturated HFCs, unsaturated CFCs, unsaturated HCFCs, unsaturated BFCs, unsaturated BCFCs, unsaturated HBFCs, unsaturated HBCFCs, unsaturated halogenated ethers, and unsaturated halogenated esters;

(12) Fluorotelomer alcohols;

(13) Fluorinated GHGs with carbon-iodine bonds; or

(14) Remaining fluorinated GHGs.

Fluorinated heat transfer fluids means fluorinated GHGs used for temperature control, device testing, cleaning substrate surfaces and other parts, other solvent applications, and soldering in certain types of electronics manufacturing production processes and in other industries. Fluorinated heat transfer fluids do not include fluorinated GHGs used as lubricants or surfactants in electronics manufacturing. For fluorinated heat transfer fluids, the lower vapor pressure limit of 1 mm Hg in absolute at 25 °C in the definition of ''fluorinated greenhouse gas'' in this section shall not apply. Fluorinated heat transfer fluids include, but are not limited to, perfluoropolyethers (including PFPMIE), perfluoroalkylamines, perfluoroalkylmorpholines, perfluoroalkanes, perfluoroethers, perfluorocyclic ethers, and hydrofluoroethers. Fluorinated heat transfer fluids include HFC–43–10meee but do not include other hydrofluorocarbons.

* * * * *

Greenhouse gas or *GHG* means carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated greenhouse gases (GHGs) as defined in this section.

* * * * *

Process vent means a gas stream that: Is discharged through a conveyance to the atmosphere either directly or after passing through a control device; originates from a unit operation, including but not limited to reactors (including reformers, crackers, and furnaces, and separation equipment for products and recovered byproducts); and contains or has the potential to contain GHG that is generated in the process. Process vent does not include safety device discharges, equipment leaks, gas streams routed to a fuel gas system or to a flare, discharges from storage tanks.

* * * * *

Remaining fluorinated GHGs means fluorinated GHGs that are none of the following:

(1) Fully fluorinated GHGs;

(2) Saturated hydrofluorocarbons with two or fewer carbon-hydrogen bonds;

(3) Saturated hydrofluorocarbons with three or more carbon-hydrogen bonds;

(4) Saturated hydrofluoroethers and hydrochlorofluoroethers with one carbon-hydrogen bond;

(5) Saturated hydrofluoroethers and hydrochlorofluoroethers with two carbon-hydrogen bonds;

(6) Saturated hydrofluoroethers and hydrochlorofluoroethers with three or more carbon-hydrogen bonds;

(7) Saturated chlorofluorocarbons (CFCs);

(8) Fluorinated formates;

(9) Cyclic forms of the following: unsaturated perfluorocarbons (PFCs), unsaturated HFCs, unsaturated CFCs, unsaturated hydrochlorofluorocarbons (HCFCs), unsaturated bromofluorocarbons (BFCs), unsaturated bromochlorofluorocarbons (BCFCs), unsaturated hydrobromofluorocarbons (HBFCs), unsaturated hydrobromochlorofluorocarbons (HBCFCs), unsaturated halogenated ethers, and unsaturated halogenated esters;

(10) Fluorinated acetates, carbonofluoridates, and fluorinated alcohols other than fluorotelomer alcohols;

(11) Fluorinated aldehydes, fluorinated ketones and non-cyclic forms of the following: unsaturated PFCs, unsaturated HFCs, unsaturated CFCs, unsaturated HCFCs, unsaturated BFCs, unsaturated BCFCs, unsaturated HBFCs, unsaturated HBCFCs, unsaturated halogenated ethers, and unsaturated halogenated esters;

(12) Fluorotelomer alcohols; or

(13) fluorinated GHGs with carbon-iodine bonds.

* * * * *

Saturated chlorofluorocarbons (CFCs) means fluorinated GHGs that contain only chlorine, fluorine, and carbon and that contain only single bonds.

* * * * *

Unsaturated bromochlorofluorocarbons (BCFCs) means fluorinated GHGs that contain only bromine, chlorine, fluorine, and carbon and that contain one or more bonds that are not single bonds.

Unsaturated bromofluorocarbons (BFCs) means fluorinated GHGs that contain only bromine, fluorine, and carbon and that contain one or more bonds that are not single bonds.

Unsaturated chlorofluorocarbons (CFCs) means fluorinated GHGs that contain only chlorine, fluorine, and carbon and that contain one or more bonds that are not single bonds.

* * * * *

Unsaturated hydrobromochlorofluorocarbons (HBCFCs) means fluorinated GHGs that contain only hydrogen, bromine, chlorine, fluorine, and carbon and that contain one or more bonds that are not single bonds.

Unsaturated hydrobromofluorocarbons (HBFCs) means fluorinated GHGs that contain only hydrogen, bromine, fluorine, and carbon and that contain one or more bonds that are not single bonds.

* * * * *

■ 8. Amend § 98.7 by:
■ a. Revising the introductory text;
■ b. Redesignating paragraphs (c) through (e) as paragraphs (b) through (d);
■ c. Revising newly redesignated paragraph (d);
■ d. Adding new paragraph (e); and
■ e. Revising paragraphs (i) and (m)(3).

The revisions and addition read as follows:

§ 98.7 What standardized methods are incorporated by reference into this part?

Certain material is incorporated by reference into this part with the approval of the Director of the **Federal Register** under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, the EPA must publish a document in the **Federal Register** and the material must be available to the public. All approved incorporation by reference (IBR) material is available for inspection at the EPA and at the National Archives

and Records Administration (NARA). Contact EPA at: EPA Docket Center, Public Reading Room, EPA WJC West, Room 3334, 1301 Constitution Ave. NW, Washington, DC; phone: 202–566–1744; email: *Docket-customerservice@epa.gov;* website: *www.epa.gov/dockets/epa-docket-center-reading-room.* For information on the availability of this material at NARA, visit *www.archives.gov/federal-register/cfr/ibr-locations* or email *fr.inspection@nara.gov.* The material may be obtained from the following sources:

* * * * *

(d) ASTM International (ASTM), 100 Barr Harbor Drive, P.O. Box CB700, West Conshohocken, Pennsylvania 19428–B2959; (800) 262–1373; *www.astm.org.*

(1) ASTM C25–06, Standard Test Method for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime, approved February 15, 2006; IBR approved for §§ 98.114(b); 98.174(b); 98.184(b); 98.194(c); 98.334(b); and 98.504(b).

(2) ASTM C114–09, Standard Test Methods for Chemical Analysis of Hydraulic Cement; IBR approved for § 98.84(a) through (c).

(3) ASTM D235–02 (Reapproved 2007), Standard Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent); IBR approved for § 98.6.

(4) ASTM D240–02 (Reapproved 2007), Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter; IBR approved for § 98.254(e).

(5) ASTM D388–05, Standard Classification of Coals by Rank; IBR approved for § 98.6.

(6) ASTM D910–07a, Standard Specification for Aviation Gasolines; IBR approved for § 98.6.

(7) ASTM D1826–94 (Reapproved 2003), Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter; IBR approved for § 98.254(e).

(8) ASTM D1836–07, Standard Specification for Commercial Hexanes; IBR approved for § 98.6.

(9) ASTM D1941–91 (Reapproved 2007), Standard Test Method for Open Channel Flow Measurement of Water with the Parshall Flume, approved June 15, 2007; IBR approved for § 98.354(d).

(10) ASTM D1945–03, Standard Test Method for Analysis of Natural Gas by Gas Chromatography; IBR approved for §§ 98.74(c); 98.164(b); 98.244(b); 98.254(d); 98.324(d); 98.344(b); 98.354(g).

(11) ASTM D1946–90 (Reapproved 2006), Standard Practice for Analysis of Reformed Gas by Gas Chromatography; IBR approved for §§ 98.74(c); 98.164(b); 98.254(d); 98.324(d); 98.344(b); 98.354(g); 98.364(c).

(12) ASTM D2013–07, Standard Practice for Preparing Coal Samples for Analysis; IBR approved for § 98.164(b).

(13) ASTM D2234/D2234M–07, Standard Practice for Collection of a Gross Sample of Coal; IBR approved for § 98.164(b).

(14) ASTM D2502–04, Standard Test Method for Estimation of Mean Relative Molecular Mass of Petroleum Oils From Viscosity Measurements; IBR approved for § 98.74(c).

(15) ASTM D2503–92 (Reapproved 2007), Standard Test Method for Relative Molecular Mass (Molecular Weight) of Hydrocarbons by Thermoelectric Measurement of Vapor Pressure; IBR approved for §§ 98.74(c); 98.254(d)(6).

(16) ASTM D2505–88 (Reapproved 2004)e1, Standard Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by Gas Chromatography; IBR approved for § 98.244(b).

(17) ASTM D2593–93 (Reapproved 2009), Standard Test Method for Butadiene Purity and Hydrocarbon Impurities by Gas Chromatography, approved July 1, 2009; IBR approved for § 98.244(b).

(18) ASTM D2597–94 (Reapproved 2004), Standard Test Method for Analysis of Demethanized Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography; IBR approved for § 98.164(b).

(19) ASTM D2879–97 (Reapproved 2007), Standard Test Method for Vapor Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope (ASTM D2879), approved May 1, 2007; IBR approved for § 98.128.

(20) ASTM D3176–15, Standard Practice for Ultimate Analysis of Coal and Coke, approved January 1, 2015; IBR approved for § 98.494(c).

(21) ASTM D3176–89 (Reapproved 2002), Standard Practice for Ultimate Analysis of Coal and Coke; IBR approved for §§ 98.74(c); 98.164(b); 98.244(b); 98.284(c) and (d); 98.314(c), (d), and (f).

(22) ASTM D3238–95 (Reapproved 2005), Standard Test Method for Calculation of Carbon Distribution and Structural Group Analysis of Petroleum Oils by the n-d-M Method; IBR approved for §§ 98.74(c); 98.164(b).

(23) ASTM D3588–98 (Reapproved 2003), Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels; IBR approved for § 98.254(e).

(24) ASTM D3682–01 (Reapproved 2006), Standard Test Method for Major and Minor Elements in Combustion Residues from Coal Utilization Processes; IBR approved for § 98.144(b).

(25) ASTM D4057–06, Standard Practice for Manual Sampling of Petroleum and Petroleum Products; IBR approved for § 98.164(b).

(26) ASTM D4177–95 (Reapproved 2005), Standard Practice for Automatic Sampling of Petroleum and Petroleum Products; IBR approved for § 98.164(b).

(27) ASTM D4809–06, Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method); IBR approved for § 98.254(e).

(28) ASTM D4891–89 (Reapproved 2006), Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion; IBR approved for §§ 98.254(e); 98.324(d).

(29) ASTM D5291–02 (Reapproved 2007), Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants; IBR approved for §§ 98.74(c); 98.164(b); 98.244(b).

(30) ASTM D5291–16, Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants, approved October 1, 2016; IBR approved for § 98.494(c).

(31) ASTM D5373–08, Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Laboratory Samples of Coal, approved February 1, 2008; IBR approved for §§ 98.74(c); 98.114(b); 98.164(b); 98.174(b); 98.184(b); 98.244(b); 98.274(b); 98.284(c) and (d); 98.314(c), (d), and (f); 98.334(b); 98.504(b).

(32) ASTM D5373–21, Standard Test Methods for Determination of Carbon, Hydrogen, and Nitrogen in Analysis Samples of Coal and Carbon in Analysis Samples of Coal and Coke, approved April 1, 2021; IBR approved for § 98.494(c).

(33) ASTM D5614–94 (Reapproved 2008), Standard Test Method for Open Channel Flow Measurement of Water with Broad-Crested Weirs, approved October 1, 2008; IBR approved for § 98.354(d).

(34) ASTM D6060–96 (Reapproved 2001), Standard Practice for Sampling of Process Vents With a Portable Gas Chromatograph; IBR approved for § 98.244(b).

(35) ASTM D6348–03, Standard Test Method for Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform Infrared

(FTIR) Spectroscopy; IBR approved for § 98.54(b); table I–9 to subpart I of this part; §§ 98.224(b); 98.414(n).

(36) ASTM D6349–09, Standard Test Method for Determination of Major and Minor Elements in Coal, Coke, and Solid Residues from Combustion of Coal and Coke by Inductively Coupled Plasma—Atomic Emission Spectrometry; IBR approved for § 98.144(b).

(37) ASTM D6609–08, Standard Guide for Part-Stream Sampling of Coal; IBR approved for § 98.164(b).

(38) ASTM D6751–08, Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels; IBR approved for § 98.6.

(39) ASTM D6866–16, Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis, approved June 1, 2016; IBR approved for §§ 98.34(d) and (e); 98.36(e).

(40) ASTM D6883–04, Standard Practice for Manual Sampling of Stationary Coal from Railroad Cars, Barges, Trucks, or Stockpiles; IBR approved for § 98.164(b).

(41) ASTM D7359–08, Standard Test Method for Total Fluorine, Chlorine and Sulfur in Aromatic Hydrocarbons and Their Mixtures by Oxidative Pyrohydrolytic Combustion followed by Ion Chromatography Detection (Combustion Ion Chromatography-CIC) (ASTM D7359), approved October 15, 2008; IBR approved for § 98.124(e)(2).

(42) ASTM D7430–08ae1, Standard Practice for Mechanical Sampling of Coal; IBR approved for § 98.164(b).

(43) ASTM D7459–08, Standard Practice for Collection of Integrated Samples for the Speciation of Biomass (Biogenic) and Fossil-Derived Carbon Dioxide Emitted from Stationary Emissions Sources; IBR approved for §§ 98.34(d) and (e); 98.36(e).

(44) ASTM D7633–10, Standard Test Method for Carbon Black—Carbon Content, approved May 15, 2010; IBR approved for § 98.244(b).

(45) ASTM E359–00 (Reapproved 2005)e1, Standard Test Methods for Analysis of Soda Ash (Sodium Carbonate); IBR approved for § 98.294(a) and (b).

(46) ASTM E415–17, Standard Test Method for Analysis of Carbon and Low-Alloy Steel by Spark Atomic Emission Spectrometry, approved May 15, 2017; IBR approved for § 98.174(b).

(47) ASTM E1019–08, Standard Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel, Iron, Nickel, and Cobalt Alloys by Various Combustion and Fusion Techniques; IBR approved for § 98.174(b).

(48) ASTM E1915–07a, Standard Test Methods for Analysis of Metal Bearing Ores and Related Materials by Combustion Infrared-Absorption Spectrometry; IBR approved for § 98.174(b).

(49) ASTM E1941–04, Standard Test Method for Determination of Carbon in Refractory and Reactive Metals and Their Alloys; IBR approved for §§ 98.114(b); 98.184(b); 98.334(b).

(50) ASTM UOP539–97, Refinery Gas Analysis by Gas Chromatography; IBR approved for §§ 98.164(b); 98.244(b); 98.254(d); 98.324(d); 98.344(b); 98.354(g).

(e) CSA Group (CSA), 178 Rexdale Boulevard, Toronto, Ontario Canada M9W 183; (800) 463–6727; *https://shop.csa.ca.*

(1) CSA/ANSI ISO 27916:19, Carbon dioxide capture, transportation and geological storage—Carbon dioxide storage using enhanced oil recovery (CO_2–EOR), approved August 30, 2019; IBR approved for §§ 98.470(c); 98.480(a); 98.481(a) through (c); 98.482; 98.483; 98.484; 98.485; 98.486(g); 98.487; 98.488(a)(5); 98.489.

Note 1 to paragraph (e)(1): This standard is also available from ISO as ISO 27916:2019(E).

(2) [Reserved]

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(i) National Institute of Standards and Technology (NIST), 100 Bureau Drive, Stop 1070, Gaithersburg, MD 20899–1070, (800) 877–8339, *www.nist.gov/.*

(1) NIST HB 44–2023: Specifications, Tolerances, and Other Technical Requirements For Weighing and Measuring Devices, 2023 edition, approved November 18, 2022; IBR approved for § 98.494(b).

(2) Specifications, Tolerances, and Other Technical Requirements For Weighing and Measuring Devices, NIST Handbook 44 (2009); IBR approved for §§ 98.244(b); 98.344(a).

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(m) * * *

(3) Protocol for Measuring Destruction or Removal Efficiency (DRE) of Fluorinated Greenhouse Gas Abatement Equipment in Electronics Manufacturing, Version 1, EPA–430–R–10–003, March 2010 (EPA 430–R–10–003), approved March 2010; IBR approved for §§ 98.94(e); 98.94(f) and (g); 98.97(b) and (d); 98.98; appendix A to subpart I of this part; §§ 98.124(e); 98.414(n). (Also available from: *www.epa.gov/sites/default/files/2016-02/documents/dre_protocol.pdf.*)

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■ 9. Revise table A–1 to subpart A to read as follows:

TABLE A–1 TO SUBPART A OF PART 98—GLOBAL WARMING POTENTIALS, 100-YEAR TIME HORIZON

Name	CAS No.	Chemical formula	Global warming potential (100 yr.)
Chemical-Specific GWPs			
Carbon dioxide	124–38–9	CO_2	1
Methane	74–82–8	CH_4	[a][d]28
Nitrous oxide	10024–97–2	N_2O	[a][d]265
Fully Fluorinated GHGs			
Sulfur hexafluoride	2551–62–4	SF_6	[a][d]23,500
Trifluoromethyl sulphur pentafluoride	373–80–8	SF_5CF_3	[d]17,400
Nitrogen trifluoride	7783–54–2	NF_3	[d]16,100
PFC–14 (Perfluoromethane)	75–73–0	CF_4	[a][d]6,630
PFC–116 (Perfluoroethane)	76–16–4	C_2F_6	[a][d]11,100
PFC–218 (Perfluoropropane)	76–19–7	C_3F_8	[a][d]8,900
Perfluorocyclopropane	931–91–9	c-C_3F_6	[d]9,200
PFC–3–1–10 (Perfluorobutane)	355–25–9	C_4F_{10}	[a][d]9,200
PFC–318 (Perfluorocyclobutane)	115–25–3	c-C_4F_8	[a][d]9,540

TABLE A–1 TO SUBPART A OF PART 98—GLOBAL WARMING POTENTIALS, 100-YEAR TIME HORIZON—Continued

Name	CAS No.	Chemical formula	Global warming potential (100 yr.)
Perfluorotetrahydrofuran	773–14–8	c-C_4F_8O	[e] 13,900
PFC–4–1–12 (Perfluoropentane)	678–26–2	C_5F_{12}	[a d] 8,550
PFC–5–1–14 (Perfluorohexane, FC–72)	355–42–0	C_6F_{14}	[a d] 7,910
PFC–6–1–12	335–57–9	C_7F_{16}; $CF_3(CF_2)_5CF_3$	[b] 7,820
PFC–7–1–18	307–34–6	C_8F_{18}; $CF_3(CF_2)_6CF_3$	[b] 7,620
PFC–9–1–18	306–94–5	$C_{10}F_{18}$	[d] 7,190
PFPMIE (HT–70)	NA	$CF_3OCF(CF_3)CF_2OCF_2OCF_3$	[d] 9,710
Perfluorodecalin (cis)	60433–11–6	Z-$C_{10}F_{18}$	[b d] 7,240
Perfluorodecalin (trans)	60433–12–7	E-$C_{10}F_{18}$	[b d] 6,290
Perfluorotriethylamine	359–70–6	$N(C_2F_5)_3$	[e] 10,300
Perfluorotripropylamine	338–83–0	$N(CF_2CF_2CF_3)_3$	[e] 9,030
Perfluorotributylamine	311–89–7	$N(CF_2CF_2CF_2CF_3)_3$	[e] 8,490
Perfluorotripentylamine	338–84–1	$N(CF_2CF_2CF_2CF_2CF_3)_3$	[e] 7,260
Saturated Hydrofluorocarbons (HFCs) With Two or Fewer Carbon-Hydrogen Bonds			
(4s,5s)-1,1,2,2,3,3,4,5-octafluorocyclopentane	158389–18–5	trans-cyc (-CF2CF2CF2CHFCHF-)	[e] 258
HFC–23	75–46–7	CHF_3	[a d] 12,400
HFC–32	75–10–5	CH_2F_2	[a d] 677
HFC–125	354–33–6	C_2HF_5	[a d] 3,170
HFC–134	359–35–3	$C_2H_2F_4$	[a d] 1,120
HFC–134a	811–97–2	CH_2FCF_3	[a d] 1,300
HFC–227ca	2252–84–8	$CF_3CF_2CHF_2$	[b] 2,640
HFC–227ea	431–89–0	C_3HF_7	[a d] 3,350
HFC–236cb	677–56–5	$CH_2FCF_2CF_3$	[d] 1,210
HFC–236ea	431–63–0	CHF_2CHFCF_3	[d] 1,330
HFC–236fa	690–39–1	$C_3H_2F_6$	[a d] 8,060
HFC–329p	375–17–7	$CHF_2CF_2CF_2CF_3$	[b] 2360
HFC–43–10mee	138495–42–8	$CF_3CFHCFHCF_2CF_3$	[a d] 1,650
Saturated Hydrofluorocarbons (HFCs) With Three or More Carbon-Hydrogen Bonds			
1,1,2,2,3,3-hexafluorocyclopentane	123768–18–3	cyc (-$CF_2CF_2CF_2CH_2CH_2$-)	[e] 120
1,1,2,2,3,3,4-heptafluorocyclopentane	15290–77–4	cyc (-$CF_2CF_2CF_2CHFCH_2$-)	[e] 231
HFC–41	593–53–3	CH_3F	[a d] 116
HFC–143	430–66–0	$C_2H_3F_3$	[a d] 328
HFC–143a	420–46–2	$C_2H_3F_3$	[a d] 4,800
HFC–152	624–72–6	CH_2FCH_2F	[d] 16
HFC–152a	75–37–6	CH_3CHF_2	[a d] 138
HFC–161	353–36–6	CH_3CH_2F	[d] 4
HFC–245ca	679–86–7	$C_3H_3F_5$	[a d] 716
HFC–245cb	1814–88–6	$CF_3CF_2CH_3$	[b] 4,620
HFC–245ea	24270–66–4	$CHF_2CHFCHF_2$	[b] 235
HFC–245eb	431–31–2	$CH_2FCHFCF_3$	[b] 290
HFC–245fa	460–73–1	$CHF_2CH_2CF_3$	[d] 858
HFC–263fb	421–07–8	$CH_3CH_2CF_3$	[b] 76
HFC–272ca	420–45–1	$CH_3CF_2CH_3$	[b] 144
HFC–365mfc	406–58–6	$CH_3CF_2CH_2CF_3$	[d] 804
Saturated Hydrofluoroethers (HFEs) and Hydrochlorofluoroethers (HCFEs) With One Carbon-Hydrogen Bond			
HFE–125	3822–68–2	CHF_2OCF_3	[d] 12,400
HFE–227ea	2356–62–9	$CF_3CHFOCF_3$	[d] 6,450
HFE–329mcc2	134769–21–4	$CF_3CF_2OCF_2CHF_2$	[d] 3,070
HFE–329me3	428454–68–6	$CF_3CFHCF_2OCF_3$	[b] 4,550
1,1,1,2,2,3,3-Heptafluoro-3-(1,2,2,2-tetrafluoroethoxy)-propane.	3330–15–2	$CF_3CF_2CF_2OCHFCF_3$	[b] 6,490
Saturated HFEs and HCFEs With Two Carbon-Hydrogen Bonds			
HFE–134 (HG–00)	1691–17–4	CHF_2OCHF_2	[d] 5,560
HFE–236ca	32778–11–3	$CHF_2OCF_2CHF_2$	[b] 4,240
HFE–236ca12 (HG–10)	78522–47–1	$CHF_2OCF_2OCHF_2$	[d] 5,350
HFE–236ea2 (Desflurane)	57041–67–5	$CHF_2OCHFCF_3$	[d] 1,790
HFE–236fa	20193–67–3	$CF_3CH_2OCF_3$	[d] 979
HFE–338mcf2	156053–88–2	$CF_3CF_2OCH_2CF_3$	[d] 929
HFE–338mmz1	26103–08–2	$CHF_2OCH(CF_3)_2$	[d] 2,620
HFE–338pcc13 (HG–01)	188690–78–0	$CHF_2OCF_2CF_2OCHF_2$	[d] 2,910
HFE–43–10pccc (H-Galden 1040x, HG–11)	E1730133	$CHF_2OCF_2OC_2F_4OCHF_2$	[d] 2,820
HCFE–235ca2 (Enflurane)	13838–16–9	CHF_2OCF_2CHFCl	[b] 583

TABLE A–1 TO SUBPART A OF PART 98—GLOBAL WARMING POTENTIALS, 100-YEAR TIME HORIZON—Continued

Name	CAS No.	Chemical formula	Global warming potential (100 yr.)
HCFE–235da2 (Isoflurane)	26675–46–7	$CHF_2OCHClCF_3$	[d] 491
HG–02	205367–61–9	HF_2C-$(OCF_2CF_2)_2$-OCF_2H	[b] [d] 2,730
HG–03	173350–37–3	HF_2C-$(OCF_2CF_2)_3$-OCF_2H	[b] [d] 2,850
HG–20	249932–25–0	HF_2C-$(OCF_2)_2$-OCF_2H	[b] 5,300
HG–21	249932–26–1	HF_2C-$OCF_2CF_2OCF_2OCF_2O$-CF_2H	[b] 3,890
HG–30	188690–77–9	HF_2C-$(OCF_2)_3$-OCF_2H	[b] 7,330
1,1,3,3,4,4,6,6,7,7,9,9,10,10,12,12,13,13,15,15-eicosafluoro-2,5,8,11,14-Pentaoxapentadecane.	173350–38–4	$HCF_2O(CF_2CF_2O)_4CF_2H$	[b] 3,630
1,1,2-Trifluoro-2-(trifluoromethoxy)-ethane	84011–06–3	$CHF_2CHFOCF_3$	[b] 1,240
Trifluoro(fluoromethoxy)methane	2261–01–0	CH_2FOCF_3	[b] 751
Saturated HFEs and HCFEs With Three or More Carbon-Hydrogen Bonds			
HFE–143a	421–14–7	CH_3OCF_3	[d] 523
HFE–245cb2	22410–44–2	$CH_3OCF_2CF_3$	[d] 654
HFE–245fa1	84011–15–4	$CHF_2CH_2OCF_3$	[d] 828
HFE–245fa2	1885–48–9	$CHF_2OCH_2CF_3$	[d] 812
HFE–254cb1	425–88–7	$CH_3OCF_2CHF_2$	[d] 301
HFE–263fb2	460–43–5	$CF_3CH_2OCH_3$	[d] 1
HFE–263m1; R–E–143a	690–22–2	$CF_3OCH_2CH_3$	[b] 29
HFE–347mcc3 (HFE–7000)	375–03–1	$CH_3OCF_2CF_2CF_3$	[d] 530
HFE–347mcf2	171182–95–9	$CF_3CF_2OCH_2CHF_2$	[d] 854
HFE–347mmy1	22052–84–2	$CH_3OCF(CF_3)_2$	[d] 363
HFE–347mmz1 (Sevoflurane)	28523–86–6	$(CF_3)_2CHOCH_2F$	[c] 216
HFE–347pcf2	406–78–0	$CHF_2CF_2OCH_2CF_3$	[d] 889
HFE–356mec3	382–34–3	$CH_3OCF_2CHFCF_3$	[d] 387
HFE–356mff2	333–36–8	$CF_3CH_2OCH_2CF_3$	[b] 17
HFE–356mmz1	13171–18–1	$(CF_3)_2CHOCH_3$	[d] 14
HFE–356pcc3	160620–20–2	$CH_3OCF_2CF_2CHF_2$	[d] 413
HFE–356pcf2	50807–77–7	$CHF_2CH_2OCF_2CHF_2$	[d] 719
HFE–356pcf3	35042–99–0	$CHF_2OCH_2CF_2CHF_2$	[d] 446
HFE–365mcf2	22052–81–9	$CF_3CF_2OCH_2CH_3$	[b] 58
HFE–365mcf3	378–16–5	$CF_3CF_2CH_2OCH_3$	[d] 0.99
HFE–374pc2	512–51–6	$CH_3CH_2OCF_2CHF_2$	[d] 627
HFE–449s1 (HFE–7100) Chemical blend	163702–07–6	$C_4F_9OCH_3$	[d] 421
	163702–08–7	$(CF_3)_2CFCF_2OCH_3$	
HFE–569sf2 (HFE–7200) Chemical blend	163702–05–4	$C_4F_9OC_2H_5$	[d] 57
	163702–06–5	$(CF_3)_2CFCF_2OC_2H_5$	
HFE–7300	132182–92–4	$(CF_3)_2CFCFOC_2H_5CF_2CF_2CF_3$	[e] 405
HFE–7500	297730–93–9	n-$C_3F_7CFOC_2H_5CF(CF_3)_2$	[e] 13
HG′–01	73287–23–7	$CH_3OCF_2CF_2OCH_3$	[b] 222
HG′–02	485399–46–0	$CH_3O(CF_2CF_2O)_2CH_3$	[b] 236
HG′–03	485399–48–2	$CH_3O(CF_2CF_2O)_3CH_3$	[b] 221
Difluoro(methoxy)methane	359–15–9	CH_3OCHF_2	[b] 144
2-Chloro-1,1,2-trifluoro-1-methoxyethane	425–87–6	CH_3OCF_2CHFCl	[b] 122
1-Ethoxy-1,1,2,2,3,3,3-heptafluoropropane	22052–86–4	$CF_3CF_2CF_2OCH_2CH_3$	[b] 61
2-Ethoxy-3,3,4,4,5-pentafluorotetrahydro-2,5-bis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-furan.	920979–28–8	$C_{12}H_5F_{19}O_2$	[b] 56
1-Ethoxy-1,1,2,3,3,3-hexafluoropropane	380–34–7	$CF_3CHFCF_2OCH_2CH_3$	[b] 23
Fluoro(methoxy)methane	460–22–0	CH_3OCH_2F	[b] 13
1,1,2,2-Tetrafluoro-3-methoxy-propane; Methyl 2,2,3,3-tetrafluoropropyl ether.	60598–17–6	$CHF_2CF_2CH_2OCH_3$	[b] [d] 0.49
1,1,2,2-Tetrafluoro-1-(fluoromethoxy)ethane	37031–31–5	$CH_2FOCF_2CF_2H$	[b] 871
Difluoro(fluoromethoxy)methane	461–63–2	CH_2FOCHF_2	[b] 617
Fluoro(fluoromethoxy)methane	462–51–1	CH_2FOCH_2F	[b] 130
Saturated Chlorofluorocarbons (CFCs)			
E–R316c	3832–15–3	trans-cyc (-CClFCF$_2$CF$_2$CClF-)	[e] 4,230
Z–R316c	3934–26–7	cis-cyc (-CClFCF$_2$CF$_2$CClF-)	[e] 5,660
Fluorinated Formates			
Trifluoromethyl formate	85358–65–2	$HCOOCF_3$	[b] 588
Perfluoroethyl formate	313064–40–3	$HCOOCF_2CF_3$	[b] 580
1,2,2,2-Tetrafluoroethyl formate	481631–19–0	$HCOOCHFCF_3$	[b] 470
Perfluorobutyl formate	197218–56–7	$HCOOCF_2CF_2CF_2CF_3$	[b] 392
Perfluoropropyl formate	271257–42–2	$HCOOCF_2CF_2CF_3$	[b] 376
1,1,1,3,3,3-Hexafluoropropan-2-yl formate	856766–70–6	$HCOOCH(CF_3)_2$	[b] 333
2,2,2-Trifluoroethyl formate	32042–38–9	$HCOOCH_2CF_3$	[b] 33

TABLE A–1 TO SUBPART A OF PART 98—GLOBAL WARMING POTENTIALS, 100-YEAR TIME HORIZON—Continued

Name	CAS No.	Chemical formula	Global warming potential (100 yr.)
3,3,3-Trifluoropropyl formate	1344118–09–7	$HCOOCH_2CH_2CF_3$	[b] 17
Fluorinated Acetates			
Methyl 2,2,2-trifluoroacetate	431–47–0	CF_3COOCH_3	[b] 52
1,1-Difluoroethyl 2,2,2-trifluoroacetate	1344118–13–3	$CF_3COOCF_2CH_3$	[b] 31
Difluoromethyl 2,2,2-trifluoroacetate	2024–86–4	$CF_3COOCHF_2$	[b] 27
2,2,2-Trifluoroethyl 2,2,2-trifluoroacetate	407–38–5	$CF_3COOCH_2CF_3$	[b] 7
Methyl 2,2-difluoroacetate	433–53–4	HCF_2COOCH_3	[b] 3
Perfluoroethyl acetate	343269–97–6	$CH_3COOCF_2CF_3$	[b] [d] 2
Trifluoromethyl acetate	74123–20–9	CH_3COOCF_3	[b] [d] 2
Perfluoropropyl acetate	1344118–10–0	$CH_3COOCF_2CF_2CF_3$	[b] [d] 2
Perfluorobutyl acetate	209597–28–4	$CH_3COOCF_2CF_2CF_2CF_3$	[b] [d] 2
Ethyl 2,2,2-trifluoroacetate	383–63–1	$CF_3COOCH_2CH_3$	[b] [d] 1
Carbonofluoridates			
Methyl carbonofluoridate	1538–06–3	$FCOOCH_3$	[b] 95
1,1-Difluoroethyl carbonofluoridate	1344118–11–1	$FCOOCF_2CH_3$	[b] 27
Fluorinated Alcohols Other Than Fluorotelomer Alcohols			
Bis(trifluoromethyl)-methanol	920–66–1	$(CF_3)_2CHOH$	[d] 182
2,2,3,3,4,4,5,5-Octafluorocyclopentanol	16621–87–7	cyc (-$(CF_2)_4CH(OH)$-)	[d] 13
2,2,3,3,3-Pentafluoropropanol	422–05–9	$CF_3CF_2CH_2OH$	[d] 19
2,2,3,3,4,4,4-Heptafluorobutan-1-ol	375–01–9	C_3F_7CH2OH	[b] [d] 34
2,2,2-Trifluoroethanol	75–89–8	CF_3CH_2OH	[b] 20
2,2,3,4,4,4-Hexafluoro-1-butanol	382–31–0	$CF_3CHFCF_2CH_2OH$	[b] 17
2,2,3,3-Tetrafluoro-1-propanol	76–37–9	$CHF_2CF_2CH_2OH$	[b] 13
2,2-Difluoroethanol	359–13–7	CHF_2CH2OH	[b] 3
2-Fluoroethanol	371–62–0	CH_2FCH_2OH	[b] 1.1
4,4,4-Trifluorobutan-1-ol	461–18–7	$CF_3(CH_2)_2CH_2OH$	[b] 0.05
Non-Cyclic, Unsaturated Perfluorocarbons (PFCs)			
PFC–1114; TFE	116–14–3	$CF_2 = CF_2$; C_2F_4	[b] 0.004
PFC–1216; Dyneon HFP	116–15–4	C_3F_6; $CF_3CF = CF_2$	[b] 0.05
Perfluorobut-2-ene	360–89–4	$CF_3CF = CFCF_3$	[b] 1.82
Perfluorobut-1-ene	357–26–6	$CF_3CF_2CF = CF_2$	[b] 0.10
Perfluorobuta-1,3-diene	685–63–2	$CF_2 = CFCF = CF_2$	[b] 0.003
Non-Cyclic, Unsaturated Hydrofluorocarbons (HFCs) and Hydrochlorofluorocarbons (HCFCs)			
HFC–1132a; VF2	75–38–7	$C_2H_2F_2$, $CF_2 = CH_2$	[b] 0.04
HFC–1141; VF	75–02–5	C_2H_3F, $CH_2 = CHF$	[b] 0.02
(E)-HFC–1225ye	5595–10–8	$CF_3CF = CHF(E)$	[b] 0.06
(Z)-HFC–1225ye	5528–43–8	$CF_3CF = CHF(Z)$	[b] 0.22
Solstice 1233zd(E)	102687–65–0	$C_3H_2ClF_3$; $CHCl = CHCF_3$	[b] 1.34
HCFO–1233zd(Z)	99728–16–2	(Z)-$CF_3CH = CHCl$	[e] 0.45
HFC–1234yf; HFO–1234yf	754–12–1	$C_3H_2F_4$; $CF_3CF = CH_2$	[b] 0.31
HFC–1234ze(E)	1645–83–6	$C_3H_2F_4$; trans-$CF_3CH = CHF$	[b] 0.97
HFC–1234ze(Z)	29118–25–0	$C_3H_2F_4$; cis-$CF_3CH = CHF$; $CF_3CH = CHF$	[b] 0.29
HFC–1243zf; TFP	677–21–4	$C_3H_3F_3$, $CF_3CH = CH_2$	[b] 0.12
(Z)-HFC–1336	692–49–9	$CF_3CH = CHCF_3(Z)$	[b] 1.58
HFO–1336mzz(E)	66711–86–2	(E)-$CF_3CH = CHCF_3$	[e] 18
HFC–1345zfc	374–27–6	$C_2F_5CH = CH_2$	[b] 0.09
HFO–1123	359–11–5	$CHF=CF_2$	[e] 0.005
HFO–1438ezy(E)	14149–41–8	(E)-$(CF_3)_2CFCH = CHF$	[e] 8.2
HFO–1447fz	355–08–8	$CF_3(CF_2)_2CH = CH_2$	[e] 0.24
Capstone 42–U	19430–93–4	$C_6H_3F_9$, $CF_3(CF_2)_3CH = CH_2$	[b] 0.16
Capstone 62–U	25291–17–2	$C_8H_3F_{13}$, $CF_3(CF_2)_5CH = CH_2$	[b] 0.11
Capstone 82–U	21652–58–4	$C_{10}H_3F_{17}$, $CF_3(CF_2)_7CH = CH_2$	[b] 0.09
(e)-1-chloro-2-fluoroethene	460–16–2	(E)-$CHCl = CHF$	[e] 0.004
3,3,3-trifluoro-2-(trifluoromethyl)prop-1-ene	382–10–5	$(CF_3)_2C = CH_2$	[e] 0.38
Non-Cyclic, Unsaturated CFCs			
CFC–1112	598–88–9	$CClF=CClF$	[e] 0.13
CFC–1112a	79–35–6	$CCl_2=CF_2$	[e] 0.021

TABLE A–1 TO SUBPART A OF PART 98—GLOBAL WARMING POTENTIALS, 100-YEAR TIME HORIZON—Continued

Name	CAS No.	Chemical formula	Global warming potential (100 yr.)
Non-Cyclic, Unsaturated Halogenated Ethers			
PMVE; HFE–216	1187–93–5	$CF_3OCF = CF_2$	[b] 0.17
Fluoroxene	406–90–6	$CF_3CH_2OCH = CH_2$	[b] 0.05
Methyl-perfluoroheptene-ethers	N/A	$CH_3OC_7F_{13}$	[e] 15
Non-Cyclic, Unsaturated Halogenated Esters			
Ethenyl 2,2,2-trifluoroacetate	433–28–3	$CF_3COOCH=CH_2$	[e] 0.008
Prop-2-enyl 2,2,2-trifluoroacetate	383–67–5	$CF_3COOCH_2CH=CH_2$	[e] 0.007
Cyclic, Unsaturated HFCs and PFCs			
PFC C–1418	559–40–0	c-C_5F_8	[d] 2
Hexafluorocyclobutene	697–11–0	cyc (-CF=CFCF$_2$CF$_2$-)	[e] 126
1,3,3,4,4,5,5-heptafluorocyclopentene	1892–03–1	cyc (-CF$_2$CF$_2$CF$_2$CF=CH-)	[e] 45
1,3,3,4,4-pentafluorocyclobutene	374–31–2	cyc (-CH=CFCF$_2$CF$_2$-)	[e] 92
3,3,4,4-tetrafluorocyclobutene	2714–38–7	cyc (-CH=CHCF$_2$CF$_2$-)	[e] 26
Fluorinated Aldehydes			
3,3,3-Trifluoro-propanal	460–40–2	CF_3CH_2CHO	[b] 0.01
Fluorinated Ketones			
Novec 1230 (perfluoro (2-methyl-3-pentanone))	756–13–8	$CF_3CF_2C(O)CF(CF3)_2$	[b] 0.1
1,1,1-trifluoropropan-2-one	421–50–1	CF_3COCH_3	[e] 0.09
1,1,1-trifluorobutan-2-one	381–88–4	$CF_3COCH_2CH_3$	[e] 0.095
Fluorotelomer Alcohols			
3,3,4,4,5,5,6,6,7,7,7-Undecafluoroheptan-1-ol	185689–57–0	$CF_3(CF_2)_4CH_2CH_2OH$	[b] 0.43
3,3,3-Trifluoropropan-1-ol	2240–88–2	$CF_3CH_2CH_2OH$	[b] 0.35
3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-Pentadecafluorononan-1-ol	755–02–2	$CF_3(CF_2)_6CH_2CH_2OH$	[b] 0.33
3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11-Nonadecafluoroundecan-1-ol.	87017–97–8	$CF_3(CF_2)_8CH_2CH_2OH$	[b] 0.19
Fluorinated GHGs With Carbon-Iodine Bond(s)			
Trifluoroiodomethane	2314–97–8	CF_3I	[b] 0.4
Remaining Fluorinated GHGs with Chemical-Specific GWPs			
Dibromodifluoromethane (Halon 1202)	75–61–6	CBr_2F_2	[b] 231
2-Bromo-2-chloro-1,1,1-trifluoroethane (Halon-2311/Halothane).	151–67–7	$CHBrClCF_3$	[b] 41
Heptafluoroisobutyronitrile	42532–60–5	$(CF_3)_2CFCN$	[e] 2,750
Carbonyl fluoride	353–50–4	COF_2	[e] 0.14

Fluorinated GHG group [f]	Global warming potential (100 yr.)
Default GWPs for Compounds for Which Chemical-Specific GWPs Are Not Listed Above	
Fully fluorinated GHGs [g]	9,200
Saturated hydrofluorocarbons (HFCs) with 2 or fewer carbon-hydrogen bonds [g]	3,000
Saturated HFCs with 3 or more carbon-hydrogen bonds [g]	840
Saturated hydrofluoroethers (HFEs) and hydrochlorofluoroethers (HCFEs) with 1 carbon-hydrogen bond [g]	6,600
Saturated HFEs and HCFEs with 2 carbon-hydrogen bonds [g]	2,900
Saturated HFEs and HCFEs with 3 or more carbon-hydrogen bonds [g]	320
Saturated chlorofluorocarbons (CFCs) [g]	4,900
Fluorinated formates	350
Cyclic forms of the following: unsaturated perfluorocarbons (PFCs), unsaturated HFCs, unsaturated CFCs, unsaturated hydrochlorofluorocarbons (HCFCs), unsaturated bromofluorocarbons (BFCs), unsaturated bromochlorofluorocarbons (BCFCs), unsaturated hydrobromofluorocarbons (HBFCs), unsaturated hydrobromochlorofluorocarbons (HBCFCs), unsaturated halogenated ethers, and unsaturated halogenated esters [g]	58
Fluorinated acetates, carbonofluoridates, and fluorinated alcohols other than fluorotelomer alcohols [g]	25

Fluorinated GHG group [f]	Global warming potential (100 yr.)
Fluorinated aldehydes, fluorinated ketones, and non-cyclic forms of the following: unsaturated perfluorocarbons (PFCs), unsaturated HFCs, unsaturated CFCs, unsaturated HCFCs, unsaturated BFCs, unsaturated BCFCs, unsaturated HBFCs, unsaturated HBCFCs, unsaturated halogenated ethers and unsaturated halogenated esters [g]	1
Fluorotelomer alcohols [g]	1
Fluorinated GHGs with carbon-iodine bond(s) [g]	1
Other fluorinated GHGs [g]	1,800

[a] The GWP for this compound was updated in the final rule published on November 29, 2013 [78 FR 71904] and effective on January 1, 2014.
[b] This compound was added to table A–1 in the final rule published on December 11, 2014, and effective on January 1, 2015.
[c] The GWP for this compound was updated in the final rule published on December 11, 2014, and effective on January 1, 2015.
[d] The GWP for this compound was updated in the final rule published on April 25, 2024 and effective on January 1, 2025.
[e] The GWP for this compound was added to table A–1 in the final rule published on April 25, 2024 and effective on January 1, 2025.
[f] For electronics manufacturing (as defined in § 98.90), the term "fluorinated GHGs" in the definition of each fluorinated GHG group in § 98.6 shall include fluorinated heat transfer fluids (as defined in § 98.6), whether or not they are also fluorinated GHGs.
[g] The GWP for this fluorinated GHG group was updated in the final rule published on April 25, 2024 and effective on January 1, 2025.

■ 10. Revise and republish table A–3 to subpart A to read as follows:

TABLE A–3 TO SUBPART A OF PART 98—SOURCE CATEGORY LIST FOR § 98.2(a)(1)

Source Categories [a] Applicable in Reporting Year 2010 and Future Years:
- Electricity generation units that report CO_2 mass emissions year round through 40 CFR part 75 (subpart D).
- Adipic acid production (subpart E of this part).
- Aluminum production (subpart F of this part).
- Ammonia manufacturing (subpart G of this part).
- Cement production (subpart H of this part).
- HCFC–22 production (subpart O of this part).
- HFC–23 destruction processes that are not collocated with a HCFC–22 production facility and that destroy more than 2.14 metric tons of HFC–23 per year (subpart O of this part).
- Lime manufacturing (subpart S of this part).
- Nitric acid production (subpart V of this part).
- Petrochemical production (subpart X of this part).
- Petroleum refineries (subpart Y of this part).
- Phosphoric acid production (subpart Z of this part).
- Silicon carbide production (subpart BB of this part).
- Soda ash production (subpart CC of this part).
- Titanium dioxide production (subpart EE of this part).
- Municipal solid waste landfills that generate CH_4 in amounts equivalent to 25,000 metric tons CO_2e or more per year, as determined according to subpart HH of this part.
- Manure management systems with combined CH_4 and N_2O emissions in amounts equivalent to 25,000 metric tons CO_2e or more per year, as determined according to subpart JJ of this part.

Additional Source Categories [a] Applicable in Reporting Year 2011 and Future Years:
- Electrical transmission and distribution equipment use at facilities where the total estimated emissions from fluorinated GHGs, as determined under § 98.301 (subpart DD of this part), are equivalent to 25,000 metric tons CO_2e or more per year.
- Underground coal mines liberating 36,500,000 actual cubic feet of CH_4 or more per year (subpart FF of this part).
- Geologic sequestration of carbon dioxide (subpart RR of this part).
- Injection of carbon dioxide (subpart UU of this part).

Additional Source Categories [a] Applicable in Reporting Year 2025 and Future Years:
- Geologic sequestration of carbon dioxide with enhanced oil recovery using ISO 27916 (subpart VV of this part).
- Coke calciners (subpart WW of this part).
- Calcium carbide production (subpart XX of this part).
- Caprolactam, glyoxal, and glyoxylic acid production (subpart YY of this part).

[a] Source categories are defined in each applicable subpart of this part.

■ 11. Revise and republish table A–4 to subpart A to read as follows:

TABLE A–4 TO SUBPART A OF PART 98—SOURCE CATEGORY LIST FOR § 98.2(a)(2)

Source Categories [a] Applicable in Reporting Year 2010 and Future Years:
- Ferroalloy production (subpart K of this part).
- Glass production (subpart N of this part).
- Hydrogen production (subpart P of this part).
- Iron and steel production (subpart Q of this part).
- Lead production (subpart R of this part).
- Pulp and paper manufacturing (subpart AA of this part).
- Zinc production (subpart GG of this part).

Additional Source Categories [a] Applicable in Reporting Year 2011 and Future Years:

TABLE A–4 TO SUBPART A OF PART 98—SOURCE CATEGORY LIST FOR § 98.2(a)(2)—Continued

Electronics manufacturing (subpart I of this part).
Fluorinated gas production (subpart L of this part).
Magnesium production (subpart T of this part).
Petroleum and Natural Gas Systems (subpart W of this part).
Industrial wastewater treatment (subpart II of this part).
Electrical transmission and distribution equipment manufacture or refurbishment, as determined under § 98.451 (subpart SS of this part).
Industrial waste landfills (subpart TT of this part).
Additional Source Categories [a] Applicable in Reporting Year 2025 and Future Years:
Ceramics manufacturing facilities, as determined under § 98.520 (subpart ZZ of this part).

[a] Source categories are defined in each applicable subpart.

Subpart C—General Stationary Fuel Combustion Sources

■ 12. Amend § 98.33 by:
■ a. Revising and republishing paragraph (a)(3)(iii);
■ b. Revising paragraph (b)(1)(vii);
■ c. Revising parameter ''EF'' of equation C–10 in paragraph (c)(4) introductory text;
■ d. Revising and republishing paragraph (c)(6);
■ e. Revising parameter ''R'' of equation C–11 in paragraph (d)(1); and
■ f. Revising the introductory text of paragraphs (e), (e)(1) and (3), and paragraph (e)(3)(iv).

The revisions read as follows:

§ 98.33 Calculating GHG emissions.

* * * * *

(a) * * *

(3) * * *

(iii) For a gaseous fuel, use equation C–5 to this section.

$$CO_2 = \frac{44}{12} * Fuel * CC * \frac{MW}{MVC} * 0.001$$

(Eq. C–5)

Where:

CO_2 = Annual CO_2 mass emissions from combustion of the specific gaseous fuel (metric tons).

Fuel = Annual volume of the gaseous fuel combusted (scf). The volume of fuel combusted must be measured directly, using fuel flow meters calibrated according to § 98.3(i). Fuel billing meters may be used for this purpose.

CC = Annual average carbon content of the gaseous fuel (kg C per kg of fuel). The annual average carbon content shall be determined using the procedures specified in paragraphs (a)(3)(iii)(A)(*1*) and (*2*) of this section.

MW = Annual average molecular weight of the gaseous fuel (kg per kg-mole). The annual average molecular weight shall be determined using the procedures specified in paragraphs (a)(3)(iii)(B)(*1*) and (*2*) of this section.

MVC = Molar volume conversion factor at standard conditions, as defined in § 98.6. Use 849.5 scf per kg mole if you select 68 °F as standard temperature and 836.6 scf per kg mole if you select 60 °F as standard temperature.

44/12 = Ratio of molecular weights, CO_2 to carbon.

0.001 = Conversion factor from kg to metric tons.

(A) The minimum required sampling frequency for determining the annual average carbon content (*e.g.,* monthly, quarterly, semi-annually, or by lot) is specified in § 98.34. The method for computing the annual average carbon content for equation C–5 to this section is a function of unit size and how frequently you perform or receive from the fuel supplier the results of fuel sampling for carbon content. The methods are specified in paragraphs (a)(3)(iii)(A)(*1*) and (*2*) of this section, as applicable.

(*1*) If the results of fuel sampling are received monthly or more frequently, then for each unit with a maximum rated heat input capacity greater than or equal to 100 mmBtu/hr (or for a group of units that includes at least one unit of that size), the annual average carbon content for equation C–5 shall be calculated using equation C–5A to this section. If multiple carbon content determinations are made in any month, average the values for the month arithmetically.

$$(CC)_{annual} = \frac{\sum_{i=1}^{n}(CC)_i * (Fuel)_i * (MW)_i/MWC}{\sum_{i=1}^{n}(Fuel)_i * (MW)_i/MVC}$$

(Eq. C–5A)

Where:

$(CC)_{annual}$ = Weighted annual average carbon content of the fuel (kg C per kg of fuel).

$(CC)_i$ = Measured carbon content of the fuel, for sample period ''i'' (which may be the arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (kg C per kg of fuel).

$(Fuel)_i$ = Volume of the fuel (scf) combusted during the sample period ''i'' (*e.g.,* monthly, quarterly, semi-annually, or by lot) from company records.

$(MW)_i$ = Measured molecular weight of the fuel, for sample period ''i'' (which may be the arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (kg per kg-mole).

MVC = Molar volume conversion factor at standard conditions, as defined in § 98.6. Use 849.5 scf per kg-mole if you select 68 °F as standard temperature and 836.6

scf per kg-mole if you select 60 °F as standard temperature.

n = Number of sample periods in the year.

(*2*) If the results of fuel sampling are received less frequently than monthly, or, for a unit with a maximum rated heat input capacity less than 100 mmBtu/hr (or a group of such units) regardless of the carbon content sampling frequency, the annual average carbon content for equation C–5 shall either be computed according to paragraph (a)(3)(iii)(A)(*1*) of this section or as the arithmetic average carbon content for all values for the year (including valid samples and substitute data values under § 98.35).

(B) The minimum required sampling frequency for determining the annual average molecular weight (*e.g.,* monthly, quarterly, semi-annually, or by lot) is specified in § 98.34. The method for computing the annual average molecular weight for equation C–5 is a function of unit size and how frequently you perform or receive from the fuel supplier the results of fuel sampling for molecular weight. The methods are specified in paragraphs (a)(3)(iii)(B)(*1*) and (*2*) of this section, as applicable.

(*1*) If the results of fuel sampling are received monthly or more frequently, then for each unit with a maximum rated heat input capacity greater than or equal to 100 mmBtu/hr (or for a group of units that includes at least one unit of that size), the annual average molecular weight for equation C–5 shall be calculated using equation C–5B to this section. If multiple molecular weight determinations are made in any month, average the values for the month arithmetically.

$$(MW)_{annual} = \frac{\sum_{i=1}^{n}(MW)_i * (Fuel)_i/MVC}{\sum_{i=1}^{n}(Fuel)_i/MVC}$$

(Eq. C–5B)

Where:

$(MW)_{annual}$ = Weighted annual average molecular weight of the fuel (kg per kg-mole).

$(MW)_i$ = Measured molecular weight of the fuel, for sample period ''i'' (which may be the arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (kg per kg-mole).

$(Fuel)_i$ = Volume of the fuel (scf) combusted during the sample period ''i'' (*e.g.,* monthly, quarterly, semi-annually, or by lot) from company records.

MVC = Molar volume conversion factor at standard conditions, as defined in § 98.6. Use 849.5 scf per kg-mole if you select 68 °F as standard temperature and 836.6 scf per kg-mole if you select 60 °F as standard temperature.

n = Number of sample periods in the year.

(*2*) If the results of fuel sampling are received less frequently than monthly, or, for a unit with a maximum rated heat input capacity less than 100 mmBtu/hr (or a group of such units) regardless of the molecular weight sampling frequency, the annual average molecular weight for equation C–5 shall either be computed according to paragraph (a)(3)(iii)(B)(*1*) of this section or as the arithmetic average molecular weight for all values for the year (including valid samples and substitute data values under § 98.35).

* * * * *

(b) * * *

(1) * * *

(vii) May be used for the combustion of MSW and/or tires in a unit, provided that no more than 10 percent of the unit's annual heat input is derived from those fuels, combined.

* * * * *

(c) * * *

(4) * * *

EF = Fuel-specific emission factor for CH_4 or N_2O, from table C–2 to this subpart (kg CH_4 or N_2O per mmBtu).

* * * * *

(6) Calculate the annual CH_4 and N_2O mass emissions from the combustion of blended fuels as follows:

(i) If the mass, volume, or heat input of each component fuel in the blend is determined before the fuels are mixed and combusted, calculate and report CH_4 and N_2O emissions separately for each component fuel, using the applicable procedures in this paragraph (c).

(ii) If the mass, volume, or heat input of each component fuel in the blend is not determined before the fuels are mixed and combusted, a reasonable estimate of the percentage composition of the blend, based on best available information, is required. Perform the following calculations for each component fuel ''i'' that is listed in table C–2 to this subpart:

(A) Multiply (% Fuel)i, the estimated mass, volume, or heat input percentage of component fuel ''i'' (expressed as a decimal fraction), by the total annual mass, volume, or heat input of the blended fuel combusted during the reporting year, to obtain an estimate of the annual value for component ''i'';

(B) [Reserved]

(C) Calculate the annual CH_4 and N_2O emissions from component ''i'', using equation C–8 (fuel mass or volume) to this section, C–8a (fuel heat input) to this section, C–8b (fuel heat input) to this section, C–9a (fuel mass or volume) to this section, or C–10 (fuel heat input) to this section, as applicable;

(D) Sum the annual CH_4 emissions across all component fuels to obtain the annual CH_4 emissions for the blend. Similarly sum the annual N_2O emissions across all component fuels to obtain the annual N_2O emissions for the blend. Report these annual emissions totals.

(d) * * *

(1) * * *

R = The number of moles of CO_2 released per mole of sorbent used (R = 1.00 when the sorbent is $CaCO_3$ and the targeted acid gas species is SO_2).

* * * * *

(e) *Biogenic CO_2 emissions from combustion of biomass with other fuels.* Use the applicable procedures of this paragraph (e) to estimate biogenic CO_2 emissions from units that combust a combination of biomass and fossil fuels (*i.e.,* either co-fired or blended fuels). Separate reporting of biogenic CO_2 emissions from the combined combustion of biomass and fossil fuels is required for those biomass fuels listed in table C–1 to this subpart, MSW, and tires. In addition, when a biomass fuel that is not listed in table C–1 to this subpart is combusted in a unit that has a maximum rated heat input greater than 250 mmBtu/hr, if the biomass fuel accounts for 10% or more of the annual heat input to the unit, and if the unit does not use CEMS to quantify its annual CO_2 mass emissions, then, pursuant to paragraph (b)(3)(iii) of this section, Tier 3 must be used to determine the carbon content of the biomass fuel and to calculate the biogenic CO_2 emissions from combustion of the fuel. Notwithstanding these requirements, in accordance with § 98.3(c)(12), separate reporting of biogenic CO_2 emissions is optional for the 2010 reporting year for units subject to subpart D of this part and for units

that use the CO_2 mass emissions calculation methodologies in part 75 of this chapter, pursuant to paragraph (a)(5) of this section. However, if the owner or operator opts to report biogenic CO_2 emissions separately for these units, the appropriate method(s) in this paragraph (e) shall be used.

(1) You may use equation C–1 to this section to calculate the annual CO_2 mass emissions from the combustion of the biomass fuels listed in table C–1 to this subpart, in a unit of any size, including units equipped with a CO_2 CEMS, except when the use of Tier 2 is required as specified in paragraph (b)(1)(iv) of this section. Determine the quantity of biomass combusted using one of the following procedures in this paragraph (e)(1), as appropriate, and document the selected procedures in the Monitoring Plan under § 98.3(g):

* * * * *

(3) You must use the procedures in paragraphs (e)(3)(i) through (iii) of this section to determine the annual biogenic CO_2 emissions from the combustion of MSW, except as otherwise provided in paragraph (e)(3)(iv) of this section. These procedures also may be used for any unit that co-fires biomass and fossil fuels, including units equipped with a CO_2 CEMS.

* * * * *

(iv) In lieu of following the procedures in paragraphs (e)(3)(i) through (iii) of this section, the procedures of this paragraph (e)(3)(iv) may be used for the combustion of tires regardless of the percent of the annual heat input provided by tires. The calculation procedure in this paragraph (e)(3)(iv) may be used for the combustion of MSW if the combustion of MSW provides no more than 10 percent of the annual heat input to the unit or if a small, batch incinerator combusts no more than 1,000 tons per year of MSW.

(A) Calculate the total annual CO_2 emissions from combustion of MSW and/or tires in the unit, using the applicable methodology in paragraphs (a)(1) through (3) of this section for units using Tier 1, Tier 2, or Tier 3; otherwise use the Tier 1 calculation methodology in paragraph (a)(1) of this section for units using either the Tier 4 or Alternative Part 75 calculation methodologies to calculate total CO_2 emissions.

(B) Multiply the result from paragraph (e)(3)(iv)(A) of this section by the appropriate default factor to determine the annual biogenic CO_2 emissions, in metric tons. For MSW, use a default factor of 0.60 and for tires, use a default factor of 0.24.

* * * * *

■ 13. Amend § 98.34 by revising paragraphs (c)(6), (d) and (e) to read as follows:

§ 98.34 Monitoring and QA/QC requirements.

* * * * *

(c) * * *

(6) For applications where CO_2 concentrations in process and/or combustion flue gasses are lower or higher than the typical CO_2 span value for coal-based fuels (*e.g.,* 20 percent CO_2 for a coal fired boiler), cylinder gas audits of the CO_2 monitor under appendix F to part 60 of this chapter may be performed at 40–60 percent and 80–100 percent of CO_2 span, in lieu of the prescribed calibration levels of 5–8 percent and 10–14 percent CO_2 by volume.

* * * * *

(d) Except as otherwise provided in § 98.33(e)(3)(iv), when municipal solid waste (MSW) is either the primary fuel combusted in a unit or the only fuel with a biogenic component combusted in the unit, determine the biogenic portion of the CO_2 emissions using ASTM D6866–16 and ASTM D7459–08 (both incorporated by reference, see § 98.7). Perform the ASTM D7459–08 sampling and the ASTM D6866–16 analysis at least once in every calendar quarter in which MSW is combusted in the unit. Collect each gas sample during normal unit operating conditions for at least 24 total (not necessarily consecutive) hours, or longer if the facility deems it necessary to obtain a representative sample. Notwithstanding this requirement, if the types of fuels combusted and their relative proportions are consistent throughout the year, the minimum required sampling time may be reduced to 8 hours if at least two 8-hour samples and one 24-hour sample are collected under normal operating conditions, and arithmetic average of the biogenic fraction of the flue gas from the 8-hour samples (expressed as a decimal) is within ±5 percent of the biogenic fraction from the 24-hour test. There must be no overlapping of the 8-hour and 24-hour test periods. Document the results of the demonstration in the unit's monitoring plan. If the types of fuels and their relative proportions are not consistent throughout the year, an optional sampling approach that facilities may wish to consider to obtain a more representative sample is to collect an integrated sample by extracting a small amount of flue gas (*e.g.,* 1 to 5 cc) in each unit operating hour during the quarter. Separate the total annual CO_2 emissions into the biogenic and non-biogenic fractions using the average proportion of biogenic emissions of all samples analyzed during the reporting year. Express the results as a decimal fraction (*e.g.,* 0.30, if 30 percent of the CO_2 is biogenic). When MSW is the primary fuel for multiple units at the facility, and the units are fed from a common fuel source, testing at only one of the units is sufficient.

(e) For other units that combust combinations of biomass fuel(s) (or heterogeneous fuels that have a biomass component, *e.g.,* tires) and fossil (or other non-biogenic) fuel(s), in any proportions, ASTM D6866–16 and ASTM D7459–08 (both incorporated by reference, see § 98.7) may be used to determine the biogenic portion of the CO_2 emissions in every calendar quarter in which biomass and non-biogenic fuels are co-fired in the unit. Follow the procedures in paragraph (d) of this section. If multiple units at the facility are fed from a common fuel source, testing at only one of the units is sufficient.

* * * * *

■ 14. Amend § 98.36 by revising paragraphs (c)(1)(vi), (c)(3)(vi), (e)(2)(ii)(C) and (e)(2)(xi) to read as follows:

§ 98.36 Data reporting requirements.

* * * * *

(c) * * *

(1) * * *

(vi) Annual CO_2 mass emissions and annual CH_4, and N_2O mass emissions, aggregated for each type of fuel combusted in the group of units during the report year, expressed in metric tons of each gas and in metric tons of CO_2e. If any of the units burn biomass, report also the annual CO_2 emissions from combustion of all biomass fuels combined, expressed in metric tons.

* * * * *

(3) * * *

(vi) If any of the units burns biomass, the annual CO_2 emissions from combustion of all biomass fuels from the units served by the common pipe, expressed in metric tons.

* * * * *

(e) * * *

(2) * * *

(ii) * * *

(C) The annual average, and, where applicable, monthly high heat values used in the CO_2 emissions calculations for each type of fuel combusted during the reporting year, in mmBtu per short ton for solid fuels, mmBtu per gallon for

liquid fuels, and mmBtu per scf for gaseous fuels. Report an HHV value for each calendar month in which HHV determination is required. If multiple values are obtained in a given month, report the arithmetic average value for the month.

* * * * *

(xi) When ASTM methods D7459–08 and D6866–16 (both incorporated by reference, see § 98.7) are used in accordance with § 98.34(e) to determine the biogenic portion of the annual CO_2 emissions from a unit that co-fires biogenic fuels (or partly-biogenic fuels, including tires) and non-biogenic fuels, you shall report the results of each quarterly sample analysis, expressed as a decimal fraction (*e.g.,* if the biogenic fraction of the CO_2 emissions is 30 percent, report 0.30).

* * * * *

■ 15. Amend § 98.37 by revising and republishing paragraph (b) to read as follows:

§ 98.37 Records that must be retained.

* * * * *

(b) The applicable verification software records as identified in this paragraph (b). For each stationary fuel combustion source that elects to use the verification software specified in § 98.5(b) rather than report data specified in paragraphs (b)(9)(iii), (c)(2)(ix), (e)(2)(i), (e)(2)(ii)(A), (C), and (D), (e)(2)(iv)(A), (C), and (F), and (e)(2)(ix)(D) through (F) of this section, you must keep a record of the file generated by the verification software for the applicable data specified in paragraphs (b)(1) through (37) of this section. Retention of this file satisfies the recordkeeping requirement for the data in paragraphs (b)(1) through (37) of this section.

(1) Mass of each solid fuel combusted (tons/year) (equation C–1 to § 98.33).

(2) Volume of each liquid fuel combusted (gallons/year) (equation C–1 to § 98.33).

(3) Volume of each gaseous fuel combusted (scf/year) (equation C–1 to § 98.33).

(4) Annual natural gas usage (therms/year) (equation C–1a to § 98.33).

(5) Annual natural gas usage (mmBtu/year) (equation C–1b to § 98.33).

(6) Mass of each solid fuel combusted (tons/year) (equation C–2a to § 98.33).

(7) Volume of each liquid fuel combusted (gallons/year) (equation C–2a to § 98.33).

(8) Volume of each gaseous fuel combusted (scf/year) (equation C–2a to § 98.33).

(9) Measured high heat value of each solid fuel, for month (which may be the arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (mmBtu per ton) (equation C–2b to § 98.33). Annual average HHV of each solid fuel (mmBtu per ton) (equation C–2a to § 98.33).

(10) Measured high heat value of each liquid fuel, for month (which may be the arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (mmBtu per gallons) (equation C–2b to § 98.33). Annual average HHV of each liquid fuel (mmBtu per gallons) (equation C–2a to § 98.33).

(11) Measured high heat value of each gaseous fuel, for month (which may be the arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (mmBtu per scf) (equation C–2b to § 98.33). Annual average HHV of each gaseous fuel (mmBtu per scf) (equation C–2a to § 98.33).

(12) Mass of each solid fuel combusted during month (tons) (equation C–2b to § 98.33).

(13) Volume of each liquid fuel combusted during month (gallons) (equation C–2b to § 98.33).

(14) Volume of each gaseous fuel combusted during month (scf) (equation C–2b, equation C–5A, equation C–5B to § 98.33).

(15) Total mass of steam generated by municipal solid waste or each solid fuel combustion during the reporting year (pounds steam) (equation C–2c to § 98.33).

(16) Ratio of the boiler's maximum rated heat input capacity to its design rated steam output capacity (MMBtu/pounds steam) (equation C–2c to § 98.33).

(17) Annual mass of each solid fuel combusted (short tons/year) (equation C–3 to § 98.33).

(18) Annual average carbon content of each solid fuel (percent by weight, expressed as a decimal fraction) (equation C–3 to § 98.33). Where applicable, monthly carbon content of each solid fuel (which may be the arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (percent by weight, expressed as a decimal fraction) (equation C–2b to § 98.33—see the definition of ''CC'' in equation C–3 to § 98.33).

(19) Annual volume of each liquid fuel combusted (gallons/year) (equation C–4 to § 98.33).

(20) Annual average carbon content of each liquid fuel (kg C per gallon of fuel) (equation C–4 to § 98.33). Where applicable, monthly carbon content of each liquid fuel (which may be the arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (kg C per gallon of fuel) (equation C–2b to § 98.33—see the definition of ''CC'' in equation C–3 to § 98.33).

(21) Annual volume of each gaseous fuel combusted (scf/year) (equation C–5 to § 98.33).

(22) Annual average carbon content of each gaseous fuel (kg C per kg of fuel) (equation C–5 to § 98.33). Where applicable, monthly carbon content of each gaseous (which may be the arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (kg C per kg of fuel) (equation C–5A to § 98.33).

(23) Annual average molecular weight of each gaseous fuel (kg/kg-mole) (equation C–5 to § 98.33). Where applicable, monthly molecular weight of each gaseous (which may be the arithmetic average of multiple determinations), or, if applicable, an appropriate substitute data value (kg/kg-mole) (equation C–5B to § 98.33).

(24) Molar volume conversion factor at standard conditions, as defined in § 98.6 (scf per kg-mole) (equation C–5 to § 98.33).

(25) Identify for each fuel if you will use the default high heat value from table C–1 to this subpart, or actual high heat value data (equation C–8 to § 98.33).

(26) High heat value of each solid fuel (mmBtu/tons) (equation C–8 to § 98.33).

(27) High heat value of each liquid fuel (mmBtu/gallon) (equation C–8 to § 98.33).

(28) High heat value of each gaseous fuel (mmBtu/scf) (equation C–8 to § 98.33).

(29) Cumulative annual heat input from combustion of each fuel (mmBtu) (equation C–10 to § 98.33).

(30) Total quantity of each solid fossil fuel combusted in the reporting year, as defined in § 98.6 (pounds) (equation C–13 to § 98.33).

(31) Total quantity of each liquid fossil fuel combusted in the reporting year, as defined in § 98.6 (gallons) (equation C–13 to § 98.33).

(32) Total quantity of each gaseous fossil fuel combusted in the reporting year, as defined in § 98.6 (scf) (equation C–13 to § 98.33).

(33) High heat value of the each solid fossil fuel (Btu/lb) (equation C–13 to § 98.33).

(34) High heat value of the each liquid fossil fuel (Btu/gallons) (equation C–13 to § 98.33).

(35) High heat value of the each gaseous fossil fuel (Btu/scf) (equation C–13 to § 98.33).

(36) Fuel-specific carbon based F-factor per fuel (scf CO_2/mmBtu) (equation C–13 to § 98.33).

(37) Moisture content used to calculate the wood and wood residuals wet basis HHV (percent), if applicable (equations C–1 and C–8 to § 98.33).

Subpart G—Ammonia Manufacturing

■ 16. Amend § 98.72 by revising paragraph (a) to read as follows:

§ 98.72 GHGs to report.

* * * * *

(a) CO_2 process emissions from steam reforming of a hydrocarbon or the gasification of solid and liquid raw material, reported for each ammonia manufacturing unit following the requirements of this subpart.

* * * * *

■ 17. Amend § 98.73 by revising the introductory text and paragraph (b) to read as follows:

§ 98.73 Calculating GHG emissions.

You must calculate and report the annual CO_2 process emissions from each ammonia manufacturing unit using the procedures in either paragraph (a) or (b) of this section.

* * * * *

(b) Calculate and report under this subpart process CO_2 emissions using the procedures in paragraphs (b)(1) through (4) of this section, as applicable.

(1) *Gaseous feedstock.* You must calculate, from each ammonia manufacturing unit, the CO_2 process emissions from gaseous feedstock according to equation G–1 to this section:

$$CO_{2,G} = \left(\sum_{n=1}^{12} \frac{44}{12} * Fdstk_n * CC_n * \frac{MW}{MVC}\right) * 0.001 \quad \text{(Eq. G–1)}$$

Where:

$CO_{2,G}$ = Annual CO_2 emissions arising from gaseous feedstock consumption (metric tons).

$Fdstk_n$ = Volume of the gaseous feedstock used in month n (scf of feedstock).

CC_n = Carbon content of the gaseous feedstock, for month n (kg C per kg of feedstock), determined according to § 98.74(c).

MW = Molecular weight of the gaseous feedstock (kg/kg-mole).

MVC = Molar volume conversion factor (849.5 scf per kg-mole at standard conditions).

44/12 = Ratio of molecular weights, CO_2 to carbon.

0.001 = Conversion factor from kg to metric tons.

n = Number of month.

(2) *Liquid feedstock.* You must calculate, from each ammonia manufacturing unit, the CO_2 process emissions from liquid feedstock according to equation G–2 to this section:

$$CO_{2,L} = \left(\sum_{n=1}^{12} \frac{44}{12} * Fdstk_n * CC_n\right) * 0.001 \quad \text{(Eq. G–2)}$$

Where:

$CO_{2,L}$ = Annual CO_2 emissions arising from liquid feedstock consumption (metric tons).

$Fdstk_n$ = Volume of the liquid feedstock used in month n (gallons of feedstock).

CC_n = Carbon content of the liquid feedstock, for month n (kg C per gallon of feedstock) determined according to § 98.74(c).

44/12 = Ratio of molecular weights, CO_2 to carbon.

0.001 = Conversion factor from kg to metric tons.

n = Number of month.

(3) *Solid feedstock.* You must calculate, from each ammonia manufacturing unit, the CO_2 process emissions from solid feedstock according to equation G–3 to this section:

$$CO_{2,S} = \left(\sum_{n=1}^{12} \frac{44}{12} * Fdstk_n * CC_n\right) * 0.001 \quad \text{(Eq. G–3)}$$

Where:

$CO_{2,S}$ = Annual CO_2 emissions arising from solid feedstock consumption (metric tons).

$Fdstk_n$ = Mass of the solid feedstock used in month n (kg of feedstock).

CC_n = Carbon content of the solid feedstock, for month n (kg C per kg of feedstock), determined according to § 98.74(c).

44/12 = Ratio of molecular weights, CO_2 to carbon.

0.001 = Conversion factor from kg to metric tons.

n = Number of month.

(4) *CO_2 process emissions.* You must calculate the annual CO_2 process emissions at each ammonia manufacturing unit according to equation G–4 to this section:

$$CO_2 = \sum_{p=1}^{3} CO_{2,p} \quad \text{(Eq. G–4)}$$

Where:

CO_2 = Annual CO_2 process emissions from each ammonia manufacturing unit (metric tons).

$CO_{2,p}$ = Annual CO_2 process emissions arising from feedstock consumption based on feedstock type ''p'' (metric tons/yr) as calculated in paragraphs (b)(1) through (3) of this section.

p = Index for feedstock type; 1 indicates gaseous feedstock; 2 indicates liquid feedstock; and 3 indicates solid feedstock.

* * * * *

■ 18. Amend § 98.76 by revising the introductory text and paragraphs (b)(1) and (13) and adding paragraph (b)(16) to read as follows:

§ 98.76 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the information specified in paragraphs (a) and (b) of this section, as applicable for each ammonia manufacturing unit.

* * * * *

(b) * * *

(1) Annual CO_2 process emissions (metric tons) for each ammonia manufacturing unit.

* * * * *

(13) Annual amount of CO_2 (metric tons) collected from ammonia production and consumed on site for urea production and the method used to determine the CO_2 consumed in urea production.

* * * * *

(16) Annual quantity of excess hydrogen produced that is not consumed through the production of ammonia (metric tons).

Subpart H—Cement Production

■ 19. Amend § 98.83 by:

■ a. Revising paragraph (d)(1);

■ b. Revising parameters ''CKD_{CaO}'' and ''CKD_{MgO}'' of equation H–4 in paragraph (d)(2)(ii)(A); and

■ c. Revising paragraph (d)(3).

The revisions read as follows:

§ 98.83 Calculating GHG emissions.

* * * * *

(d) * * *

(1) Calculate CO_2 process emissions from all kilns at the facility using equation H–1 to this section:

$$CO_{2\ CMF} = \sum_{m=1}^{k}\left[CO_{2\ Cli,m} + CO_{2\ rm,m}\right] \quad \text{(Eq. H–1)}$$

Where:

$CO_{2\ CMF}$ = Annual process emissions of CO_2 from cement manufacturing, metric tons.

$CO_{2\ Cli,m}$ = Total annual emissions of CO_2 from clinker production from kiln m, metric tons.

$CO_{2\ rm,m}$ = Total annual emissions of CO_2 from raw materials from kiln m, metric tons.

k = Total number of kilns at a cement manufacturing facility.

(2) * * *

(ii) * * *

(A) * * *

CKD_{ncCaO} = Quarterly non-calcined CaO content of CKD not recycled to the kiln, wt-fraction.

* * * * *

CKD_{ncMgO} = Quarterly non-calcined MgO content of CKD not recycled to the kiln, wt-fraction.

* * * * *

(3) *CO_2 emissions from raw materials from each kiln.* Calculate CO_2 emissions from raw materials using equation H–5 to this section:

$$CO_{2\ rm,m} = \sum_{i=1}^{M}\left[rm * TOC_{rm} * \frac{44}{12} * \frac{2000}{2205}\right] \quad \text{(Eq. H–5)}$$

Where:

rm = The amount of raw material i consumed annually from kiln m, tons/yr (dry basis) or the amount of raw kiln feed consumed annually from kiln m, tons/yr (dry basis).

$CO_{2,rm,m}$ = Annual CO_2 emissions from raw materials from kiln m.

TOC_{rm} = Organic carbon content of raw material i from kiln m or organic carbon content of combined raw kiln feed (dry basis) from kiln m, as determined in § 98.84(c) or using a default factor of 0.2 percent of total raw material weight.

M = Number of raw materials or 1 if calculating emissions based on combined raw kiln feed.

44/12 = Ratio of molecular weights, CO_2 to carbon.

2000/2205 = Conversion factor to convert tons to metric tons.

* * * * *

■ 20. Amend § 98.86 by adding paragraphs (a)(4) through (8) and (b)(19) through (28) to read as follows:

§ 98.86 Data reporting requirements.

* * * * *

(a) * * *

(4) Annual arithmetic average of total CaO content of clinker at the facility, wt-fraction.

(5) Annual arithmetic average of non-calcined CaO content of clinker at the facility, wt-fraction.

(6) Annual arithmetic average of total MgO content of clinker at the facility, wt-fraction.

(7) Annual arithmetic average of non-calcined MgO content of clinker at the facility, wt-fraction.

(8) Annual facility CKD not recycled to the kiln(s), tons.

(b) * * *

(19) Annual arithmetic average of total CaO content of clinker at the facility, wt-fraction.

(20) Annual arithmetic average of non-calcined CaO content of clinker at the facility, wt-fraction.

(21) Annual arithmetic average of total MgO content of clinker at the facility, wt-fraction.

(22) Annual arithmetic average of non-calcined MgO content of clinker at the facility, wt-fraction.

(23) Annual arithmetic average of total CaO content of CKD not recycled to the kiln(s) at the facility, wt-fraction.

(24) Annual arithmetic average of non-calcined CaO content of CKD not recycled to the kiln(s) at the facility, wt-fraction.

(25) Annual arithmetic average of total MgO content of CKD not recycled to the kiln(s) at the facility, wt-fraction.

(26) Annual arithmetic average of non-calcined MgO content of CKD not recycled to the kiln(s) at the facility, wt-fraction.

(27) Annual facility CKD not recycled to the kiln(s), tons.

(28) The amount of raw kiln feed consumed annually at the facility, tons (dry basis).

Subpart I—Electronics Manufacturing

■ 21. Revise and republish § 98.91 to read as follows:

§ 98.91 Reporting threshold.

(a) You must report GHG emissions under this subpart if electronics manufacturing production processes, as defined in § 98.90, are performed at your facility and your facility meets the requirements of either § 98.2(a)(1) or (2). To calculate total annual GHG emissions for comparison to the 25,000 metric ton CO_2e per year emission threshold in § 98.2(a)(2), follow the requirements of § 98.2(b), with one exception. Rather than using the calculation methodologies in § 98.93 to calculate emissions from electronics manufacturing production processes, calculate emissions of each fluorinated GHG from electronics manufacturing production processes by using paragraph (a)(1), (2), or (3) of this section, as appropriate, and then sum

the emissions of each fluorinated GHG and account for fluorinated heat transfer fluid emissions by using paragraph (a)(4) of this section.

(1) If you manufacture semiconductors or MEMS you must calculate annual production process emissions resulting from the use of each input gas for threshold applicability purposes using either the default emission factors shown in table I–1 to this subpart and equation I–1A to this section, or the consumption of each input gas, the default emission factors shown in table I–2 to this subpart, and equation I–1B to this section.

$$E_i = S * EF_i * GWP_i * 0.001 \quad \text{(Eq. I–1A)}$$

Where:

E_i = Annual production process emissions of gas i for threshold applicability purposes (metric tons CO_2e).

S = 100 percent of annual manufacturing capacity of a facility as calculated using equation I–5 to this section (m^2).

EF_i = Emission factor for gas i (kg/m^2) shown in table I–1 to this subpart.

GWP_i = Gas-appropriate GWP as provided in table A–1 to subpart A of this part.

0.001 = Conversion factor from kg to metric tons.

i = Emitted gas.

$$E_i = C_i * (GWP_i * (1 - U_i) + GWP_{CF4} * BCF_4 + GWP_{C2F6} * BC_2F_6) * 0.001 \quad \text{(Eq. I–1B)}$$

Where:

E_i = Annual production process emissions resulting from the use of input gas i for threshold applicability purposes (metric tons CO_2e).

C_i = Annual GHG (input gas i) purchases or consumption (kg). Only gases that are used in semiconductor or MEMS manufacturing processes listed at § 98.90(a)(1) through (4) must be considered for threshold applicability purposes.

$(1–U_i)$, BCF_4, and BC_2F_6 = Default emission factors for the gas consumption-based threshold applicability determination listed in table I–2 to this subpart.

GWP_i = Gas-appropriate GWP as provided in table A–1 to subpart A of this part.

0.001 = Conversion factor from kg to metric tons.

i = Input gas.

(2) If you manufacture LCDs, you must calculate annual production process emissions resulting from the use of each input gas for threshold applicability purposes using either the default emission factors shown in table I–1 to this subpart and equation I–2A to this section or the consumption of each input gas, the default emission factors shown in table I–2 to this subpart, and equation I–2B to this section.

$$E_i = S * EF_i * GWP_i * 0.000001 \quad \text{(Eq. I–2A)}$$

Where:

E_i = Annual production process emissions of gas i for threshold applicability purposes (metric tons CO_2e).

S = 100 percent of annual manufacturing capacity of a facility as calculated using equation I–5 to this section (m^2).

EF_i = Emission factor for gas i (g/m^2).

GWP_i = Gas-appropriate GWP as provided in table A–1 to subpart A of this part.

0.000001 = Conversion factor from g to metric tons.

i = Emitted gas.

$$E_i = C_i * (GWP_i * (1 - U_i) + GWP_{CF4} * BCF_4 + GWP_{C2F6} * BC_2F_6) * 0.001 \quad \text{(Eq. I–2B)}$$

Where:

E_i = Annual production process emissions resulting from the use of input gas i for threshold applicability purposes (metric tons CO_2e).

C_i = Annual GHG (input gas i) purchases or consumption (kg). Only gases that are used in LCD manufacturing processes listed at § 98.90(a)(1) through (4) must be considered for threshold applicability purposes.

$(1–U_i)$, BCF_4, and BC_2F_6 = Default emission factors for the gas consumption-based threshold applicability determination listed in table I–2 to this subpart.

GWP_i = Gas-appropriate GWP as provided in table A–1 to subpart A of this part.

0.001 = Conversion factor from kg to metric tons.

i = Input gas.

(3) If you manufacture PVs, you must calculate annual production process emissions resulting from the use of each input gas i for threshold applicability purposes using gas-appropriate GWP values shown in table A–1 to subpart A of this part, the default emission factors shown in table I–2 to this subpart, and equation I–3 to this section.

$$E_i = C_i * (GWP_i * (1 - U_i) + GWP_{CF4} * BCF_4 + GWP_{C2F6} * BC_2F_6) * 0.001 \quad \text{(Eq. I–3)}$$

Where:

E_i = Annual production process emissions resulting from the use of input gas i for threshold applicability purposes (metric tons CO_2e).

C_i = Annual fluorinated GHG (input gas i) purchases or consumption (kg). Only gases that are used in PV manufacturing processes listed at § 98.90(a)(1) through (4) must be considered for threshold applicability purposes.

$(1 - U_i)$, BCF_4, and BC_2F_6 = Default emission factors for the gas consumption-based threshold applicability determination listed in table I–2 to this subpart.

GWP_i = Gas-appropriate GWP as provided in table A–1 to subpart A of this part.

0.001 = Conversion factor from kg to metric tons.

i = Input gas.

(4) You must calculate total annual production process emissions for threshold applicability purposes using equation I–4 to this section.

$$E_T = \delta * \sum_i E_i \quad \text{(Eq. I–4)}$$

Where:

E_T = Annual production process emissions of all fluorinated GHGs for threshold applicability purposes (metric tons CO_2e).

δ = Factor accounting for fluorinated heat transfer fluid emissions, estimated as 10 percent of total annual production process emissions at a semiconductor facility. Set equal to 1.1 when equation I–4 to this section is used to calculate total annual production process emissions from semiconductor manufacturing. Set equal to 1 when equation I–4 to this section is used to calculate total annual production process emissions from MEMS, LCD, or PV manufacturing.

E_i = Annual production process emissions of gas i for threshold applicability purposes (metric tons CO_2e), as calculated in equations I–1a, I–1b, I–2a, I–2b, or I–3 to this section.

i = Emitted gas.

(b) You must calculate annual manufacturing capacity of a facility using equation I–5 to this section.

$$S = \sum_x^{12} W_x \quad \text{(Eq. I–5)}$$

Where:

S = 100 percent of annual manufacturing capacity of a facility (m^2).

W_x = Maximum substrate starts of fab f in month x (m^2 per month).

x = Month.

■ 22. Amend § 98.92 by revising paragraph (a) introductory text to read as follows:

§ 98.92 GHGs to report.

(a) You must report emissions of fluorinated GHGs (as defined in § 98.6), N_2O, and fluorinated heat transfer fluids (as defined in § 98.6). The fluorinated GHGs and fluorinated heat transfer fluids that are emitted from electronics manufacturing production processes include, but are not limited to, those listed in table I–21 to this subpart. You must individually report, as appropriate:

* * * * *

■ 23. Amend § 98.93 by:

■ a. Revising paragraph (a);

■ b. Revising the introductory text of paragraph (e);

■ c. Revising parameters ''UT_{ij}'' and ''Td_{ijp}'' of equation I–15 in paragraph (g); and

■ d. Revising paragraphs (h)(1) and (i).

The revisions read as follows:

§ 98.93 Calculating GHG emissions.

(a) You must calculate total annual emissions of each fluorinated GHG emitted by electronics manufacturing production processes from each fab (as defined in § 98.98) at your facility, including each input gas and each by-product gas. You must use either default gas utilization rates and by-product formations rates according to the procedures in paragraph (a)(1), (2), (6), or (7) of this section, as appropriate, or the stack test method according to paragraph (i) of this section, to calculate emissions of each input gas and each by-product gas.

(1) If you manufacture semiconductors, you must adhere to the procedures in paragraphs (a)(1)(i) through (iii) of this section. You must calculate annual emissions of each input gas and of each by-product gas using equations I–6, I–7, and I–9 to this section. If your fab uses less than 50 kg of a fluorinated GHG in one reporting year, you may calculate emissions as equal to your fab's annual consumption for that specific gas as calculated in equation I–11 to this section, plus any by-product emissions of that gas calculated under paragraph (a) of this section.

$$\text{ProcesstypeE}_i = \sum_{j=1}^{N} E_{ij} \quad \text{(Eq. I–6)}$$

Where:

ProcesstypeE_i = Annual emissions of input gas i from the process type on a fab basis (metric tons).

E_{ij} = Annual emissions of input gas i from process sub-type or process type j as calculated in equation I–8A to this section (metric tons).

N = The total number of process sub-types j that depends on the electronics manufacturing fab and emission calculation methodology. If E_{ij} is calculated for a process type j in equation I–8A to this section, N = 1.

i = Input gas.

j = Process sub-type or process type.

$$\text{ProcesstypeBE}_k = \sum_{j=1}^{N} \sum_i BE_{kij} \quad \text{(Eq. I–7)}$$

Where:

ProcesstypeBE_k = Annual emissions of by-product gas k from the processes type on a fab basis (metric tons).

BE_{kij} = Annual emissions of by-product gas k formed from input gas i used for process sub-type or process type j as calculated in equation I–8B to this section (metric tons).

N = The total number of process sub-types j that depends on the electronics manufacturing fab and emission calculation methodology. If BE_{kij} is calculated for a process type j in equation I–8B to this section, N = 1.

i = Input gas.

j = Process sub-type, or process type.

k = By-product gas.

(i) You must calculate annual fab-level emissions of each fluorinated GHG used for the plasma etching/wafer cleaning process type using default utilization and by-product formation rates as shown in table I–3 or I–4 to this subpart, and by using equations I–8A and I–8B to this section.

$$E_{ij} = C_{ij} * \left(1 - U_{ij}\right) * \left(1 - \left(a_{ij} * d_{ij} * UT_{ij}\right)\right) * 0.001 \qquad \text{(Eq. I–8A)}$$

Where:

E_{ij} = Annual emissions of input gas i from process sub-type or process type j, on a fab basis (metric tons).

C_{ij} = Amount of input gas i consumed for process sub-type or process type j, as calculated in equation I–13 to this section, on a fab basis (kg).

U_{ij} = Process utilization rate for input gas i for process sub-type or process type j (expressed as a decimal fraction).

a_{ij} = Fraction of input gas i used in process sub-type or process type j with abatement systems, on a fab basis (expressed as a decimal fraction).

d_{ij} = Fraction of input gas i destroyed or removed when fed into abatement systems by process tools where process sub-type, or process type j is used, on a fab basis, calculated by taking the tool weighted average of the claimed DREs for input gas i on tools that use process type or process sub-type j (expressed as a decimal fraction). This is zero unless the facility adheres to the requirements in § 98.94(f).

UT_{ij} = The average uptime factor of all abatement systems connected to process tools in the fab using input gas i in process sub-type or process type j, as calculated in equation I–15 to this section, on a fab basis (expressed as a decimal fraction).

0.001 = Conversion factor from kg to metric tons.

i = Input gas.

j = Process sub-type or process type.

$$BE_{kij} = B_{kij} * C_{ij} * \left(1 - \left(a_{kij} * d_{kij} * UT_{kij}\right)\right) * 0.001 \qquad \text{(Eq. I–8B)}$$

Where:

BE_{kij} = Annual emissions of by-product gas k formed from input gas i from process sub-type or process type j, on a fab basis (metric tons).

B_{kij} = By-product formation rate of gas k created as a by-product per amount of input gas i (kg) consumed by process sub-type or process type j (kg). If all input gases consumed by a chamber cleaning process sub-type are non-carbon containing input gases, this is zero when the combination of the non-carbon containing input gas and chamber cleaning process sub-type is never used to clean chamber walls on equipment that process carbon-containing films during the year (*e.g.,* when NF_3 is used in remote plasma cleaning processes to only clean chambers that never process carbon-containing films during the year). If all input gases consumed by an etching and wafer cleaning process sub-type are non-carbon containing input gases, this is zero when the combination of the non-carbon containing input gas and etching and wafer cleaning process sub-type is never used to etch or wafer clean carbon-containing films during the year.

C_{ij} = Amount of input gas i consumed for process sub-type, or process type j, as calculated in equation I–13 to this section, on a fab basis (kg).

a_{kij} = Fraction of input gas i used for process sub-type, or process type j with abatement systems, on a fab basis (expressed as a decimal fraction).

d_{kij} = Fraction of by-product gas k destroyed or removed in when fed into abatement systems by process tools where process sub-type or process type j is used, on a fab basis, calculated by taking the tool weighted average of the claimed DREs for by-product gas k on tools that use input gas i in process type or process sub-type j (expressed as a decimal fraction). This is zero unless the facility adheres to the requirements in § 98.94(f).

UT_{kij} = The average uptime factor of all abatement systems connected to process tools in the fab emitting by-product gas k, formed from input gas i in process sub-type or process type j, on a fab basis (expressed as a decimal fraction). For this equation, UT_{kij} is assumed to be equal to UT_{ij} as calculated in equation I–15 to this section.

0.001 = Conversion factor from kg to metric tons.

i = Input gas.

j = Process sub-type or process type.

k = By-product gas.

(ii) You must calculate annual fab-level emissions of each fluorinated GHG used for each of the process sub-types associated with the chamber cleaning process type, including in-situ plasma chamber clean, remote plasma chamber clean, and in-situ thermal chamber clean, using default utilization and by-product formation rates as shown in table I–3 or I–4 to this subpart, and by using equations I–8A and I–8B to this section.

(iii) If default values are not available for a particular input gas and process type or sub-type combination in tables I–3 or I–4, you must follow the procedures in paragraph (a)(6) of this section.

(2) If you manufacture MEMS or PVs and use semiconductor tools and processes, you may use § 98.3(a)(1) to calculate annual fab-level emissions for those processes. For all other tools and processes used to manufacture MEMs, LCD and PV, you must calculate annual fab-level emissions of each fluorinated GHG used for the plasma etching and chamber cleaning process types using default utilization and by-product formation rates as shown in table I–5, I–6, or I–7 to this subpart, as appropriate, and by using equations I–8A and I–8B to this section. If default values are not available for a particular input gas and process type or sub-type combination in tables I–5, I–6, or I–7 to this subpart, you must follow the procedures in paragraph (a)(6) of this section. If your fab uses less than 50 kg of a fluorinated GHG in one reporting year, you may calculate emissions as equal to your fab's annual consumption for that specific gas as calculated in equation I–11 to this section, plus any by-product emissions of that gas calculated under this paragraph (a).

(3)–(5) [Reserved]

(6) If you are required, or elect, to perform calculations using default emission factors for gas utilization and by-product formation rates according to the procedures in paragraph (a)(1) or (2) of this section, and default values are not available for a particular input gas and process type or sub-type combination in tables I–3, I–4, I–5, I–6, or I–7 to this subpart, you must use a utilization rate (U_{ij}) of 0.2 (*i.e.,* a $1–U_{ij}$ of 0.8) and by-product formation rates of 0.15 for CF_4 and 0.05 for C_2F_6 and use equations I–8A and I–8B to this section.

(7) If your fab employs hydrocarbon-fuel-based combustion emissions control systems (HC fuel CECS), including, but not limited to, abatement systems as defined at § 98.98, that were purchased and installed on or after January 1, 2025, to control emissions from tools that use either NF_3 in remote plasma cleaning processes or F_2 as an input gas in any process type or sub-type, you must calculate the amount CF_4 produced within and emitted from such systems using equation I–9 to this section using default utilization and by-product formation rates as shown in table I–3 or I–4 to this subpart. A HC fuel CECS is assumed not to form CF_4 from F_2 if the electronics manufacturer can certify that the rate of conversion from F_2 to CF_4 is <0.1% for that HC fuel CECS.

$$EAB_{CF_4} = \sum_j C_{F_2,j} \bullet \left(1 - U_{F_2,j}\right) \bullet a_{F_2,j} \bullet UT_{F_2,j} \bullet AB_{CF_4,F_2} + C_{NF_3,RPC} \bullet B_{F_2,NF_3} \bullet a_{NF_3,RPC} \bullet UT_{NF_3,RPC,F2} \bullet AB_{CF_4,F_2} \quad \text{(Eq. I–9)}$$

Where:

EAB_{CF4} = Emissions of CF_4 from HC fuel CECS when direct reaction between hydrocarbon fuel and F_2 is not certified not to occur by the emissions control system manufacturer or electronics manufacturer, kg.

$C_{F2,j}$ = Amount of F_2 consumed for process type or sub-type j, as calculated in equation I–13 to this section, on a fab basis (kg).

$U_{F2,j}$ = Process utilization rate for F_2 for process type or sub-type j (expressed as a decimal fraction).

$a_{F2,j}$ = Within process sub-type or process type j, fraction of F_2 used in process tools with HC fuel CECS that are not certified not to form CF_4, on a fab basis, where the numerator is the number of tools that are equipped with HC fuel CECS that are not certified not to form CF_4 that use F_2 in process type j and the denominator is the total number of tools in the fab that use F_2 in process type j (expressed as a decimal fraction).

$UT_{F2,j}$ = The average uptime factor of all HC fuel CECS connected to process tools in the fab using F_2 in process sub-type or process type j (expressed as a decimal fraction).

$AB_{CF4,F2}$ = Mass fraction of F_2 in process exhaust gas that is converted into CF_4 by direct reaction with hydrocarbon fuel in a HC fuel CECS. The default value of $AB_{CF4,F2}$ = 0.116.

$C_{NF3,RPC}$ = Amount of NF_3 consumed in remote plasma cleaning processes, as calculated in equation I–13 to this section, on a fab basis (kg).

$B_{F2,NF3}$ = By-product formation rate of F_2 created as a by-product per amount of NF_3 (kg) consumed in remote plasma cleaning processes (kg).

$a_{NF3,RPC}$ = Within remote plasma cleaning processes, fraction of NF_3 used in process tools with HC fuel CECS that are not certified not to form CF_4, where the numerator is the number of tools running remote plasma cleaning processes that are equipped with HC fuel CECS that are not certified not to form CF_4 that use NF_3 and the denominator is the total number of tools that run remote plasma clean processes in the fab that use NF_3 (expressed as decimal fraction).

$UT_{NF3,RPC,F2}$ = The average uptime factor of all HC fuel CECS connected to process tools in the fab emitting by-product gas F_2, formed from input gas NF_3 in remote plasma cleaning processes, on a fab basis (expressed as a decimal fraction). For this equation, $UT_{NF3,RPC,F2}$ is assumed to be equal to $UT_{NF3,RPC}$ as calculated in equation I–15 to this section.

j = Process type or sub-type.

* * * * *

(e) You must calculate the amount of input gas i consumed, on a fab basis, for each process sub-type or process type j, using equation I–13 to this section. Where a gas supply system serves more than one fab, equation I–13 to this section is applied to that gas which has been apportioned to each fab served by that system using the apportioning factors determined in accordance with § 98.94(c). If you elect to calculate emissions using the stack test method in paragraph (i) of this section and to use this paragraph (e) to calculate the fraction each fluorinated input gas i exhausted from tools with abatement systems and the fraction of each by-product gas k exhausted from tools with abatement systems, you may substitute ''The set of tools with abatement systems'' for ''Process sub-type or process type'' in the definition of ''j'' in equation I–13 to this section.

* * * * *

(g) * * *

UT_{ij} = The average uptime factor of all abatement systems connected to process tools in the fab using input gas i in process sub-type or process type j (expressed as a decimal fraction). The average uptime factor may be set to one (1) if all the abatement systems for the relevant input gas i and process sub-type or type j are interlocked with all the tools using input gas i in process sub-type or type j and feeding the abatement systems such that no gas can flow to the tools if the abatement systems are not in operational mode.

Td_{ijp} = The total time, in minutes, that abatement system p, connected to process tool(s) in the fab using input gas i in process sub-type or process type j, is not in operational mode, as defined in § 98.98, when at least one of the tools connected to abatement system p is in operation. If your fab uses redundant abatement systems, you may account for Td_{ijp} as specified in § 98.94(f)(4)(vi).

* * * * *

(h) * * *

(1) If you use a fluorinated chemical both as a fluorinated heat transfer fluid and in other applications, you may calculate and report either emissions from all applications or from only those specified in the definition of fluorinated heat transfer fluids in § 98.6.

* * * * *

(i) *Stack test method.* As an alternative to the default emission factor method in paragraph (a) of this section, you may calculate fab-level fluorinated GHG emissions using fab-specific emission factors developed from stack testing. In this case, you must comply with the stack test method specified in paragraph (i)(3) of this section.

(1)–(2) [Reserved]

(3) *Stack system stack test method.* For each stack system in the fab, measure the emissions of each fluorinated GHG from the stack system by conducting an emission test. In addition, measure the fab-specific consumption of each fluorinated GHG by the tools that are vented to the stack systems tested. Measure emissions and consumption of each fluorinated GHG as specified in § 98.94(j). Develop fab-specific emission factors and calculate fab-level fluorinated GHG emissions using the procedures specified in paragraphs (i)(3)(i) through (viii) of this section. All emissions test data and procedures used in developing emission factors must be documented and recorded according to § 98.97.

(i) You must measure the fab-specific fluorinated GHG consumption of the tools that are vented to the stack systems during the emission test as specified in § 98.94(j)(3). Calculate the consumption for each fluorinated GHG for the test period.

(ii) You must calculate the emissions of each fluorinated GHG consumed as an input gas using equation I–17 to this section and each fluorinated GHG formed as a by-product gas using equation I–18 to this section and the procedures specified in paragraphs (i)(3)(ii)(A) through (E) of this section. If a stack system is comprised of multiple stacks, you must sum the emissions from each stack in the stack system when using equation I–17 or equation I–18 to this section.

$$E_{is} = MW_i * Q_s * \frac{1}{SV} * \frac{1}{10^3} * \sum_{m=1}^{N} \frac{X_{ism}}{10^9} * \Delta t_m \quad \text{(Eq. I–17)}$$

Where:

E_{is} = Total fluorinated GHG input gas i, emitted from stack system s, during the sampling period (kg).

X_{ism} = Average concentration of fluorinated GHG input gas i in stack system s, during the time interval m (ppbv).

MW_i = Molecular weight of fluorinated GHG input gas i (g/g-mole).

Q_s = Flow rate of the stack system s, during the sampling period (m^3/min).

SV = Standard molar volume of gas (0.0240 m^3/g-mole at 68 °F and 1 atm).

Δt_m = Length of time interval m (minutes). Each time interval in the FTIR sampling period must be less than or equal to 60 minutes (for example an 8 hour sampling period would consist of at least 8 time intervals).

$1/10^3$ = Conversion factor (1 kilogram/1,000 grams).

i = Fluorinated GHG input gas.

s = Stack system.

N = Total number of time intervals m in sampling period.

m = Time interval.

$$E_{ks} = MW_k * Q_s * \frac{1}{SV} * \frac{1}{10^3} * \sum_{m=1}^{N} \frac{X_{ksm}}{10^9} * \Delta t_m \quad \text{(Eq. I–18)}$$

Where:

E_{ks} = Total fluorinated GHG by-product gas k, emitted from stack system s, during the sampling period (kg).

X_{ks} = Average concentration of fluorinated GHG by-product gas k in stack system s, during the time interval m (ppbv).

MW_k = Molecular weight of the fluorinated GHG by-product gas k (g/g-mole).

Q_s = Flow rate of the stack system s, during the sampling period (m^3/min).

SV = Standard molar volume of gas (0.0240 m^3/g-mole at 68 °F and 1 atm).

Δt_m = Length of time interval m (minutes). Each time interval in the FTIR sampling period must be less than or equal to 60 minutes (for example an 8 hour sampling period would consist of at least 8 time intervals).

$1/10^3$ = Conversion factor (1 kilogram/1,000 grams).

k = Fluorinated GHG by-product gas.

s = Stack system.

N = Total number of time intervals m in sampling period.

m = Time interval.

(A) If a fluorinated GHG is consumed during the sampling period, but emissions are not detected, use one-half of the field detection limit you determined for that fluorinated GHG according to § 98.94(j)(2) for the value of ''X_{ism}'' in equation I–17 to this section.

(B) If a fluorinated GHG is consumed during the sampling period and detected intermittently during the sampling period, use the detected concentration for the value of ''X_{ism}'' in equation I–17 to this section when available and use one-half of the field detection limit you determined for that fluorinated GHG according to § 98.94(j)(2) for the value of ''X_{ism}'' when the fluorinated GHG is not detected.

(C) If an expected or possible by-product, as listed in table I–17 to this subpart, is detected intermittently during the sampling period, use the measured concentration for ''X_{ksm}'' in equation I–18 to this section when available and use one-half of the field detection limit you determined for that fluorinated GHG according to § 98.94(j)(2) for the value of ''X_{ksm}'' when the fluorinated GHG is not detected.

(D) If a fluorinated GHG is not consumed during the sampling period and is an expected by-product gas as listed in table I–17 to this subpart and is not detected during the sampling period, use one-half of the field detection limit you determined for that fluorinated GHG according to § 98.94(j)(2) for the value of ''X_{ksm}'' in equation I–18 to this section.

(E) If a fluorinated GHG is not consumed during the sampling period and is a possible by-product gas as listed in table I–17 to this subpart, and is not detected during the sampling period, then assume zero emissions for that fluorinated GHG for the tested stack system.

(iii) You must calculate a fab-specific emission factor for each fluorinated GHG input gas consumed (in kg of fluorinated GHG emitted per kg of input gas i consumed) in the tools that vent to stack systems, as applicable, using equations I–19A and I–19B to this section or equations I–19A and I–19C to this section. Use equation I–19A to this section to calculate the controlled emissions for each carbon-containing fluorinated GHG that would result during the sampling period if the utilization rate for the input gas were equal to 0.2 ($E_{imax,f}$). If $\Sigma_s E_{i,s}$ (the total measured emissions of the fluorinated GHG across all stack systems, calculated based on the results of equation I–17 to this section) is less than or equal to $E_{imax,f}$ calculated in equation I–19A to this section, use equation I–19B to this section to calculate the emission factor for that fluorinated GHG. If $\Sigma_s E_{i,s}$ is larger than the $E_{imax,f}$ calculated in equation I–19A to this section, use equation I–19C to this section to calculate the emission factor and treat the difference between the total measured emissions $\Sigma_s E_{i,s}$ and the maximum expected controlled emissions $E_{imax,f}$ as a by-product of the other input gases, using equation I–20 to this section. For all fluorinated GHGs that do not contain carbon, use equation I–19B to this section to calculate the emission factor for that fluorinated GHG.

$$E_{imax,f} = 0.8 \bullet Activity_{if} \bullet (1 - UT_f \bullet a_{if} \bullet d_{if}) \quad \text{(Eq. I–19A)}$$

Where:

$E_{imax,f}$ = Maximum expected controlled emissions of gas i from its use an input gas during the stack testing period, from fab f (max kg emitted).

$Activity_{if}$ = Consumption of fluorinated GHG input gas i, for fab f, in the tools vented to the stack systems being tested, during the sampling period, as determined following the procedures specified in § 98.94(j)(3) (kg consumed).

UT_f = The total uptime of all abatement systems for fab f, during the sampling period, as calculated in equation I–23 to this section (expressed as decimal fraction). If the stack system does not have abatement systems on the tools vented to the stack system, the value of this parameter is zero.

a_{if} = Fraction of input gas i emitted from tools with abatement systems in fab f (expressed as a decimal fraction), as calculated in equation I–24C to this section.

d_{if} = Fraction of fluorinated GHG input gas i destroyed or removed when fed into abatement systems by process tools in fab f, as calculated in equation I–24A to this section (expressed as decimal fraction).

f = Fab.

i = Fluorinated GHG input gas.

$$EF_{if} = \frac{\sum_s (E_{is})}{Activity_{if} * \left(UT_f + \left(\frac{1 - UT_f}{1 - (a_{if} \bullet d_{if})} \right) \right)} \quad \text{(Eq. I–19B)}$$

Where:

EF_{if} = Emission factor for fluorinated GHG input gas i, from fab f, representing 100 percent abatement system uptime (kg emitted/kg input gas consumed).

E_{is} = Mass emission of fluorinated GHG input gas i from stack system s during the sampling period (kg emitted).

$Activity_{if}$ = Consumption of fluorinated GHG input gas i, for fab f during the sampling period, as determined following the procedures specified in § 98.94(j)(3) (kg consumed).

UT_f = The total uptime of all abatement systems for fab f, during the sampling period, as calculated in equation I–23 to this section (expressed as decimal fraction). If the stack system does not have abatement systems on the tools vented to the stack system, the value of this parameter is zero.

a_{if} = Fraction of fluorinated GHG input gas i exhausted from tools with abatement systems in fab f (expressed as a decimal fraction), as calculated in equation I–24C to this section.

d_{if} = Fraction of fluorinated GHG input gas i destroyed or removed when fed into abatement systems by process tools in fab f, as calculated in equation I–24A to this section (expressed as decimal fraction). If the stack system does not have abatement systems on the tools vented to the stack system, the value of this parameter is zero.

f = Fab.

i = Fluorinated GHG input gas.

s = Stack system.

$$EF_{if} = 0.8 \bullet (1 - a_{if} \bullet d_{if}) \quad \text{(Eq. I–19C)}$$

EF_{if} = Emission factor for input gas i, from fab f, representing a 20-percent utilization rate and a 100-percent abatement system uptime (kg emitted/kg input gas consumed).

a_{if} = Fraction of input gas i emitted from tools with abatement systems in fab f (expressed as a decimal fraction), as calculated in equation I–24C to this section.

d_{if} = Fraction of fluorinated GHG input gas i destroyed or removed when fed into abatement systems by process tools in fab f, as calculated in equation I–24A to this section (expressed as decimal fraction).

f = Fab.

i = Fluorinated GHG input gas.

(iv) You must calculate a fab-specific emission factor for each fluorinated GHG formed as a by-product (in kg of fluorinated GHG per kg of total fluorinated GHG consumed) in the tools vented to stack systems, as applicable, using equation I–20 to this section. When calculating the by-product emission factor for an input gas for which $\Sigma_s E_{i,s}$ equals or exceeds $E_{imax,f}$, exclude the consumption of that input gas from the term ''$\Sigma(Activity_{if})$.''

$$EF_{kf} = \frac{\sum_s (E_{ks})}{\sum_i Activity_{if} * \left(UT_f + \left(\frac{1 - UT_f}{1 - (a_{kif} * d_{kif})} \right) \right)} \quad \text{(Eq. I–20)}$$

Where:

EF_{kf} = Emission factor for fluorinated GHG by-product gas k, from fab f, representing 100 percent abatement system uptime (kg emitted/kg of all input gases consumed in tools vented to stack systems).

E_{ks} = Mass emission of fluorinated GHG by-product gas k, emitted from stack system s, during the sampling period (kg emitted).

$Activity_{if}$ = Consumption of fluorinated GHG input gas i for fab f in tools vented to stack systems during the sampling period as determined following the procedures specified in § 98.94(j)(3) (kg consumed).

UT_f = The total uptime of all abatement systems for fab f, during the sampling period, as calculated in equation I–23 to this section (expressed as decimal fraction).

a_{kif} = Fraction of by-product k emitted from tools using input gas i with abatement systems in fab f (expressed as a decimal fraction), as calculated using equation I–24D to this section.

d_{kif} = Fraction of fluorinated GHG by-product gas k generated from input gas i destroyed or removed when fed into abatement systems by process tools in fab f, as calculated in equation I–24B to this section (expressed as decimal fraction).

f = Fab.

i = Fluorinated GHG input gas.

k = Fluorinated GHG by-product gas.

s = Stack system.

(v) You must calculate annual fab-level emissions of each fluorinated GHG consumed using equation I–21 to this section.

$$E_{if} = EF_{if} \bullet C_{if} \bullet UT_f + \frac{EF_{if}}{(1 - (a_{if} \bullet d_{if}))} \bullet C_{if} \bullet (1 - UT_f) \quad \text{(Eq. I–21)}$$

Where:

E_{if} = Annual emissions of fluorinated GHG input gas i (kg/year) from the stack systems for fab f.

EF_{if} = Emission factor for fluorinated GHG input gas i emitted from fab f, as calculated in equation I–19 to this section (kg emitted/kg input gas consumed).

C_{if} = Total consumption of fluorinated GHG input gas i in tools that are vented to stack systems, for fab f, for the reporting year, as calculated using equation I–13 to this section (kg/year).

UT_f = The total uptime of all abatement systems for fab f, during the reporting year, as calculated using equation I–23 to this section (expressed as a decimal fraction).

a_{if} = Fraction of fluorinated GHG input gas i emitted from tools with abatement systems in fab f (expressed as a decimal fraction), as calculated using equation I–24C or I–24D to this section.

d_{if} = Fraction of fluorinated GHG input gas i destroyed or removed when fed into abatement systems by process tools in fab f that are included in the stack testing option, as calculated in equation I–24A to this section (expressed as decimal fraction).

f = Fab.

i = Fluorinated GHG input gas.

(vi) You must calculate annual fab-level emissions of each fluorinated GHG

by-product formed using equation I–22 to this section.

$$E_{kf} = EF_{kf} \bullet \sum_i C_{if} \bullet UT_f + EF_{kf} \bullet \sum_i \frac{C_{if} \bullet (1 - UT_f)}{1 - a_{kif} \bullet d_{kif}} \quad \text{(Eq. I–22)}$$

Where:

E_{kf} = Annual emissions of fluorinated GHG by-product gas k (kg/year) from the stack for fab f.

EF_{kf} = Emission factor for fluorinated GHG by-product gas k, emitted from fab f, as calculated in equation I–20 to this section (kg emitted/kg of all fluorinated input gases consumed).

C_{if} = Total consumption of fluorinated GHG input gas i in tools that are vented to stack systems, for fab f, for the reporting year, as calculated using equation I–13 to this section.

UT_f = The total uptime of all abatement systems for fab f, during the reporting year as calculated using equation I–23 to this section (expressed as a decimal fraction).

a_{kif} = Estimate of fraction of fluorinated GHG by-product gas k emitted in fab f from tools using input gas i with abatement systems (expressed as a decimal fraction), as calculated using equation I–24D to this section.

d_{kif} = Fraction of fluorinated GHG by-product k generated from input gas i destroyed or removed when fed into abatement systems by process tools in fab f that are included in the stack testing option, as calculated in equation I–24B to this section (expressed as decimal fraction).

f = Fab.

i = Fluorinated GHG input gas.

k = Fluorinated GHG by-product.

(vii) When using the stack testing method described in this paragraph (i), you must calculate abatement system uptime on a fab basis using equation I–23 to this section. When calculating abatement system uptime for use in equation I–19 and I–20 to this section, you must evaluate the variables ''Tdpf'' and ''UTpf'' for the sampling period instead of the reporting year.

$$UT_f = 1 - \frac{\sum_p Td_{pf}}{\sum_p UT_{pf}} \quad \text{(Eq. I–23)}$$

Where:

UT_f = The average uptime factor for all abatement systems in fab f (expressed as a decimal fraction). The average uptime factor may be set to one (1) if all the abatement systems in fab f are interlocked with all the tools feeding the abatement systems such that no gas can flow to the tools if the abatement systems are not in operational mode.

Td_{pf} = The total time, in minutes, that abatement system p, connected to process tool(s) in fab f, is not in operational mode as defined in § 98.98. If your fab uses redundant abatement systems, you may account for Tdpf as specified in § 98.94(f)(4)(vi).

UT_{pf} = Total time, in minutes per year, in which the tool(s) connected at any point during the year to abatement system p, in fab f could be in operation. For determining the amount of tool operating time, you may assume that tools that were installed for the whole of the year were operated for 525,600 minutes per year. For tools that were installed or uninstalled during the year, you must prorate the operating time to account for the days in which the tool was not installed; treat any partial day that a tool was installed as a full day (1,440 minutes) of tool operation. For an abatement system that has more than one connected tool, the tool operating time is 525,600 minutes per year if there was at least one tool installed at all times throughout the year. If you have tools that are idle with no gas flow through the tool, you may calculate total tool time using the actual time that gas is flowing through the tool.

f = Fab.

p = Abatement system.

(viii) When using the stack testing option described in this paragraph (i) and when using more than one DRE for the same input gas i or by-product gas k, you must calculate the weighted-average fraction of each fluorinated input gas i and each fluorinated by-product gas k that has more than one DRE and that is destroyed or removed in abatement systems for each fab f, as applicable, by using equation I–24A to this section (for input gases) and equation I–24B to this section (for by-product gases) and table I–18 to this subpart. If default values are not available in table I–18 for a particular input gas, you must use a value of 10.

$$D_{if} = \frac{\sum_p (\gamma_{i,p} \cdot \sum_{DREy} n_{i,p,DREy} \cdot DRE_y) + \sum_{DREz} DRE_z \cdot m_{i,q,DREz}}{\sum_p \gamma_{i,p} \cdot n_{i,p,a} + m_{i,q,a}} \quad \text{(Eq. I–24A)}$$

$$D_{kif} = \frac{\sum_p (\gamma_{k,i,p} \cdot \sum_{DREy} n_{k,i,p,DREy} \cdot DRE_y) + \sum_{DREz} DRE_z \cdot m_{k,i,q,DREz}}{\sum_p \gamma_{k,i,p} \cdot n_{k,i,p,a} + m_{k,i,q,a}} \quad \text{(Eq. I–24B)}$$

Where:

d_{if} = The average weighted fraction of fluorinated GHG input gas i destroyed or removed when fed into abatement systems by process tools in fab f (expressed as a decimal fraction).

d_{kif} = The average weighted fraction of fluorinated GHG by-product gas k generated from input gas i that is destroyed or removed when fed into abatement systems by process tools in fab f (expressed as a decimal fraction).

$n_{i,p,DREy}$ = Number of tools that use gas i, that run chamber cleaning process p, and that are equipped with abatement systems for gas i that have the DRE DREy.

$m_{i,q,DREz}$ = Number of tools that use gas i, that run etch and/or wafer cleaning processes, and that are equipped with abatement systems for gas i that have the DRE DREz.

$n_{i,p,a}$ = Total number of tools that use gas i, run chamber cleaning process type p, and that are equipped with abatement systems for gas i.

$m_{i,q,a}$ = Total number of tools that use gas i, run etch and/or wafer cleaning processes, and that are equipped with abatement systems for gas i.

$n_{k,i,p,DREy}$ = Number of tools that use gas i, generate by-product k, that run chamber cleaning process p, and that are equipped with abatement systems for gas i that have the DRE DREy.

$m_{k,i,q,DREz}$ = Number of tools that use gas i, generate by-product k, that run etch and/or wafer cleaning processes, and that are equipped with abatement systems for gas i that have the DRE DREz.
$n_{k,i,p,a}$ = Total number of tools that use gas i, generate by-product k, run chamber cleaning process type p, and that are equipped with abatement systems for gas i.
$m_{k,i,q,a}$ = Total number of tools that use gas i, generate by-product k, run etch and/or wafer cleaning processes, and that are equipped with abatement systems for gas i.
$\gamma_{i,p}$ = Default factor reflecting the ratio of uncontrolled emissions per tool of input gas i from tools running process sub-type p processes to uncontrolled emissions per tool of input gas i from process tools running process type q processes.
$\gamma_{k,i,p}$ = Default factor reflecting the ratio of uncontrolled emissions per tool of input gas i from tools running process sub-type p processes to uncontrolled emissions per tool of input gas i from process tools running process type q processes.
DRE_y = Default or alternative certified DRE for gas i for abatement systems connected to CVD tool.
DRE_z = Default or alternative certified DRE for gas i for abatement systems connected to etching and/or wafer cleaning tool.
p = Chamber cleaning process sub-type.
q = Reference process type. There is one process type q that consists of the combination of etching and/or wafer cleaning processes.
f = Fab.
i = Fluorinated GHG input gas.

(ix) When using the stack testing method described in this paragraph (i), you must calculate the fraction each fluorinated input gas i exhausted in fab f from tools with abatement systems and the fraction of each by-product gas k exhausted from tools with abatement systems, as applicable, by following either the procedure set forth in paragraph (i)(3)(ix)(A) of this section or the procedure set forth in paragraph (i)(3)(ix)(B) of this section.

(A) Use equation I–24C to this section (for input gases) and equation I–24D to this section (for by-product gases) and table I–18 to this subpart. If default values are not available in table I–18 for a particular input gas, you must use a value of 10.

$$A_{i,f} = \frac{\sum_p \gamma_{i,p} \cdot n_{i,p,a} + m_{i,q,a}}{\sum_p \gamma_{i,p} \cdot n_{i,p} + m_{i,q}} \quad \text{(Eq. I–24C)}$$

Where:
a_{if} = Fraction of fluorinated input gas i exhausted from tools with abatement systems in fab f (expressed as a decimal fraction).
$n_{i,p,a}$ = Number of tools that use gas i, that run chamber cleaning process sub-type p, and that are equipped with abatement systems for gas i.
$m_{i,q,a}$ = Number of tools that use gas i, that run etch and/or wafer cleaning processes, and that are equipped with abatement systems for gas i.
$n_{i,p}$ = Total number of tools using gas i and running chamber cleaning process sub-type p.
$m_{i,q}$ = Total number of tools using gas i and running etch and/or wafer cleaning processes.
$\gamma_{i,p}$ = Default factor reflecting the ratio of uncontrolled emissions per tool of input gas i from tools running process type p processes to uncontrolled emissions per tool of input gas i from process tools running process type q processes.
p = Chamber cleaning process sub-type.
q = Reference process type. There is one process type q that consists of the combination of etching and/or wafer cleaning processes.

$$A_{k,i,f} = \frac{\sum_p \gamma_{k,i,p} \cdot n_{k,i,p,a} + m_{k,i,q,a}}{\sum_p \gamma_{k,i,p} \cdot n_{k,i,p} + m_{k,i,q}} \quad \text{Eq. I–24D}$$

Where:
$a_{k,i,f}$ = Fraction of by-product gas k exhausted from tools using input gas i with abatement systems in fab f (expressed as a decimal fraction).
$n_{k,i,p,a}$ = Number of tools that exhaust by-product gas k from input gas i, that run chamber cleaning process p, and that are equipped with abatement systems for gas k.
$m_{k,i,q,a}$ = Number of tools that exhaust by-product gas k from input gas i, that run etch and/or wafer cleaning processes, and that are equipped with abatement systems for gas k.
$n_{k,i,p}$ = Total number of tools emitting by-product k from input gas i and running chamber cleaning process p.
$m_{k,i,q}$ = Total number of tools emitting by-product k from input gas i and running etch and/or wafer cleaning processes.
$\gamma_{k,i,p}$ = Default factor reflecting the ratio of uncontrolled emissions per tool of by-product gas k from input gas i from tools running chamber cleaning process p to uncontrolled emissions per tool of by-product gas k from input gas i from process tools running etch and/or wafer cleaning processes.
p = Chamber cleaning process sub-type.
q = Reference process type. There is one process type q that consists of the combination of etching and/or wafer cleaning processes.

(B) Use paragraph (e) of this section to apportion consumption of gas i either to tools with abatement systems and tools without abatement systems or to each process type or sub-type, as applicable. If you apportion consumption of gas i to each process type or sub-type, calculate the fractions of input gas i and by-product gas k formed from gas i that are exhausted from tools with abatement systems based on the numbers of tools with and without abatement systems within each process type or sub-type.

(4) *Method to calculate emissions from fluorinated GHGs that are not tested.* Calculate emissions from consumption of each intermittent low-use fluorinated GHG as defined in § 98.98 of this subpart using the default utilization and by-product formation rates provided in table I–11, I–12, I–13, I–14, or I–15 to this subpart, as applicable, and by using equations I–8A, I–8B, I–9, and I–13 to this section. If a fluorinated GHG was not being used during the stack testing and does not meet the definition of intermittent low-use fluorinated GHG in § 98.98, then you must test the stack systems associated with the use of that fluorinated GHG at a time when that gas is in use at a magnitude that would allow you to determine an emission factor for that gas according to the procedures specified in paragraph (i)(3) of this section.

(5) [Reserved]

■ 24. Amend § 98.94 by:
■ a. Revising paragraph (c) introductory text;
■ b. Adding paragraph (e);
■ c. Revising paragraphs (f)(3), (f)(4) introductory text, (f)(4)(iii), (j)(1) introductory text, (j)(1)(i), (j)(3) introductory text, and (j)(5); and
■ d. Removing and reserving paragraphs (j)(6) and (j)(8)(v).

The revisions and addition read as follows:

§ 98.94 Monitoring and QA/QC requirements.

* * * * *

(c) You must develop apportioning factors for fluorinated GHG and N_2O consumption (including the fraction of gas consumed by process tools connected to abatement systems as in equations I–8A, I–8B, I–9, and I–10 to § 98.93), to use in the equations of this subpart for each input gas i, process sub-type, process type, stack system, and fab as appropriate, using a fab-specific engineering model that is documented in your site GHG Monitoring Plan as required under § 98.3(g)(5). This model must be based on a quantifiable metric, such as wafer passes or wafer starts, or direct measurement of input gas consumption as specified in paragraph (c)(3) of this section. To verify your model, you must demonstrate its precision and accuracy by adhering to the requirements in paragraphs (c)(1) and (2) of this section.

* * * * *

(e) If you use HC fuel CECS purchased and installed on or after January 1, 2025 to control emissions from tools that use either NF_3 as an input gas in remote plasma cleaning processes or F_2 as an input gas in any process, and if you use a value less than 1 for either $a_{F2,j}$ or $a_{NF3,RPC}$ in equation I–9 to § 98.93, you must certify and document that the model for each of the systems for which you are claiming that it does not form CF_4 from F_2 has been tested and verified to produce less than 0.1% CF_4 from F_2 and that each of the systems is installed, operated, and maintained in accordance with the directions of the HC fuel CECS manufacturer. Hydrocarbon-fuel-based combustion emissions control systems include but are not limited to abatement systems as defined in § 98.98 that are hydrocarbon-fuel-based. The rate of conversion from F_2 to CF_4 must be measured using a scientifically sound, industry-accepted method that accounts for dilution through the abatement device, such as EPA 430–R–10–003 (incorporated by reference, see § 98.7), adjusted to calculate the rate of conversion from F_2 to CF_4 rather than the DRE. Either the HC fuel CECS manufacturer or the electronics manufacturer may perform the measurement. The flow rate of F_2 into the tested HC fuel CECS may be metered using a calibrated mass flow controller.

(f) * * *

(3) If you use default destruction and removal efficiency values in your emissions calculations under § 98.93(a), (b), and/or (i), you must certify and document that the abatement systems at your facility for which you use default destruction or removal efficiency values are specifically designed for fluorinated GHG or N_2O abatement, as applicable, and provide the abatement system manufacturer-verified DRE value that meets (or exceeds) the default destruction or removal efficiency in table I–16 to this subpart for the fluorinated GHG or N_2O. For abatement systems purchased and installed on or after January 1, 2025, you must also certify and document that the abatement system has been tested by the abatement system manufacturer based on the methods specified in paragraph (f)(3)(i) of this section and verified to meet (or exceed) the default destruction or removal efficiency in table I–16 for the fluorinated GHG or N_2O under worst-case flow conditions as defined in paragraph (f)(3)(ii) of this section. If you use a verified destruction and removal efficiency value that is lower than the default in table I–16 to this subpart in your emissions calculations under § 98.93(a), (b), and/or (i), you must certify and document that the abatement systems at your facility for which you use the verified destruction or removal efficiency values are specifically designed for fluorinated GHG or N_2O abatement, as applicable, and provide the abatement system manufacturer-verified DRE value that is lower than the default destruction or removal efficiency in table I–16 for the fluorinated GHG or N_2O. For abatement systems purchased and installed on or after January 1, 2025, you must also certify and document that the abatement system has been tested by the abatement system manufacturer based on the methods specified in paragraph (f)(3)(i) of this section and verified to meet or exceed the destruction or removal efficiency value used for that fluorinated GHG or N_2O under worst-case flow conditions as defined in paragraph (f)(3)(ii) of this section. If you elect to calculate fluorinated GHG emissions using the stack test method under § 98.93(i), you must also certify that you have included and accounted for all abatement systems designed for fluorinated GHG abatement and any respective downtime in your emissions calculations under § 98.93(i)(3).

(i) For purposes of paragraph (f)(3) of this section, destruction and removal efficiencies for abatement systems purchased and installed on or after January 1, 2025, must be measured using a scientifically sound, industry-accepted measurement methodology that accounts for dilution through the abatement system, such as EPA 430–R–10–003 (incorporated by reference, see § 98.7).

(ii) Worst-case flow conditions are defined as the highest total fluorinated GHG or N_2O flows through each model of emissions control systems (gas by gas and process type by process type across the facility) and the highest total flow scenarios (with N_2 dilution accounted for) across the facility during which the abatement system is claimed to be in operational mode.

(4) If you calculate and report controlled emissions using neither the default destruction or removal efficiency values in table I–16 to this subpart nor an abatement system manufacturer-verified lower destruction or removal efficiency value per paragraph (f)(3) of this section, you must use an average of properly measured destruction or removal efficiencies for each gas and process sub-type or process type combination, as applicable, determined in accordance with procedures in paragraphs (f)(4)(i) through (vi) of this section. This includes situations in which your fab employs abatement systems not specifically designed for fluorinated GHG or N_2O abatement or for which your fab operates abatement systems outside the range of parameters specified in the documentation supporting the certified DRE and you elect to reflect emission reductions due to these systems. You must not use a default value from table I–16 to this subpart for any abatement system not specifically designed for fluorinated GHG and N_2O abatement, for any abatement system not certified to meet the default value from table I–16, or for any gas and process type combination for which you have measured the destruction or removal efficiency according to the requirements of paragraphs (f)(4)(i) through (vi) of this section.

* * * * *

(iii) If you elect to take credit for abatement system destruction or removal efficiency before completing testing on 20 percent of the abatement systems for that gas and process sub-type or process type combination, as applicable, you must use default destruction or removal efficiencies or a verified destruction or removal efficiency, if verified at a lower value, for a gas and process type combination. You must not use a default value from table I–16 to this subpart for any abatement system not specifically designed for fluorinated GHG and N_2O abatement, and must not take credit for abatement system destruction or removal efficiency before completing testing on 20 percent of the abatement systems for that gas and process sub-

type or process type combination, as applicable. Following testing on 20 percent of abatement systems for that gas and process sub-type or process type combination, you must calculate the average destruction or removal efficiency as the arithmetic mean of all test results for that gas and process sub-type or process type combination, until you have tested at least 30 percent of all abatement systems for each gas and process sub-type or process type combination. After testing at least 30 percent of all systems for a gas and process sub-type or process type combination, you must use the arithmetic mean of the most recent 30 percent of systems tested as the average destruction or removal efficiency. You may include results of testing conducted on or after January 1, 2011 for use in determining the site-specific destruction or removal efficiency for a given gas and process sub-type or process type combination if the testing was conducted in accordance with the requirements of paragraph (f)(4)(i) of this section.

* * * * *

(j) * * *

(1) Stack system testing. Conduct an emissions test for each stack system according to the procedures in paragraphs (j)(1)(i) through (iv) of this section.

(i) You must conduct an emission test during which the fab is operating at a representative operating level, as defined in § 98.98, and with the abatement systems connected to the stack system being tested operating with at least 90-percent uptime, averaged over all abatement systems, during the 8-hour (or longer) period for each stack system, or at no less than 90 percent of the abatement system uptime rate measured over the previous reporting year, averaged over all abatement systems. Hydrocarbon-fuel-based combustion emissions control systems that were purchased and installed on or after January 1, 2025, that are used to control emissions from tools that use either NF_3 in remote plasma cleaning processes or F_2 as an input gas in any process type or sub-type, and that are not certified not to form CF_4, must operate with at least 90-percent uptime during the test.

* * * * *

(3) *Fab-specific fluorinated GHG consumption measurements.* You must determine the amount of each fluorinated GHG consumed by each fab during the sampling period for all process tools connected to the stack systems under § 98.93(i)(3), according to the procedures in paragraphs (j)(3)(i) and (ii) of this section.

* * * * *

(5) *Emissions testing frequency.* You must conduct emissions testing to develop fab-specific emission factors on a frequency according to the procedures in paragraph (j)(5)(i) or (ii) of this section.

(i) *Annual testing.* You must conduct an annual emissions test for each stack system unless you meet the criteria in paragraph (j)(5)(ii) of this section to skip annual testing. Each set of emissions testing for a stack system must be separated by a period of at least 2 months.

(ii) *Criteria to test less frequently.* After the first 3 years of annual testing, you may calculate the relative standard deviation of the emission factors for each fluorinated GHG included in the test and use that analysis to determine the frequency of any future testing. As an alternative, you may conduct all three tests in less than 3 calendar years for purposes of this paragraph (j)(5)(ii), but this does not relieve you of the obligation to conduct subsequent annual testing if you do not meet the criteria to test less frequently. If the criteria specified in paragraphs (j)(5)(ii)(A) and (B) of this section are met, you may use the arithmetic average of the three emission factors for each fluorinated GHG and fluorinated GHG byproduct for the current year and the next 4 years with no further testing unless your fab operations are changed in a way that triggers the re-test criteria in paragraph (j)(8) of this section. In the fifth year following the last stack test included in the previous average, you must test each of the stack systems and repeat the relative standard deviation analysis using the results of the most recent three tests (*i.e.* , the new test and the two previous tests conducted prior to the 4-year period). If the criteria specified in paragraphs (j)(5)(ii)(A) and (B) of this section are not met, you must use the emission factors developed from the most recent testing and continue annual testing. You may conduct more than one test in the same year, but each set of emissions testing for a stack system must be separated by a period of at least 2 months. You may repeat the relative standard deviation analysis using the most recent three tests, including those tests conducted prior to the 4-year period, to determine if you are exempt from testing for the next 4 years.

(A) The relative standard deviation of the total CO_2e emission factors calculated from each of the three tests (expressed as the total CO_2e fluorinated GHG emissions of the fab divided by the total CO_2e fluorinated GHG use of the fab) is less than or equal to 15 percent.

(B) The relative standard deviation for all single fluorinated GHGs that individually accounted for 5 percent or more of CO_2e emissions were less than 20 percent.

* * * * *

■ 25. Amend § 98.96 by:
■ a. Revising paragraphs (c)(1) and (2);
■ b. Adding paragraph (o); and
■ c. Revising paragraphs (p)(2), (q)(2) and (3), (r)(2), (w)(2), (y) introductory text, (y)(1), (y)(2)(i) and (iv), and (y)(4).

The revisions and addition read as follows:

§ 98.96 Data reporting requirements.

* * * * *

(c) * * *

(1) When you use the procedures specified in § 98.93(a), each fluorinated GHG emitted from each process type for which your fab is required to calculate emissions as calculated in equations I–6, I–7, and I–9 to § 98.93.

(2) When you use the procedures specified in § 98.93(a), each fluorinated GHG emitted from each process type or process sub-type as calculated in equations I–8A and I–8B to § 98.93, as applicable.

* * * * *

(o) For all HC fuel CECS that were purchased and installed on or after January 1, 2025, that are used to control emissions from tools that use either NF_3 as an input gas in remote plasma clean processes or F_2 as an input gas in any process type or sub-type and for which you are not calculating emissions under equation I–9 to § 98.93, certification that the rate of conversion from F_2 to CF_4 is <0.1% and that the systems are installed, operated, and maintained in accordance with the directions of the HC fuel CECS manufacturer. Hydrocarbon-fuel-based combustion emissions control systems include but are not limited to abatement systems as defined in § 98.98 that are hydrocarbon-fuel-based. If you make the certification based on your own testing, you must certify that you tested the model of the system according to the requirements specified in § 98.94(e). If you make the certification based on testing by the HC fuel CECS manufacturer, you must provide documentation from the HC fuel CECS manufacturer that the rate of conversion from F_2 to CF_4 is <0.1% when tested according to the requirements specified in § 98.94(e).

(p) * * *

(2) The basis of the destruction or removal efficiency being used (default, manufacturer-verified, or site-specific measurement according to

§ 98.94(f)(4)(i)) for each process sub-type or process type and for each gas.

(q) * * *

(2) If you use default destruction or removal efficiency values in your emissions calculations under § 98.93(a), (b), or (i), certification that the site maintenance plan for abatement systems for which emissions are being reported contains the manufacturer's recommendations and specifications for installation, operation, and maintenance for each abatement system. To use the default or lower manufacturer-verified destruction or removal efficiency values, operation of the abatement system must be within manufacturer's specifications, which may include, for example, specifications on vacuum pumps' purges, fuel and oxidizer settings, supply and exhaust flows and pressures, and utilities to the emissions control equipment including fuel gas flow and pressure, calorific value, and water quality, flow and pressure.

(3) If you use default destruction or removal efficiency values in your emissions calculations under § 98.93(a), (b), and/or (i), certification that the abatement systems for which emissions are being reported were specifically designed for fluorinated GHG or N_2O abatement, as applicable. You must support this certification by providing abatement system supplier documentation stating that the system was designed for fluorinated GHG or N_2O abatement, as applicable, and supply the destruction or removal efficiency value at which each abatement system is certified for the fluorinated GHG or N_2O abated, as applicable. You may only use the default destruction or removal efficiency value if the abatement system is verified to meet or exceed the destruction or removal efficiency default value in table I–16 to this subpart. If the system is verified at a destruction or removal efficiency value lower than the default value, you may use the verified value.

* * * * *

(r) * * *

(2) Use equation I–28 to this section to calculate total unabated emissions, in metric ton CO_2e, of all fluorinated GHG emitted from electronics manufacturing processes whose emissions of fluorinated GHG you calculated according to the stack testing procedures in § 98.93(i)(3). For each set of processes, use the same input gas consumption (C_{if}), input gas emission factors (EF_{if}), by-product gas emission factors (EF_{kf}), fractions of tools abated (a_{if} and a_{kif}), and destruction efficiencies (d_{if} and d_{ik}) to calculate unabated emissions as you used to calculate emissions.

$$SFGHG = \sum_i \left[\frac{EF_{if}}{(1-(a_{if} * d_{if}))} * C_{if} * GWP_i \right] + \sum_k \left[EF_{kf} * \sum_i \frac{C_{if}}{1-(a_{kif} \bullet d_{ik})} * GWP_k \right] \quad \text{Eq. I–28}$$

Where:

SFGHG = Total unabated emissions of fluorinated GHG emitted from electronics manufacturing processes in the fab, expressed in metric ton CO_2e for which you calculated total emission according to the procedures in § 98.93(i)(3).

EF_{if} = Emission factor for fluorinated GHG input gas i, emitted from fab f, as calculated in equation I–19 to § 98.93 (kg emitted/kg input gas consumed).

a_{if} = Fraction of fluorinated GHG input gas i used in fab f in tools with abatement systems (expressed as a decimal fraction).

d_{if} = Fraction of fluorinated GHG i destroyed or removed in abatement systems connected to process tools in fab f, as calculated from equation I–24A to § 98.93, which you used to calculate total emissions according to the procedures in § 98.93(i)(3) (expressed as a decimal fraction).

C_{if} = Total consumption of fluorinated GHG input gas i, of tools vented to stack systems, for fab f, for the reporting year, expressed in metric ton CO_2e, which you used to calculate total emissions according to the procedures in § 98.93(i)(3) (expressed as a decimal fraction).

EF_{kf} = Emission factor for fluorinated GHG by-product gas k, emitted from fab f, as calculated in equation I–20 to § 98.93 (kg emitted/kg of all input gases consumed in tools vented to stack systems).

a_{kif} = Fraction of fluorinated GHG by-product gas k emitted in fab f from tools using input gas i with abatement systems (expressed as a decimal fraction), as calculated using equation I–24D to § 98.93.

d_{ik} = Fraction of fluorinated GHG byproduct k destroyed or removed in abatement systems connected to process tools in fab f, as calculated from equation I–24B to § 98.93, which you used to calculate total emissions according to the procedures in § 98.93(i)(3) (expressed as a decimal fraction).

GWP_i = GWP of emitted fluorinated GHG i from table A–1 to subpart A of this part.

GWP_k = GWP of emitted fluorinated GHG by-product k from table A–1 to subpart A of this part.

i = Fluorinated GHG.

k = Fluorinated GHG by-product.

* * * * *

(w) * * *

(2) An inventory of all stack systems from which process fluorinated GHG are emitted.

* * * * *

(y) If your semiconductor manufacturing facility manufactures wafers greater than 150 mm and emits more than 40,000 metric ton CO_2e of GHG emissions, based on your most recently submitted annual report as required in paragraph (c) of this section, from the electronics manufacturing processes subject to reporting under this subpart, you must prepare and submit a technology assessment report every five years to the Administrator (or an authorized representative) that meets the requirements specified in paragraphs (y)(1) through (6) of this section. Any other semiconductor manufacturing facility may voluntarily submit this report to the Administrator. If your semiconductor manufacturing facility manufactures only 150 mm or smaller wafers, you are not required to prepare and submit a technology assessment report, but you are required to prepare and submit a report if your facility begins manufacturing wafers 200 mm or larger during or before the calendar year preceding the year the technology assessment report is due. If your semiconductor manufacturing facility is no longer required to report to the GHGRP under subpart I due to the cessation of semiconductor manufacturing as described in § 98.2(i)(3), you are not required to submit a technology assessment report.

(1) The first technology assessment report due after January 1, 2025, is due on March 31, 2028, and subsequent reports must be delivered every 5 years no later than March 31 of the year in which it is due.

(2) * * *

(i) It must describe how the gases and technologies used in semiconductor manufacturing using 200 mm and 300 mm wafers in the United States have changed in the past 5 years and whether any of the identified changes are likely to have affected the emissions characteristics of semiconductor manufacturing processes in such a way that the default utilization and by-product formation rates or default destruction or removal efficiency factors of this subpart may need to be updated.

* * * * *

(iv) It must provide any utilization and byproduct formation rates and/or destruction or removal efficiency data that have been collected in the previous 5 years that support the changes in semiconductor manufacturing processes described in the report. Any utilization or byproduct formation rate data submitted must be reported using both of the methods specified in paragraphs (y)(2)(iv)(A) and (B) of this section if multiple fluorinated input gases are used, unless one of the input gases does not have a reference process utilization rate in table I–19 or I–20 to this subpart for the process type and wafer size whose emission factors are being measured, in which case the data must be submitted using the method specified in paragraph (y)(2)(iv)(A) of this section. If only one fluorinated input gas is fed into the process, you must use equations I–29A and I–29B to this section. In addition to using the methods specified in paragraphs (y)(2)(iv)(A) and (B) of this section, you have the option to calculate and report the utilization or byproduct formation rate data using any alternative calculation methodology. The report must include the input gases used and measured, the utilization rates measured, the byproduct formation rates measured, the process type, the process subtype for chamber clean processes, the wafer size, and the methods used for the measurements. The report must also specify the method used to calculate each reported utilization and by-product formation rate, and provide a unique record number for each data set. For any destruction or removal efficiency data submitted, the report must include the input gases used and measured, the destruction and removal efficiency measured, the process type, the methods used for the measurements, and whether the abatement system is specifically designed to abate the gas measured under the operating conditions used for the measurement. If you choose to use an additional alternative calculation methodology to calculate and report the input gas emission factors and by-product formation rates, you must provide a complete, mathematical description of the alternative method used (including the equation used to calculate each reported utilization and by-product formation rate) and include the information in this paragraph (y)(2)(iv).

(A) *All-input gas method.* Use equation I–29A to this section to calculate the input gas emission factor ($1 - U_{ij}$) for each input gas in a single test. If the result of equation I–29A exceeds 0.8 for an F–GHG that contains carbon, you must use equation I–29C to this section to calculate the input gas emission factor for that F–GHG and equation I–29D to this section to calculate the by-product formation rate for that F–GHG from the other input gases. Use equation I–29B to this section to calculate the by-product formation rates from each input gas for F–GHGs that are not input gases. If a test uses a cleaning or etching gas that does not contain carbon in combination with a cleaning or etching gas that does contain carbon and the process chamber is not used to etch or deposit carbon-containing films, you may elect to assign carbon containing by-products only to the carbon-containing input gases. If you choose to assign carbon containing by-products only to carbon-containing input gases, remove the input mass of the non-carbon containing gases from the sum of $Mass_i$ and the sum of $Mass_g$ in equations I–29B and I–29D to this section, respectively.

$$\left(1 - U_{ij}\right) = \frac{(E_i)}{(Mass_i)} \qquad \text{(Eq. I–29A)}$$

Where:

U_{ij} = Process utilization rate for fluorinated GHG i, process type j.

E_i = The mass emissions of input gas i.

$Mass_i$ = The mass of input gas i fed into the process.

i = Fluorinated GHG.

j = Process type.

$$BEF_{kji} = \frac{(E_k)}{\sum_i Mass_i} \qquad \text{(Eq. I–29B)}$$

Where:

BEF_{kji} = By-product formation rate for gas k from input gas i, for process type j, where gas k is not an input gas.

E_k = The mass emissions of by-product gas k.

$Mass_i$ = The mass of input gas i fed into the process.

i = Fluorinated GHG.

j = Process type.

k = Fluorinated GHG by-product.

$$\left(1 - U_{ij}\right) = 0.8 \qquad \text{(Eq. I–29C)}$$

Where:

U_{ij} = Process utilization rate for fluorinated GHG i, process type j.

$$BEF_{ijg} = \frac{(E_i - 0.8 * Mass_i)}{\sum_g Mass_g} \qquad \text{(Eq. I–29D)}$$

Where:

BEF_{ijg} = By-product formation rate for gas i from input gas g for process type j.

E_i = The mass emissions of input gas i.

$Mass_i$ = The mass of input gas i fed into the process.

$Mass_g$ = The mass of input gas g fed into the process, where g does not equal input gas i.

i = Fluorinated GHG.

g = Fluorinated GHG input gas, where gas g is not equal to gas i.

j = Process type.

(B) *Reference emission factor method.* Calculate the input gas emission factors and by-product formation rates from a test using equations I–30A, I–30B, and I–29B to this section, and table I–19 or I–20 to this subpart. In this case, use

equation I–30A to this section to calculate the input gas emission factors and use equation I–30B and I–29B to this section to calculate the by-product formation rates.

$$\left(1 - U_{ij}\right) = \left(1 - U_{ijr}\right) * \left[\frac{E_i}{\left(Mass_i * \left(1 - U_{ijr}\right) + \sum_g Mass_g BEF_{ijgr}\right)}\right] \quad \text{(Eq. I–30A)}$$

Where:

U_{ij} = Process utilization rate for fluorinated GHG i, process type j.

U_{ijr} = Reference process utilization rate for fluorinated GHG i, process type j, for input gas i, using table I–19 or I–20 to this subpart as appropriate.

E_i = The mass emissions of input gas i.

$Mass_i$ = The mass of gas i fed into the process.

$Mass_g$ = The mass of input gas g fed into the process, where g does not equal input gas i.

BEF_{ijgr} = Reference by-product formation rate for gas i from input gas g for process type j, using table I–19 or I–20 to this subpart as appropriate.

i = Fluorinated GHG.

g = Fluorinated GHG input gas, where gas g is not equal to gas i.

r = Reference data.

$$BEF_{ijg} = BEF_{ijgr} * \left[\frac{E_i}{\left(Mass * \left(1 - U_{ijr}\right) + \sum_g Mass_g\, BEF_{ijgr}\right)}\right] \quad \text{(Eq. I–30B)}$$

Where:

BEF_{ijg} = By-product formation rate for gas i from input gas g for process type j, where gas i is also an input gas.

BEF_{ijgr} = Reference by-product formation rate for gas i from input gas g for process type j from table I–19 or I–20 to this subpart, as appropriate.

U_{ijr} = Reference process utilization rate for fluorinated GHG i, process type j, for input gas i, using table I–19 or I–20 to this subpart, as appropriate.

E_i = The mass emissions of input gas i.

$Mass_i$ = The mass of gas i fed into the process.

$Mass_g$ = The mass of input gas g fed into the process, where g does not equal input gas i.

i = Fluorinated GHG.

j = Process type.

g = Fluorinated GHG input gas, where gas g is not equal to gas i.

r = Reference data.

* * * * *

(4) Multiple semiconductor manufacturing facilities may submit a single consolidated technology assessment report as long as the facility identifying information in § 98.3(c)(1) and the certification statement in § 98.3(c)(9) is provided for each facility for which the consolidated report is submitted.

* * * * *

■ 26. Amend § 98.97 by:

■ a. Adding paragraph (b);

■ b. Revising paragraphs (d)(1)(iii), (d)(3), (d)(5)(i), (d)(6) and (7), and (d)(9)(i);

■ c. Removing and reserving paragraph (i)(1); and

■ d. Revising paragraphs (i)(5) and (9) and (k).

The addition and revisions read as follows:

§ 98.97 Records that must be retained.

* * * * *

(b) If you use HC fuel CECS purchased and installed on or after January 1, 2025, to control emissions from tools that use either NF_3 as an input gas in remote plasma cleaning processes or F_2 as an input gas in any process, and if you use a value less than 1 for either $a_{F2,j}$ or $a_{NF3,RPC}$ in equation I–9 to § 98.93, certification and documentation that the model for each of the systems that you claim does not form CF_4 from F_2 has been tested and verified to produce less than 0.1% CF_4 from F_2, and certification that the site maintenance plan includes the HC fuel CECS manufacturer's recommendations and specifications for installation, operation, and maintenance of those systems. If you are relying on your own testing to make the certification that the model produces less than 0.1% CF_4 from F_2, the documentation must include the model tested, the method used to perform the testing (*e.g.,* EPA 430–R–10–003, modified to calculate the formation rate of CF_4 from F_2 rather than the DRE), complete documentation of the results of any initial and subsequent tests, and a final report similar to that specified in EPA 430–R–10–003 (incorporated by reference, see § 98.7), with appropriate adjustments to reflect the measurement of the formation rate of CF_4 from F_2 rather than the DRE. If you are relying on testing by the HC fuel CECS manufacturer to make the certification that the system produces less than 0.1% CF_4 from F_2, the documentation must include the model tested, the method used to perform the testing, and the results of the test.

* * * * *

(d) * * *

(1) * * *

(iii) If you use either default destruction or removal efficiency values or certified destruction or removal efficiency values that are lower than the default values in your emissions calculations under § 98.93(a), (b), and/or (i), certification that the abatement systems for which emissions are being reported were specifically designed for fluorinated GHG and N_2O abatement, as required under § 98.94(f)(3), certification that the site maintenance plan includes the abatement system manufacturer's recommendations and specifications for installation, operation, and maintenance, and the certified destruction and removal efficiency values for all applicable abatement systems. For abatement systems purchased and installed on or after January 1, 2025, also include records of the method used to measure the destruction and removal efficiency values.

* * * * *

(3) Where either the default destruction or removal efficiency value or a certified destruction or removal efficiency value that is lower than the default is used, documentation from the abatement system supplier describing the equipment's designed purpose and emission control capabilities for fluorinated GHG and N_2O.

* * * * *

(5) * * *

(i) The number of abatement systems of each manufacturer, and model numbers, and the manufacturer's certified fluorinated GHG and N_2O destruction or removal efficiency, if any.

* * * * *

(6) Records of all inputs and results of calculations made accounting for the uptime of abatement systems used during the reporting year, in accordance with equations I–15 or I–23 to § 98.93, as applicable. The inputs should

include an indication of whether each value for destruction or removal efficiency is a default value, lower manufacturer-verified value, or a measured site-specific value.

(7) Records of all inputs and results of calculations made to determine the average weighted fraction of each gas destroyed or removed in the abatement systems for each stack system using equations I–24A and I–24B to § 98.93, if applicable. The inputs should include an indication of whether each value for destruction or removal efficiency is a default value, lower manufacturer-verified value, or a measured site-specific value.

* * * * *

(9) * * *

(i) The site maintenance plan for abatement systems must be based on the abatement system manufacturer's recommendations and specifications for installation, operation, and maintenance if you use default or lower manufacturer-verified destruction and removal efficiency values in your emissions calculations under § 98.93(a), (b), and/or (i). If the manufacturer's recommendations and specifications for installation, operation, and maintenance are not available, you cannot use default destruction and removal efficiency values or lower manufacturer-verified value in your emissions calculations under § 98.93(a), (b), and/or (i). If you use an average of properly measured destruction or removal efficiencies determined in accordance with the procedures in § 98.94(f)(4)(i) through (vi), the site maintenance plan for abatement systems must be based on the abatement system manufacturer's recommendations and specifications for installation, operation, and maintenance, where available. If you deviate from the manufacturer's recommendations and specifications, you must include documentation that demonstrates how the deviations do not negatively affect the performance or destruction or removal efficiency of the abatement systems.

* * * * *

(i) * * *

(5) The fab-specific emission factor and the calculations and data used to determine the fab-specific emission factor for each fluorinated GHG and by-product, as calculated using equations I–19A, I–19B, I–19C and I–20 to § 98.93(i)(3).

* * * * *

(9) The number of tools vented to each stack system in the fab and all inputs and results for the calculations accounting for the fraction of gas exhausted through abatement systems using equations I–24C and I–24D to § 98.93.

* * * * *

(k) Annual gas consumption for each fluorinated GHG and N_2O as calculated in equation I–11 to § 98.93, including where your fab used less than 50 kg of a particular fluorinated GHG or N_2O used at your facility for which you have not calculated emissions using equations I–6, I–7, I–8A, I–8B, I–9, I–10, I–21, or I–22 to § 98.93, the chemical name of the GHG used, the annual consumption of the gas, and a brief description of its use.

* * * * *

■ 27. Amend § 98.98 by:

■ a. Removing the definition ''Fluorinated heat transfer fluids'';

■ b. Adding the definition ''Hydrocarbon-fuel based combustion emission control systems (HC fuel CECs)'' in alphabetical order; and

■ c. Revising the definition ''Operational mode''.

The revisions and addition read as follows:

§ 98.98 Definitions.

* * * * *

Hydrocarbon-fuel based combustion emission control system (HC fuel CECS) means a hydrocarbon fuel-based combustion device or equipment that is designed to destroy or remove gas emissions in exhaust streams via combustion from one or more electronics manufacturing production processes, and that is connected to manufacturing tools that have the potential to emit F_2 or fluorinated greenhouse gases. HC fuel CECs include both emission control systems that are and are not designed to destroy or remove fluorinated GHGs or N_2O.

* * * * *

Operational mode means the time in which an abatement system is properly installed, maintained, and operated according to the site maintenance plan for abatement systems as required in § 98.94(f)(1) and defined in § 98.97(d)(9). This includes being properly operated within the range of parameters as specified in the site maintenance plan for abatement systems. For abatement systems purchased and installed on or after January 1, 2025, this includes being properly operated within the range of parameters specified in the DRE certification documentation. An abatement system is considered to not be in operational mode when it is not operated and maintained according to the site maintenance plan for abatement systems or, for abatement systems purchased and installed on or after January 1, 2025, not operated within the range of parameters as specified in the DRE certification documentation.

* * * * *

■ 28. Revise table I–1 to subpart I to read as follows:

TABLE I–1 TO SUBPART I OF PART 98—DEFAULT EMISSION FACTORS FOR MANUFACTURING CAPACITY-BASED THRESHOLD APPLICABILITY DETERMINATION

Product type	Emission factors EF_i							
	CF_4	C_2F_6	CHF_3	c-C_4F_8	C_3F_8	NF_3	SF_6	N_2O
Semiconductors (kg/m^2)	0.9	1.0	0.04	NA	0.05	0.04	0.20	NA
LCD (g/m^2)	0.65	NA	0.0024	0.00	NA	1.29	4.14	17.06
MEMS (kg/m^2)	0.015	NA	NA	0.076	NA	NA	1.86	NA

Notes: NA denotes not applicable based on currently available information.

■ 29. Revise table I–2 to subpart I to read as follows:

TABLE I–2 TO SUBPART I OF PART 98—DEFAULT EMISSION FACTORS FOR GAS CONSUMPTION-BASED THRESHOLD APPLICABILITY DETERMINATION

	Process gas i	
	Fluorinated GHGs	N_2O
$1–U_i$	0.8	1
BCF_4	0.15	0
BC_2F_6	0.05	0

■ 30. Revise table I–3 to subpart I to read as follows:

TABLE I–3 TO SUBPART I OF PART 98—DEFAULT EMISSION FACTORS ($1–U_{ij}$) FOR GAS UTILIZATION RATES (U_{ij}) AND BY-PRODUCT FORMATION RATES (B_{ijk}) FOR SEMICONDUCTOR MANUFACTURING FOR 150 mm AND 200 mm WAFER SIZES

Process type/sub-type	Process gas i												
	CF_4	C_2F_6	CHF_3	CH_2F_2	C_2HF_5	CH_3F	C_3F_8	C_4F_8	NF_3	SF_6	C_4F_6	C_5F_8	C_4F_8O
Etching/Wafer Cleaning													
$1–U_i$	0.73	0.72	0.51	0.13	0.064	0.70	NA	0.14	0.19	0.55	0.083	0.072	NA
BCF_4	NA	0.10	0.085	0.079	0.077	NA	NA	0.11	0.0040	0.13	0.095	NA	NA
BC_2F_6	0.041	NA	0.035	0.025	0.024	0.0034	NA	0.037	0.025	0.11	0.073	0.014	NA
BC_4F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
$BCHF_3$	0.091	0.047	NA	0.049	NA	NA	NA	0.040	NA	0.0012	0.066	0.0039	NA
Chamber Cleaning													
In situ plasma cleaning													
$1–U_i$	0.92	0.55	NA	NA	NA	NA	0.40	0.10	0.18	NA	NA	NA	0.14
BCF_4	NA	0.19	NA	NA	NA	NA	0.20	0.11	0.14	NA	NA	NA	0.13
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.045
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Remote plasma cleaning													
$1–U_i$	NA	NA	NA	NA	NA	NA	NA	NA	0.028	NA	NA	NA	NA
BCF_4	NA	NA	NA	NA	NA	NA	NA	NA	0.015	NA	NA	NA	NA
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BF_2	NA	NA	NA	NA	NA	NA	NA	NA	0.5	NA	NA	NA	NA
In situ thermal cleaning													
$1–U_i$	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BCF_4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes: NA = Not applicable; *i.e.,* there are no applicable default emission factor measurements for this gas. This does not necessarily imply that a particular gas is not used in or emitted from a particular process sub-type or process type.

31. Revise table I–4 to subpart I to read as follows:

TABLE I–4 TO SUBPART I OF PART 98—DEFAULT EMISSION FACTORS ($1–U_{ij}$) FOR GAS UTILIZATION RATES (U_{ij}) AND BY-PRODUCT FORMATION RATES (B_{ijk}) FOR SEMICONDUCTOR MANUFACTURING FOR 300 mm AND 450 mm WAFER SIZE

Process type/sub-type	Process gas i											
	CF_4	C_2F_6	CHF_3	CH_2F_2	CH_3F	C_3F_8	C_4F_8	NF_3	SF_6	C_4F_6	C_5F_8	C_4F_8O
Etching/Wafer Cleaning												
$1–U_i$	0.65	0.80	0.37	0.20	0.30	0.30	0.18	0.16	0.30	0.15	0.10	NA
BCF_4	NA	0.21	0.076	0.060	0.0291	0.21	0.045	0.044	0.033	0.059	0.11	NA
BC_2F_6	0.058	NA	0.058	0.043	0.009	0.018	0.027	0.045	0.041	0.062	0.083	NA
BC_4F_8	0.0046	NA	0.0027	0.054	0.0070	NA	NA	NA	NA	0.0051	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00012	NA
$BCHF_3$	0.012	NA	NA	0.057	0.016	0.012	0.028	0.023	0.0039	0.017	0.0069	NA
BCH_2F_2	0.005	NA	0.0024	NA	0.0033	NA	0.0021	0.00074	0.000020	0.000030	NA	NA
BCH_3F	0.0061	NA	0.027	0.0036	NA	0.00073	0.0063	0.0080	0.0082	0.00065	NA	NA

TABLE I–4 TO SUBPART I OF PART 98—DEFAULT EMISSION FACTORS ($1–U_{ij}$) FOR GAS UTILIZATION RATES (U_{ij}) AND BY-PRODUCT FORMATION RATES (B_{ijk}) FOR SEMICONDUCTOR MANUFACTURING FOR 300 mm AND 450 mm WAFER SIZE—Continued

Process type/sub-type	Process gas i											
	CF_4	C_2F_6	CHF_3	CH_2F_2	CH_3F	C_3F_8	C_4F_8	NF_3	SF_6	C_4F_6	C_5F_8	C_4F_8O
Chamber Cleaning												
In situ plasma cleaning												
$1–U_i$	NA	NA	NA	NA	NA	NA	NA	0.20	NA	NA	NA	NA
BCF_4	NA	NA	NA	NA	NA	NA	NA	0.037	NA	NA	NA	NA
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Remote plasma cleaning												
$1–U_i$	NA	NA	NA	NA	NA	0.063	NA	0.018	NA	NA	NA	NA
BCF_4	NA	NA	NA	NA	NA	NA	NA	0.037	NA	NA	NA	NA
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
$BCHF_3$	NA	NA	NA	NA	NA	NA	NA	0.000059	NA	NA	NA	NA
BCH_2F_2	NA	NA	NA	NA	NA	NA	NA	0.00088	NA	NA	NA	NA
BCH_3F	NA	NA	NA	NA	NA	NA	NA	0.0028	NA	NA	NA	NA
BF_2	NA	NA	NA	NA	NA	NA	NA	0.5	NA	NA	NA	NA
In situ thermal cleaning												
$1–U_i$	NA	NA	NA	NA	NA	NA	NA	0.28	NA	NA	NA	NA
BCF_4	NA	NA	NA	NA	NA	NA	NA	0.010	NA	NA	NA	NA
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes: NA = Not applicable; *i.e.,* there are no applicable default emission factor measurements for this gas. This does not necessarily imply that a particular gas is not used in or emitted from a particular process sub-type or process type.

■ 32. Revise table I–8 to subpart I to read as follows:

TABLE I–8 TO SUBPART I OF PART 98—DEFAULT EMISSION FACTORS ($1–UN_2O_{,j}$) FOR N_2O UTILIZATION ($UN_2O_{,j}$)

Manufacturing type/process type/wafer size	N_2O
Semiconductor Manufacturing:	
200 mm or Less:	
CVD $1–U_i$	1.0
Other Manufacturing Process $1–U_i$	1.0
300 mm or greater:	
CVD $1–U_i$	0.5
Other Manufacturing Process $1–U_i$	1.0
LCD Manufacturing:	
CVD Thin Film Manufacturing $1–U_i$	0.63
All other N_2O Processes	1.0

■ 33. Revise table I–11 to subpart I to read as follows:

TABLE I–11 TO SUBPART I OF PART 98—DEFAULT EMISSION FACTORS ($1–U_{ij}$) FOR GAS UTILIZATION RATES (U_{ij}) AND BY-PRODUCT FORMATION RATES (B_{ijk}) FOR SEMICONDUCTOR MANUFACTURING FOR USE WITH THE STACK TEST METHOD

[150 mm and 200 mm Wafers]

All processes	Process gas i													
	CF_4	C_2F_6	CHF_3	CH_2F_2	C_2HF_5	CH_3F	C_3F_8	C_4F_8	NF_3	NF_3 Remote	SF_6	C_4F_6	C_5F_8	C_4F_8O
$1–U_i$	0.79	0.55	0.51	0.13	0.064	0.70	0.40	0.12	0.18	0.028	0.58	0.083	0.072	0.14
BCF_4	NA	0.19	0.085	0.079	0.077	NA	0.20	0.11	0.11	0.015	0.13	0.095	NA	0.13
BC_2F_6	0.027	NA	0.035	0.025	0.024	0.0034	NA	0.019	0.0059	NA	0.10	0.073	0.014	0.045
BC_4F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_5F_8	0.00077	NA	0.0012	NA	NA	NA	NA	0.0043	NA	NA	NA	NA	NA	NA
$BCHF_3$	0.060	0.0020	NA	0.049	NA	NA	NA	0.020	NA	NA	0.0011	0.066	0.0039	NA
BF_2	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.50	NA	NA	NA	NA

Notes: NA = Not applicable; *i.e.*, there are no applicable emission factor measurements for this gas. This does not necessarily imply that a particular gas is not used in or emitted from a particular process sub-type or process type.

■ 34. Revise table I–12 to subpart I to read as follows:

TABLE I–12 TO SUBPART I OF PART 98—DEFAULT EMISSION FACTORS ($1–U_{ij}$) FOR GAS UTILIZATION RATES (U_{ij}) AND BY-PRODUCT FORMATION RATES (B_{ijk}) FOR SEMICONDUCTOR MANUFACTURING FOR USE WITH THE STACK TEST METHOD

[300 mm and 450 mm Wafers]

All processes	Process gas i													
	CF_4	C_2F_6	CHF_3	CH_2F_2	CH_3F	C_3F_8	C_3F_8 Remote	C_4F_8	NF_3	NF_3 Remote	SF_6	C_4F_6	C_5F_8	C_4F_8O
$1–U_i$	0.65	0.80	0.37	0.20	0.30	0.30	0.063	0.183	0.19	0.018	0.30	0.15	0.100	NA
BCF_4	NA	0.21	0.076	0.060	0.029	0.21	NA	0.045	0.040	0.037	0.033	0.059	0.109	NA
BC_2F_6	0.058	NA	0.058	0.043	0.0093	0.18	NA	0.027	0.0204	NA	0.041	0.062	0.083	NA
BC_4F_6	0.0083	NA	0.01219	NA	0.001	NA	NA	0.008	NA	NA	NA	NA	NA	NA
BC_4F_8	0.0046	NA	0.00272	0.054	0.007	NA	NA	NA	NA	NA	NA	0.0051	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00012	NA
BCH_2F_2	0.005	NA	0.0024	NA	0.0033	NA	NA	0.0021	0.00034	0.00088	0.000020	0.000030	NA	NA
BCH_3F	0.0061	NA	0.027	0.0036	NA	0.0007	NA	0.0063	0.0036	0.0028	0.0082	0.00065	NA	NA
$BCHF_3$	0.012	NA	NA	0.057	0.016	0.012	NA	0.028	0.0106	0.000059	0.0039	0.017	0.0069	NA
BF_2	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.50	NA	NA	NA	NA

■ 35. Revise table I–16 to subpart I to read as follows:

TABLE I–16 TO SUBPART I OF PART 98—DEFAULT EMISSION DESTRUCTION OR REMOVAL EFFICIENCY (DRE) FACTORS FOR ELECTRONICS MANUFACTURING

Manufacturing type/process type/gas	Default DRE (%)
MEMS, LCDs, and PV Manufacturing	60
Semiconductor Manufacturing:	
CF_4	87
CH_3F	98
CHF_3	97
CH_2F_2	98
C_4F_8	93
C_4F_8O	93
C_5F_8	97
C_4F_6	95
C_3F_8	98
C_2HF_5	97
C_2F_6	98
SF_6	95
NF_3	96
All other carbon-based fluorinated GHGs used in Semiconductor Manufacturing	60
N_2O Processes.	
CVD and all other N_2O-using processes	60

■ 36. Add table I–18 to subpart I to read as follows:

TABLE I–18 TO SUBPART I OF PART 98—DEFAULT FACTORS FOR GAMMA ($\gamma_{i,p}$ AND $\gamma_{k,i,p}$) FOR SEMICONDUCTOR MANUFACTURING AND FOR MEMS AND PV MANUFACTURING UNDER CERTAIN CONDITIONS * FOR USE WITH THE STACK TESTING METHOD

Process type	In-situ thermal or in-situ plasma cleaning					Remote plasma cleaning		
Gas	CF_4	C_2F_6	c-C_4F_8	NF_3	SF_6	C_3F_8	CF_4	NF_3
If manufacturing wafer sizes ≤200 mm AND manufacturing 300 mm (or greater) wafer sizes								
γ_i	13	9.3	4.7	14	11	NA	NA	5.7
$\gamma_{CF4,i}$	NA	23	6.7	63	8.7	NA	NA	58
$\gamma_{C2F6,i}$	NA	NA	NA	NA	3.4	NA	NA	NA
$\gamma_{CHF3,i}$	NA	NA	NA	NA	NA	NA	NA	0.24
$\gamma_{CH2F2,i}$	NA	NA	NA	NA	NA	NA	NA	111
$\gamma_{CH3F,i}$	NA	NA	NA	NA	NA	NA	NA	33
If manufacturing ≤200 mm OR manufacturing 300 mm (or greater) wafer sizes								
γ_i (≤ 200 mm wafer size)	13	9.3	4.7	2.9	11	NA	NA	1.4

TABLE I–18 TO SUBPART I OF PART 98—DEFAULT FACTORS FOR GAMMA ($\gamma_{i,p}$ AND $\gamma_{k,i,p}$) FOR SEMICONDUCTOR MANUFACTURING AND FOR MEMS AND PV MANUFACTURING UNDER CERTAIN CONDITIONS * FOR USE WITH THE STACK TESTING METHOD—Continued

Process type	In-situ thermal or in-situ plasma cleaning					Remote plasma cleaning		
Gas	CF_4	C_2F_6	c-C_4F_8	NF_3	SF_6	C_3F_8	CF_4	NF_3
$\gamma_{CF4,i}$ (≤200 mm wafer size)	NA	23	6.7	110	8.7	NA	NA	36
$\gamma_{C2F6,i}$ (≤200 mm wafer size)	NA	NA	NA	NA	3.4	NA	NA	NA
γ_i (300 mm wafer size)	NA	NA	NA	26	NA	NA	NA	10
$\gamma_{CF4,i}$ (300 mm wafer size)	NA	NA	NA	17	NA	NA	NA	80
$\gamma_{C2F6,i}$ (300 mm wafer size)	NA	NA	NA	NA	NA	NA	NA	NA
$\gamma_{CHF3,i}$ (300 mm wafer size)	NA	NA	NA	NA	NA	NA	NA	0.24
$\gamma_{CH2F2,i}$ (300 mm wafer size)	NA	NA	NA	NA	NA	NA	NA	111
$\gamma_{CH3F,i}$ (300 mm wafer size)	NA	NA	NA	NA	NA	NA	NA	33

* If you manufacture MEMS or PVs and use semiconductor tools and processes, you may use the corresponding γ in this table. For all other tools and processes, a default γ of 10 must be used.

■ 37. Add table I–19 to subpart I to read as follows:

TABLE I–19 TO SUBPART I OF PART 98—REFERENCE EMISSION FACTORS ($1–U_{ij}$) FOR GAS UTILIZATION RATES (U_{ij}) AND BY-PRODUCT FORMATION RATES (B_{ijk}) FOR SEMICONDUCTOR MANUFACTURING FOR 150 MM AND 200 MM WAFER SIZES

Process type/sub-type	Process gas i												
	CF_4	C_2F_6	CHF_3	CH_2F_2	C_2HF_5	CH_3F	C_3F_8	C_4F_8	NF_3	SF_6	C_4F_6	C_5F_8	C_4F_8O
Etching/Wafer Cleaning													
$1–U_i$	0.73	0.46	0.31	0.37	0.064	0.66	NA	0.21	0.20	0.55	0.086	0.072	NA
BCF_4	NA	0.20	0.10	0.031	0.077	NA	NA	0.17	0.0040	0.023	0.0089	NA	NA
BC_2F_6	0.029	NA	NA	NA	NA	NA	NA	0.065	NA	NA	0.045	0.014	NA
BC_4F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_4F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_5F_8	NA	NA	NA	NA	NA	NA	NA	0.016	NA	NA	NA	NA	NA
$BCHF_3$	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0039	NA
Chamber Cleaning													
In situ plasma cleaning													
$1–U_i$	0.92	0.55	NA	NA	NA	NA	0.40	0.10	0.18	NA	NA	NA	0.14
BCF_4	NA	0.19	NA	NA	NA	NA	0.20	0.11	0.14	NA	NA	NA	0.13
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.045
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Remote plasma cleaning													
$1–U_i$	NA	NA	NA	NA	NA	NA	NA	NA	0.028	NA	NA	NA	NA
BCF_4	NA	NA	NA	NA	NA	NA	NA	NA	0.015	NA	NA	NA	NA
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In situ thermal cleaning													
$1–U_i$	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BCF_4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

■ 38. Add table I–20 to subpart I to read as follows:

TABLE I–20 TO SUBPART I OF PART 98—REFERENCE EMISSION FACTORS ($1–U_{ij}$) FOR GAS UTILIZATION RATES (U_{ij}) AND BY-PRODUCT FORMATION RATES (B_{ijk}) FOR SEMICONDUCTOR MANUFACTURING FOR 300 MM WAFER SIZES

Process type/sub-type	Process gas i											
	CF_4	C_2F_6	CHF_3	CH_2F_2	CH_3F	C_3F_8	C_4F_8	NF_3	SF_6	C_4F_6	C_5F_8	C_4F_8O
Etching/Wafer Cleaning												
$1–U_i$	0.68	0.80	0.35	0.15	0.34	0.30	0.16	0.17	0.28	0.17	0.10	NA
BCF_4	NA	0.21	0.073	0.020	0.038	0.21	0.045	0.035	0.0072	0.034	0.11	NA
BC_2F_6	0.041	NA	0.040	0.0065	0.0064	0.18	0.030	0.038	0.0017	0.025	0.083	NA
BC_4F_6	0.0015	NA	0.00010	NA	0.0010	NA	0.00083	NA	NA	NA	NA	NA
BC_4F_8	0.0051	NA	0.00061	NA	0.0070	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00012	NA
BC_5F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
$BCHF_3$	0.0056	NA	NA	0.033	0.0049	0.012	0.029	0.0065	0.0012	0.019	0.0069	NA
BCH_2F_2	0.014	NA	0.0026	NA	0.0023	NA	0.0014	0.00086	0.000020	0.000030	NA	NA
BCH_3F	0.00057	NA	0.12	NA	NA	0.00073	NA	NA	0.0082	NA	NA	NA
Chamber Cleaning												
In situ plasma cleaning												
$1–U_i$	NA	NA	NA	NA	NA	NA	NA	0.20	NA	NA	NA	NA
BCF_4	NA	NA	NA	NA	NA	NA	NA	0.037	NA	NA	NA	NA
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Remote plasma cleaning												
$1–U_i$	NA	NA	NA	NA	NA	0.063	NA	0.018	NA	NA	NA	NA
BCF_4	NA	NA	NA	NA	NA	NA	NA	0.038	NA	NA	NA	NA
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
$BCHF_3$	NA	NA	NA	NA	NA	NA	NA	0.000059	NA	NA	NA	NA
BCH_2F_2	NA	NA	NA	NA	NA	NA	NA	0.0016	NA	NA	NA	NA
BCH_3F	NA	NA	NA	NA	NA	NA	NA	0.0028	NA	NA	NA	NA
In situ thermal cleaning												
$1–U_i$	NA	NA	NA	NA	NA	NA	NA	0.28	NA	NA	NA	NA
BCF_4	NA	NA	NA	NA	NA	NA	NA	0.010	NA	NA	NA	NA
BC_2F_6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BC_3F_8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

■ 39. Add table I–21 to subpart I to read as follows:

TABLE I–21 TO SUBPART I OF PART 98—EXAMPLES OF FLUORINATED GHGS USED BY THE ELECTRONICS INDUSTRY

Product type	Fluorinated GHGs used during manufacture
Electronics	CF_4, C_2F_6, C_3F_8, c-C_4F_8, c-C_4F_8O, C_4F_6, C_5F_8, CHF_3, CH_2F_2, NF_3, SF_6, and fluorinated HTFs (CF_3-(O-$CF(CF_3)$-CF_2)n-(O-CF_2)m-O-CF_3, C_nF_{2n+2}, $C_nF_{2n+1}(O)C_mF_{2m+1}$, $C_nF_{2n}O$, $(C_nF_{2n+1})_{3N}$).

Subpart N—Glass Production

■ 40. Revise and republish § 98.146 to read as follows:

§ 98.146 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the information specified in paragraphs (a) and (b) of this section, as applicable.

(a) If a CEMS is used to measure CO_2 emissions, then you must report under this subpart the relevant information required under § 98.36 for the Tier 4 Calculation Methodology and the following information specified in paragraphs (a)(1) through (3) of this section:

(1) Annual quantity of each carbonate-based raw material (tons) charged to each continuous glass melting furnace and for all furnaces combined.

(2) Annual quantity of glass produced (tons), by glass type, from each continuous glass melting furnace and from all furnaces combined.

(3) Annual quantity (tons), by glass type, of recycled scrap glass (cullet) charged to each continuous glass melting furnace and for all furnaces combined.

(b) If a CEMS is not used to determine CO_2 emissions from continuous glass melting furnaces, and process CO_2 emissions are calculated according to the procedures specified in § 98.143(b), then you must report the following information as specified in paragraphs (b)(1) through (9) of this section:

(1) Annual process emissions of CO_2 (metric tons) for each continuous glass melting furnace and for all furnaces combined.

(2) Annual quantity of each carbonate-based raw material charged (tons) to all furnaces combined.

(3) Annual quantity of glass produced (tons), by glass type, from each continuous glass melting furnace and from all furnaces combined.

(4) Annual quantity (tons), by glass type, of recycled scrap glass (cullet) charged to each continuous glass melting furnace and for all furnaces combined.

(5) Results of all tests, if applicable, used to verify the carbonate-based mineral mass fraction for each carbonate-based raw material charged to a continuous glass melting furnace, as specified in paragraphs (b)(5)(i) through (iii) of this section.

(i) Date of test.

(ii) Method(s) and any variations used in the analyses.

(iii) Mass fraction of each sample analyzed.

(6) [Reserved]

(7) Method used to determine decimal fraction of calcination, unless you used the default value of 1.0.

(8) Total number of continuous glass melting furnaces.

(9) The number of times in the reporting year that missing data procedures were followed to measure monthly quantities of carbonate-based raw materials, recycled scrap glass (cullet), or mass fraction of the carbonate-based minerals for any continuous glass melting furnace (months).

■ 41. Amend § 98.147 by revising and republishing paragraphs (a) and (b) to read as follows:

§ 98.147 Records that must be retained.

* * * * *

(a) If a CEMS is used to measure emissions, then you must retain the records required under § 98.37 for the Tier 4 Calculation Methodology and the following information specified in paragraphs (a)(1) through (3) of this section:

(1) Monthly glass production rate for each continuous glass melting furnace, by glass type (tons).

(2) Monthly amount of each carbonate-based raw material charged to each continuous glass melting furnace (tons).

(3) Monthly amount (tons) of recycled scrap glass (cullet) charged to each continuous glass melting furnace, by glass type.

(b) If process CO_2 emissions are calculated according to the procedures specified in § 98.143(b), you must retain the records in paragraphs (b)(1) through (6) of this section.

(1) Monthly glass production rate for each continuous glass melting furnace, by glass type (tons).

(2) Monthly amount of each carbonate-based raw material charged to each continuous glass melting furnace (tons).

(3) Monthly amount (tons) of recycled scrap glass (cullet) charged to each continuous glass melting furnace, by glass type.

(4) Data on carbonate-based mineral mass fractions provided by the raw material supplier for all raw materials consumed annually and included in calculating process emissions in equation N–1 to § 98.143, if applicable.

(5) Results of all tests, if applicable, used to verify the carbonate-based mineral mass fraction for each carbonate-based raw material charged to a continuous glass melting furnace, including the data specified in paragraphs (b)(5)(i) through (v) of this section.

(i) Date of test.

(ii) Method(s), and any variations of the methods, used in the analyses.

(iii) Mass fraction of each sample analyzed.

(iv) Relevant calibration data for the instrument(s) used in the analyses.

(v) Name and address of laboratory that conducted the tests.

(6) The decimal fraction of calcination achieved for each carbonate-based raw material, if a value other than 1.0 is used to calculate process mass emissions of CO_2.

* * * * *

Subpart P—Hydrogen Production

■ 42. Revise § 98.160 to read as follows:

§ 98.160 Definition of the source category.

(a) A hydrogen production source category consists of facilities that produce hydrogen gas as a product.

(b) This source category comprises process units that produce hydrogen by reforming, gasification, oxidation, reaction, or other transformations of feedstocks except the processes listed in paragraph (b)(1) or (2) of this section.

(1) Any process unit for which emissions are reported under another subpart of this part. This includes, but is not necessarily limited to:

(i) Ammonia production units for which emissions are reported under subpart G.

(ii) Catalytic reforming units at petroleum refineries that transform

naphtha into higher octane aromatics for which emissions are reported under subpart Y.

(iii) Petrochemical process units for which emissions are reported under subpart X.

(2) Any process unit that only separates out diatomic hydrogen from a gaseous mixture and is not associated with a unit that produces hydrogen created by transformation of one or more feedstocks, other than those listed in paragraph (b)(1) of this section.

(c) This source category includes the process units that produce hydrogen and stationary combustion units directly associated with hydrogen production (*e.g.* , reforming furnace and hydrogen production process unit heater).

■ 43. Amend § 98.162 by revising paragraph (a) to read as follows:

§ 98.162 GHGs to report.

* * * * *

(a) CO_2 emissions from each hydrogen production process unit, including fuel combustion emissions accounted for in the calculation methodologies in § 98.163.

* * * * *

■ 44. Amend § 98.163 by revising the introductory text, paragraph (b) introductory text, and paragraph (c) to read as follows:

§ 98.163 Calculating GHG emissions.

You must calculate and report the annual CO_2 emissions from each hydrogen production process unit using the procedures specified in paragraphs (a) through (c) of this section, as applicable.

* * * * *

(b) Fuel and feedstock material balance approach. Calculate and report CO_2 emissions as the sum of the annual emissions associated with each fuel and feedstock used for each hydrogen production process unit by following paragraphs (b)(1) through (3) of this section. The carbon content and molecular weight shall be obtained from the analyses conducted in accordance with § 98.164(b)(2), (3), or (4), as applicable, or from the missing data procedures in § 98.165. If the analyses are performed annually, then the annual value shall be used as the monthly average. If the analyses are performed more frequently than monthly, use the arithmetic average of values obtained during the month as the monthly average.

* * * * *

(c) If GHG emissions from a hydrogen production process unit are vented through the same stack as any combustion unit or process equipment that reports CO_2 emissions using a CEMS that complies with the Tier 4 Calculation Methodology in subpart C of this part, then the owner or operator shall report under this subpart the combined stack emissions according to the Tier 4 Calculation Methodology in § 98.33(a)(4) and all associated requirements for Tier 4 in subpart C of this part. If GHG emissions from a hydrogen production process unit using a CEMS that complies with the Tier 4 Calculation Methodology in subpart C of this part does not include combustion emissions from the hydrogen production unit (*i.e.* , the hydrogen production unit has separate stacks for process and combustion emissions), then the calculation methodology in paragraph (b) of this section shall be used considering only fuel inputs to calculate and report CO_2 emissions from fuel combustion related to the hydrogen production unit.

■ 45. Amend § 98.164 by:

■ a. Revising the introductory text, paragraphs (b)(2) through (4), and (b)(5) introductory text; and

■ b. Adding paragraphs (b)(5)(xix) and (c).

The revisions and additions read as follows:

§ 98.164 Monitoring and QA/QC requirements.

The GHG emissions data for hydrogen production process units must be quality-assured as specified in paragraph (a) or (b) of this section, as appropriate for each process unit, except as provided in paragraph (c) of this section:

* * * * *

(b) * * *

(2) Determine the carbon content and the molecular weight annually of standard gaseous hydrocarbon fuels and feedstocks having consistent composition (*e.g.,* natural gas) according to paragraph (b)(5) of this section. For gaseous fuels and feedstocks that have a maximum product specification for carbon content less than or equal to 0.00002 kg carbon per kg of gaseous fuel or feedstock, you may instead determine the carbon content and the molecular weight annually using the product specification's maximum carbon content and molecular weight. For other gaseous fuels and feedstocks (*e.g.,* biogas, refinery gas, or process gas), sample and analyze no less frequently than weekly to determine the carbon content and molecular weight of the fuel and feedstock according to paragraph (b)(5) of this section.

(3) Determine the carbon content of fuel oil, naphtha, and other liquid fuels and feedstocks at least monthly, except annually for standard liquid hydrocarbon fuels and feedstocks having consistent composition, or upon delivery for liquid fuels and feedstocks delivered by bulk transport (*e.g.,* by truck or rail) according to paragraph (b)(5) of this section. For liquid fuels and feedstocks that have a maximum product specification for carbon content less than or equal to 0.00006 kg carbon per gallon of liquid fuel or feedstock, you may instead determine the carbon content annually using the product specification's maximum carbon content.

(4) Determine the carbon content of coal, coke, and other solid fuels and feedstocks at least monthly, except annually for standard solid hydrocarbon fuels and feedstocks having consistent composition, or upon delivery for solid fuels and feedstocks delivered by bulk transport (*e.g.,* by truck or rail) according to paragraph (b)(5) of this section.

(5) Except as provided in paragraphs (b)(2) and (3) of this section for fuels and feedstocks with a carbon content below the specified levels, you must use the following applicable methods to determine the carbon content for all fuels and feedstocks, and molecular weight of gaseous fuels and feedstocks. Alternatively, you may use the results of chromatographic analysis of the fuel and feedstock, provided that the chromatograph is operated, maintained, and calibrated according to the manufacturer's instructions; and the methods used for operation, maintenance, and calibration of the chromatograph are documented in the written monitoring plan for the unit under § 98.3(g)(5).

* * * * *

(xix) For fuels and feedstocks with a carbon content below the specified levels in paragraphs (b)(2) and (3) of this section, if the methods listed in paragraphs (b)(5)(i) through (xviii) of this section are not appropriate because the relevant compounds cannot be detected, the quality control requirements are not technically feasible, or use of the method would be unsafe, you may use modifications of the methods listed in paragraphs (b)(5)(i) through (xviii) or use other methods that are applicable to your fuel or feedstock.

(c) You may use best available monitoring methods as specified in paragraph (c)(2) of this section for measuring the fuel used by each stationary combustion unit directly associated with hydrogen production (*e.g.,* reforming furnace and hydrogen production process unit heater) that

meets the criteria specified in paragraph (c)(1) of this section. Eligibility to use best available monitoring methods ends upon the completion of any planned process unit or equipment shutdown after January 1, 2025.

(1) To be eligible to use best available monitoring methods, you must meet all criteria in paragraphs (c)(1)(i) through (iv) of this section.

(i) The stationary combustion unit must be directly associated with hydrogen production (*e.g.,* reforming furnace and hydrogen production process unit heater).

(ii) A measurement device meeting the requirements in paragraph (b)(1) of this section is not installed to measure the fuel used by each stationary combustion unit as of January 1, 2025.

(iii) The hydrogen production unit and associated stationary combustion unit are operated continuously.

(iv) Installation of a measurement device to measure the fuel used by each stationary combustion unit that meets the requirements in paragraph (b)(1) of this section must require a planned process equipment or unit shutdown or can only be done through a hot tap.

(2) Best available monitoring methods means any of the following methods:

(i) Monitoring methods currently used by the facility that do not meet the specifications of this subpart.

(ii) Supplier data.

(iii) Engineering calculations.

(iv) Other company records.

■ 46. Revise § 98.166 to read as follows:

§ 98.166 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the following information for each hydrogen production process unit:

(a) The unit identification number.

(b) If a CEMS is used to measure CO_2 emissions, then you must report the relevant information required under § 98.36 for the Tier 4 Calculation Methodology. If the CEMS measures emissions from either a common stack for multiple hydrogen production units or a common stack for hydrogen production unit(s) and other source(s), you must also report the estimated decimal fraction of the total annual CO_2 emissions attributable to this hydrogen production process unit (estimated using engineering estimates or best available data).

(c) If a material balance is used to calculate emissions using equations P–1 through P–3 to § 98.163, as applicable, report the total annual CO_2 emissions (metric tons) and the name and annual quantity (metric tons) of each carbon-containing fuel and feedstock.

(d) The information specified in paragraphs (d)(1) through (10):

(1) The type of hydrogen production unit (steam methane reformer (SMR) only, SMR followed by water gas shift reaction (WGS), partial oxidation (POX) only, POX followed by WGS, autothermal reforming only, autothermal reforming followed by WGS, water electrolysis, brine electrolysis, other (specify)).

(2) The type of hydrogen purification method (pressure swing adsorption, amine adsorption, membrane separation, other (specify), none).

(3) Annual quantity of hydrogen produced by reforming, gasification, oxidation, reaction, or other transformation of feedstocks (metric tons).

(4) Annual quantity of hydrogen that is purified only (metric tons). This quantity may be assumed to be equal to the annual quantity of hydrogen in the feedstocks to the hydrogen production unit.

(5) Annual quantity of ammonia intentionally produced as a desired product, if applicable (metric tons).

(6) Quantity of CO_2 collected and transferred off site in either gas, liquid, or solid forms, following the requirements of subpart PP of this part.

(7) Annual quantity of carbon other than CO_2 or methanol collected and transferred off site or transferred to a separate process unit within the facility for which GHG emissions associated with this carbon is being reported under other provisions of this part, in either gas, liquid, or solid forms (metric tons carbon).

(8) Annual quantity of methanol intentionally produced as a desired product, if applicable, (metric tons) for each process unit.

(9) Annual net quantity of steam consumed by the unit, (metric tons). Include steam purchased or produced outside of the hydrogen production unit. If the hydrogen production unit is a net producer of steam, enter the annual net quantity of steam consumed by the unit as a negative value.

(10) An indication (yes or no) if best available monitoring methods were used, in accordance with § 98.164(c), to determine fuel flow for each stationary combustion unit directly associated with hydrogen production (*e.g.,* reforming furnace and hydrogen production process unit heater). If yes, report:

(i) The beginning date of using best available monitoring methods, in accordance with § 98.164(c), to determine fuel flow for each stationary combustion unit directly associated with hydrogen production (*e.g.,* reforming furnace and hydrogen production process unit heater).

(ii) The anticipated or actual end date of using best available monitoring methods, as applicable, in accordance with § 98.164(c), to determine fuel flow for each stationary combustion unit directly associated with hydrogen production (*e.g.,* reforming furnace and hydrogen production process unit heater).

■ 47. Amend § 98.167 by:

■ a. Revising paragraphs (a) and (b);

■ b. Removing and reserving paragraph (c); and

■ c. Revising paragraphs (d) and (e) introductory text.

The revisions read as follows:

§ 98.167 Records that must be retained.

* * * * *

(a) If a CEMS is used to measure CO_2 emissions, then you must retain under this subpart the records required for the Tier 4 Calculation Methodology in § 98.37, and, if the CEMS measures emissions from a common stack for multiple hydrogen production units or emissions from a common stack for hydrogen production unit(s) and other source(s), records used to estimate the decimal fraction of the total annual CO_2 emissions from the CEMS monitoring location attributable to each hydrogen production unit.

(b) You must retain records of all analyses and calculations conducted to determine the values reported in § 98.166(b).

* * * * *

(d) The owner or operator must document the procedures used to ensure the accuracy of the estimates of fuel and feedstock usage in § 98.163(b), including, but not limited to, calibration of weighing equipment, fuel and feedstock flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded, and the technical basis for these estimates must be provided.

(e) The applicable verification software records as identified in this paragraph (e). You must keep a record of the file generated by the verification software specified in § 98.5(b) for the applicable data specified in paragraphs (e)(1) through (12) of this section. Retention of this file satisfies the recordkeeping requirement for the data in paragraphs (e)(1) through (12) of this section for each hydrogen production unit.

* * * * *

Subpart Q—Iron and Steel Production

■ 48. Amend § 98.173 by revising equation Q–5 in paragraph (b)(1)(v) to read as follows:

§ 98.173 Calculating GHG emissions.

* * * * *

(b) * * *

(1) * * *

(v) * * *

$$CO_2 = \frac{44}{12} * \left[(\text{Iron}) * (C_{\text{iron}}) + (\text{Scrap}) * (C_{\text{scrap}}) + (\text{Flux}) * (C_{\text{Flux}}) + (\text{Electrode}) * (C_{\text{Electrode}}) + (\text{Carbon}) * (C_{\text{Carbon}}) - (\text{Steel}) * (C_{\text{Steel}}) + (F_g) * (C_{gf}) * \frac{MW}{MVC} * 0.001 - (\text{Slag}) * (C_{\text{Slag}}) - (R) * (C_R)\right] \quad \text{(Eq. Q–5)}$$

* * * * *

■ 49. Amend § 98.174 by:

■ a. Revising paragraph (b)(2) introductory text;

■ b. Redesignating paragraph (b)(2)(vi) as paragraph (b)(2)(vii); and

■ c. Adding new paragraph (b)(2)(vi).

The revision and addition read as follows:

§ 98.174 Monitoring and QA/QC requirements.

* * * * *

(b) * * *

(2) Except as provided in paragraph (b)(4) of this section, determine the carbon content of each process input and output annually for use in the applicable equations in § 98.173(b)(1) based on analyses provided by the supplier, analyses provided by material recyclers who manage process outputs for sale or use by other industries, or by the average carbon content determined by collecting and analyzing at least three samples each year using the standard methods specified in paragraphs (b)(2)(i) through (vii) of this section as applicable.

* * * * *

(vi) ASTM E415–17, Standard Test Method for Analysis of Carbon and Low-Alloy Steel by Spark Atomic Emission Spectrometry (incorporated by reference, see § 98.7) as applicable for steel.

* * * * *

■ 50. Amend § 98.176 by revising paragraphs (e)(2) and adding paragraph (g) to read as follows:

§ 98.176 Data reporting requirements.

* * * * *

(e) * * *

(2) Whether the carbon content was determined from information from the supplier, material recycler, or by laboratory analysis, and if by laboratory analysis, the method used in § 98.174(b)(2).

* * * * *

(g) For each unit, the type of unit, the annual production capacity, and annual operating hours.

* * * * *

Subpart S—Lime Manufacturing

■ 51. Amend § 98.193 by revising equation S–4 in paragraph (b)(2)(iv) to read as follows:

§ 98.193 Calculating GHG emissions.

* * * * *

(b) * * *

(2) * * *

(iv) * * *

$$E_{CO2,net} = \sum_{i=1}^{t}\sum_{n=1}^{12}\left(EF_{LIME,i,n} * M_{LIME,i,n}\right) + \sum_{i=1}^{b}\sum_{n=1}^{12}\left(EF_{LKD,i,n} * M_{LKD,i,n}\right) + \sum_{i=1}^{z} E_{waste,i} \quad \text{(Eq. S–4)}$$

* * * * *

■ 52. Amend § 98.196 by:

■ a. Revising paragraph (a) introductory text;

■ b. Adding paragraphs (a)(9) through (14);

■ c. Revising paragraphs (b) introductory text and (b)(17); and

■ d. Adding paragraphs (b)(22) and (23).

The revisions and additions read as follows:

§ 98.196 Data reporting requirements.

* * * * *

(a) If a CEMS is used to measure CO_2 emissions, then you must report under this subpart the relevant information required by § 98.36 and the information listed in paragraphs (a)(1) through (14) of this section.

* * * * *

(9) Annual arithmetic average of calcium oxide content for each type of lime product produced (metric tons CaO/metric ton lime).

(10) Annual arithmetic average of magnesium oxide content for each type of lime product produced (metric tons MgO/metric ton lime).

(11) Annual arithmetic average of calcium oxide content for each type of calcined lime byproduct/waste sold (metric tons CaO/metric ton lime).

(12) Annual arithmetic average of magnesium oxide content for each type of calcined lime byproduct/waste sold (metric tons MgO/metric ton lime).

(13) Annual arithmetic average of calcium oxide content for each type of calcined lime byproduct/waste not sold (metric tons CaO/metric ton lime).

(14) Annual arithmetic average of magnesium oxide content for each type of calcined lime byproduct/waste not sold (metric tons MgO/metric ton lime)

(b) If a CEMS is not used to measure CO_2 emissions, then you must report the information listed in paragraphs (b)(1) through (23) of this section.

* * * * *

(17) Indicate whether CO_2 was captured and used on-site (*e.g.,* for use in a purification process, the manufacture of another product). If CO_2 was captured and used on-site, provide the information in paragraphs (b)(17)(i) and (ii) of this section.

(i) The annual amount of CO_2 captured for use in all on-site processes.

(ii) The method used to determine the amount of CO_2 captured.

* * * * *

(22) Annual average results of chemical composition analysis of all lime byproducts or wastes not sold.

(23) Annual quantity (tons) of all lime byproducts or wastes not sold.

Subpart U—Miscellaneous Uses of Carbonate

■ 53. Amend § 98.210 by revising paragraph (b) to read as follows:

§ 98.210 Definition of the source category.

* * * * *

(b) This source category does not include equipment that uses carbonates or carbonate containing minerals that are consumed in the production of cement, glass, ferroalloys, iron and steel, lead, lime, phosphoric acid, pulp and paper, soda ash, sodium bicarbonate, sodium hydroxide, zinc, or ceramics.

* * * * *

Subpart X-Petrochemical Production

■ 54. Amend § 98.243 by revising paragraphs (b)(3) and (d)(5) to read as follows:

§ 98.243 Calculating GHG emissions.

* * * * *

(b) * * *

(3) For each flare, calculate CO_2, CH_4, and N_2O emissions using the methodology specified in § 98.253(b).

* * * * *

(d) * * *

(5) For each flare, calculate CO_2, CH_4, and N_2O emissions using the methodology specified in § 98.253(b).

■ 55. Amend § 98.244 by revising paragraph (b)(4)(iii) to read as follows:

§ 98.244 Monitoring and QA/QC requirements.

* * * * *

(b) * * *

(4) * * *

(iii) ASTM D2505–88 (Reapproved 2004)e1 (incorporated by reference, see § 98.7).

* * * * *

■ 56. Amend § 98.246 by revising paragraphs (a) introductory text, (a)(2), (5), (13) and (15), (b)(7) and (8), and (c) to read as follows:

§ 98.246 Data reporting requirements.

* * * * *

(a) If you use the mass balance methodology in § 98.243(c), you must report the information specified in paragraphs (a)(1) through (15) of this section for each type of petrochemical produced, reported by process unit.

* * * * *

(2) The type of petrochemical produced.

* * * * *

(5) Annual quantity of each type of petrochemical produced from each process unit (metric tons). If you are electing to consider the petrochemical process unit to be the entire integrated ethylene dichloride/vinyl chloride monomer process, the portion of the total amount of ethylene dichloride (EDC) produced that is used in vinyl chloride monomer (VCM) production may be a measured quantity or an estimate that is based on process knowledge and best available data. The portion of the total amount of EDC produced that is not utilized in VCM production must be measured in accordance with § 98.244(b)(2) or (3). Sum the amount of EDC used in the production of VCM plus the amount of separate EDC product to report as the total quantity of EDC petrochemical from an integrated EDC/VCM petrochemical process unit.

* * * * *

(13) Name and annual quantity (in metric tons) of each product included in equations X–1, X–2, and X–3 to § 98.243. If you are electing to consider the petrochemical process unit to be the entire integrated ethylene dichloride/vinyl chloride monomer process, the reported quantity of EDC product should include only that which was not used in the VCM process.

* * * * *

(15) For each gaseous feedstock or product for which the volume was used in equation X–1 to § 98.243, report the annual average molecular weight of the measurements or determinations, conducted according to § 98.243(c)(3) or (4). Report the annual average molecular weight in units of kg per kg mole.

(b) * * *

(7) Information listed in § 98.256(e) for each flare that burns process off-gas. Additionally, provide estimates based on engineering judgment of the fractions of the total CO_2, CH_4 and N_2O emissions that are attributable to combustion of off-gas from the petrochemical process unit(s) served by the flare.

(8) Annual quantity of each type of petrochemical produced from each process unit (metric tons).

* * * * *

(c) If you comply with the combustion methodology specified in § 98.243(d), you must report under this subpart the information listed in paragraphs (c)(1) through (6) of this section.

(1) The ethylene process unit ID or other appropriate descriptor.

(2) For each stationary combustion unit that burns ethylene process off-gas (or group of stationary sources with a common pipe), except flares, the relevant information listed in § 98.36 for the applicable Tier methodology. For each stationary combustion unit or group of units (as applicable) that burns ethylene process off-gas, provide an estimate based on engineering judgment of the fraction of the total emissions that is attributable to combustion of off-gas from the ethylene process unit.

(3) Information listed in § 98.256(e) for each flare that burns ethylene process off-gas. Additionally, provide estimates based on engineering judgment of the fractions of the total CO_2, CH_4 and N_2O emissions that are attributable to combustion of off-gas from the ethylene process unit(s) served by the flare.

(4) Name and annual quantity of each carbon-containing feedstock (metric tons).

(5) Annual quantity of ethylene produced from each process unit (metric tons).

(6) Name and annual quantity (in metric tons) of each product produced in each process unit.

Subpart Y—Petroleum Refineries

■ 57. Amend § 98.250 by revising paragraph (c) to read as follows:

§ 98.250 Definition of source category.

* * * * *

(c) This source category consists of the following sources at petroleum refineries: Catalytic cracking units; fluid coking units; delayed coking units; catalytic reforming units; asphalt blowing operations; blowdown systems; storage tanks; process equipment components (compressors, pumps, valves, pressure relief devices, flanges, and connectors) in gas service; marine vessel, barge, tanker truck, and similar loading operations; flares; and sulfur recovery plants.

§ 98.252 [Amended]

■ 58. Amend § 98.252 by removing and reserving paragraphs (e) and (i).

■ 59. Amend § 98.253 by:

■ a. Revising the introductory text of paragraphs (b) and (c);

■ b. Revising and republishing paragraphs (c)(4) and (5);

■ c. Revising paragraph (e) introductory text;

■ d. Removing and reserving paragraph (g); and

■ e. Revising and republishing paragraphs (i)(2) and (5).

The revisions read as follows:

§ 98.253 Calculating GHG emissions.

* * * * *

(b) For flares, calculate GHG emissions according to the requirements in paragraphs (b)(1) through (3) of this section. All gas discharged through the flare stack must be included in the flare

GHG emissions calculations with the exception of the following, which may be excluded as applicable: gas used for the flare pilots, and if using the calculation method in paragraph (b)(1)(iii) of this section, the gas released during start-up, shutdown, or malfunction events of 500,000 scf/day or less.

* * * * *

(c) For catalytic cracking units and traditional fluid coking units, calculate the GHG emissions from coke burn-off using the applicable methods described in paragraphs (c)(1) through (5) of this section.

* * * * *

(4) Calculate CH_4 emissions using either unit specific measurement data, a unit-specific emission factor based on a source test of the unit, or equation Y–9 to this section.

$$CH_4 = \left(CO_2 * \frac{EmF_2}{EmF_1}\right) \quad \text{(Eq. Y–9)}$$

Where:

CH_4 = Annual methane emissions from coke burn-off (metric tons CH4/year).

CO_2 = Emission rate of CO_2 from coke burn-off calculated in paragraphs (c)(1), (c)(2), (e)(1), or (e)(2) of this section, as applicable (metric tons/year).

EmF_1 = Default CO_2 emission factor for petroleum coke from table C–1 to subpart C of this part (kg CO_2/MMBtu).

EmF_2 = Default CH_4 emission factor for ''PetroleumProducts'' from table C–2 to subpart C of this part (kg CH_4/MMBtu).

(5) Calculate N_2O emissions using either unit specific measurement data, a unit-specific emission factor based on a source test of the unit, or equation Y–10 to this section.

$$N_2O = \left(CO_2 * \frac{EmF_3}{EmF_1}\right) \quad \text{(Eq. Y–10)}$$

Where:

N_2O = Annual nitrous oxide emissions from coke burn-off (mt N_2O/year).

CO_2 = Emission rate of CO_2 from coke burn-off calculated in paragraphs (c)(1), (c)(2), (e)(1), or (e)(2) of this section, as applicable (metric tons/year).

EmF_1 = Default CO_2 emission factor for petroleum coke from table C–1 to subpart C of this part (kg CO_2/MMBtu).

EmF_3 = Default N_2O emission factor for ''PetroleumProducts'' from table C–2 to subpart C of this part (kg N_2O/MMBtu).

* * * * *

(e) For catalytic reforming units, calculate the CO_2 emissions from coke burn-off using the applicable methods described in paragraphs (e)(1) through (3) of this section and calculate the CH_4 and N_2O emissions using the methods described in paragraphs (c)(4) and (5) of this section, respectively.

* * * * *

(i) * * *

(2) Determine the typical mass of water in the delayed coking unit vessel at the end of the cooling cycle prior to venting to the atmosphere using equation Y–18b to this section.

$$M_{water} = \rho_{water} \times \left((H_{water}) \times \frac{\pi \times D^2}{4} - \frac{f_{coke} \times M_{coke}}{\rho_{particle}}\right) \quad \text{(Eq. Y–18b)}$$

Where:

M_{water} = Mass of water in the delayed coking unit vessel at the end of the cooling cycle just prior to atmospheric venting or draining (metric tons/cycle).

ρ_{water} = Density of water at average temperature of the delayed coking unit vessel at the end of the cooling cycle just prior to atmospheric venting (metric tons per cubic feet; mt/ft^3). Use the default value of 0.0270 mt/ft^3.

H_{water} = Typical distance from the bottom of the coking unit vessel to the top of the water level at the end of the cooling cycle just prior to atmospheric venting or draining (feet) from company records or engineering estimates.

f_{coke} = Fraction of the coke-filled bed that is covered by water at the end of the cooling cycle just prior to atmospheric venting or draining. Use 1 if the water fully covers coke-filled portion of the coke drum.

M_{coke} = Typical dry mass of coke in the delayed coking unit vessel at the end of the coking cycle (metric tons/cycle) as determined in paragraph (i)(1) of this section.

$\rho_{particle}$ = Particle density of coke (metric tons per cubic feet; mt/ft^3). Use the default value of 0.0382 mt/ft^3.

D = Diameter of delayed coking unit vessel (feet).

* * * * *

(5) Calculate the CH_4 emissions from decoking operations at each delayed coking unit using equation Y–18f to this section.

$$CH_4 = M_{steam} \times EmF_{DCU} \times N \times 0.001 \quad \text{(Eq. Y–18f)}$$

Where:

CH_4 = Annual methane emissions from the delayed coking unit decoking operations (metric ton/year).

M_{steam} = Mass of steam generated and released per decoking cycle (metric tons/cycle) as determined in paragraph (i)(4) of this section.

EmF_{DCU} = Methane emission factor for delayed coking unit (kilograms CH_4 per metric ton of steam; kg CH_4/mt steam) from unit-specific measurement data. If you do not have unit-specific measurement data, use the default value of 7.9 kg CH_4/metric ton steam.

N = Cumulative number of decoking cycles (or coke-cutting cycles) for all delayed coking unit vessels associated with the delayed coking unit during the year.

0.001 = Conversion factor (metric ton/kg).

* * * * *

■ 60. Amend § 98.254 by:

■ a. Revising the introductory text of paragraphs (d) and (e); and

■ b. Removing and reserving paragraphs (h) and (i).

The revisions read as follows:

§ 98.254 Monitoring and QA/QC requirements.

* * * * *

(d) Except as provided in paragraph (g) of this section, determine gas composition and, if required, average molecular weight of the gas using any of the following methods. Alternatively, the results of chromatographic or direct mass spectrometer analysis of the gas may be used, provided that the gas chromatograph or mass spectrometer is operated, maintained, and calibrated according to the manufacturer's instructions; and the methods used for operation, maintenance, and calibration of the gas chromatograph or mass spectrometer are documented in the written Monitoring Plan for the unit under § 98.3(g)(5).

* * * * *

(e) Determine flare gas higher heating value using any of the following methods. Alternatively, the results of chromatographic analysis of the gas may be used, provided that the gas chromatograph is operated, maintained, and calibrated according to the manufacturer's instructions; and the methods used for operation, maintenance, and calibration of the gas chromatograph are documented in the written Monitoring Plan for the unit under § 98.3(g)(5).

* * * * *

§ 98.255 [Amended]

■ 61. Amend § 98.255 by removing and reserving paragraph (d).

■ 62. Amend § 98.256 by:

■ a. Removing and reserving paragraphs (b) and (i);

■ b. Adding paragraph (j)(2); and

■ c. Revising paragraph (k)(6).

The addition and revision read as follows:

§ 98.256 Data reporting requirements.

* * * * *

(j) * * *

(2) Maximum rated throughput of the unit, in metric tons asphalt/stream day.

* * * * *

(k) * * *

(6) The basis for the typical dry mass of coke in the delayed coking unit vessel at the end of the coking cycle (mass measurements from company records or calculated using equation Y–18a to § 98.253). If you use mass measurements from company records to determine the typical dry mass of coke in the delayed coking unit vessel at the end of the coking cycle, you must also report:

(i) Internal height of delayed coking unit vessel (feet) for each delayed coking unit.

(ii) Typical distance from the top of the delayed coking unit vessel to the top of the coke bed (*i.e.* , coke drum outage) at the end of the coking cycle (feet) from company records or engineering estimates for each delayed coking unit.

* * * * *

■ 63. Amend § 98.257 by:

■ a. Revising paragraphs (b)(16) through (19);

■ b. Removing and reserving paragraphs (b)(27) through (31);

■ c. Revising paragraphs (b)(45), (46), and (53); and

■ d. Removing and reserving paragraphs (b)(54) through (56).

The revisions read as follows:

§ 98.257 Records that must be retained.

* * * * *

(b) * * *

(16) Value of unit-specific CH_4 emission factor, including the units of measure, for each catalytic cracking unit, traditional fluid coking unit, and catalytic reforming unit (calculation method in § 98.253(c)(4)).

(17) Annual activity data (*e.g.* , input or product rate), including the units of measure, in units of measure consistent with the emission factor, for each catalytic cracking unit, traditional fluid coking unit, and catalytic reforming unit (calculation method in § 98.253(c)(4)).

(18) Value of unit-specific N_2O emission factor, including the units of measure, for each catalytic cracking unit, traditional fluid coking unit, and catalytic reforming unit (calculation method in § 98.253(c)(5)).

(19) Annual activity data (*e.g.* , input or product rate), including the units of measure, in units of measure consistent with the emission factor, for each catalytic cracking unit, traditional fluid coking unit, and catalytic reforming unit (calculation method in § 98.253(c)(5)).

* * * * *

(45) Mass of water in the delayed coking unit vessel at the end of the cooling cycle prior to atmospheric venting or draining (metric ton/cycle) (equations Y–18b and Y–18e to § 98.253) for each delayed coking unit.

(46) Typical distance from the bottom of the coking unit vessel to the top of the water level at the end of the cooling cycle just prior to atmospheric venting or draining (feet) from company records or engineering estimates (equation Y–18b to § 98.253) for each delayed coking unit.

* * * * *

(53) Fraction of the coke-filled bed that is covered by water at the end of the cooling cycle just prior to atmospheric venting or draining (equation Y–18b to § 98.253) for each delayed coking unit.

* * * * *

Subpart AA—Pulp and Paper Manufacturing

■ 64. Revise and republish § 98.273 to read as follows:

§ 98.273 Calculating GHG emissions.

(a) For each chemical recovery furnace located at a kraft or soda facility, you must determine CO_2, biogenic CO_2, CH_4, and N_2O emissions using the procedures in paragraphs (a)(1) through (4) of this section. CH4 and N2O emissions must be calculated as the sum of emissions from combustion of fuels and combustion of biomass in spent liquor solids.

(1) Calculate CO_2 emissions from fuel combustion using direct measurement of fuels consumed and default emissions factors according to the Tier 1 methodology for stationary combustion sources in § 98.33(a)(1). Tiers 2 or 3 from § 98.33(a)(2) or (3) may be used to calculate CO_2 emissions if the respective monitoring and QA/QC requirements described in § 98.34 are met.

(2) Calculate CH_4 and N_2O emissions from fuel combustion using direct measurement of fuels consumed, default or site-specific HHV, and default emissions factors and convert to metric tons of CO_2 equivalent according to the methodology for stationary combustion sources in § 98.33(c).

(3) Calculate biogenic CO_2 emissions and emissions of CH_4 and N_2O from biomass using measured quantities of spent liquor solids fired, site-specific HHV, and default emissions factors, according to equation AA–1 to this section:

$$CO_2, CH_4, \text{or } N_2O \text{ from biomass} = (0.90718) * Solids * HHV * EF \qquad \text{(Eq. AA–1)}$$

Where:

CO_2, CH_4, or N_2O, from Biomass = Biogenic CO_2 emissions or emissions of CH_4 or N_2O from spent liquor solids combustion (metric tons per year).

Solids = Mass of spent liquor solids combusted (short tons per year) determined according to § 98.274(b).
HHV = Annual high heat value of the spent liquor solids (mmBtu per kilogram) determined according to § 98.274(b).
EF = Default emission factor for CO_2, CH_4, or N_2O, from table AA–1 to this subpart (kg CO_2, CH_4, or N_2O per mmBtu).
0.90718 = Conversion factor from short tons to metric tons.

(4) Calculate biogenic CO_2 emissions from combustion of biomass (other than spent liquor solids) with other fuels according to the applicable methodology for stationary combustion sources in § 98.33(e).

(b) For each chemical recovery combustion unit located at a sulfite or stand-alone semichemical facility, you must determine CO_2, CH_4, and N_2O emissions using the procedures in paragraphs (b)(1) through (5) of this section:

(1) Calculate CO_2 emissions from fuel combustion using direct measurement of fuels consumed and default emissions factors according to the Tier 1 Calculation Methodology for stationary combustion sources in § 98.33(a)(1). Tiers 2 or 3 from § 98.33(a)(2) or (3) may be used to calculate CO_2 emissions if the respective monitoring and QA/QC requirements described in § 98.34 are met.

(2) Calculate CH_4 and N_2O emissions from fuel combustion using direct measurement of fuels consumed, default or site-specific HHV, and default emissions factors and convert to metric tons of CO_2 equivalent according to the methodology for stationary combustion sources in § 98.33(c).

(3) Calculate biogenic CO_2 emissions using measured quantities of spent liquor solids fired and the carbon content of the spent liquor solids, according to equation AA–2 to this section:

$$\text{Biogenic } CO_2 = \frac{44}{12} * \text{Solids} * CC * (0.90718) \qquad \text{(Eq. AA–2)}$$

Where:
Biogenic CO_2 = Annual CO_2 mass emissions for spent liquor solids combustion (metric tons per year).
Solids = Mass of the spent liquor solids combusted (short tons per year) determined according to § 98.274(b).
CC = Annual carbon content of the spent liquor solids, determined according to § 98.274(b) (percent by weight, expressed as a decimal fraction, *e.g.* , 95% = 0.95).
44/12 = Ratio of molecular weights, CO_2 to carbon.
0.90718 = Conversion from short tons to metric tons.

(4) Calculate biogenic CO_2 emissions from combustion of biomass (other than spent liquor solids) with other fuels according to the applicable methodology for stationary combustion sources in § 98.33(e).

(c) For each pulp mill lime kiln located at a kraft or soda facility, you must determine CO_2, CH_4, and N_2O emissions using the procedures in paragraphs (c)(1) through (4) of this section:

(1) Calculate CO_2 emissions from fuel combustion using direct measurement of fuels consumed and default HHV and default emissions factors, according to the Tier 1 Calculation Methodology for stationary combustion sources in § 98.33(a)(1). Tiers 2 or 3 from § 98.33(a)(2) or (3) may be used to calculate CO_2 emissions if the respective monitoring and QA/QC requirements described in § 98.34 are met.

(2) Calculate CH_4 and N_2O emissions from fuel combustion using direct measurement of fuels consumed, default or site-specific HHV, and default emissions factors and convert to metric tons of CO_2 equivalent according to the methodology for stationary combustion sources in § 98.33(c); use the default HHV listed in table C–1 to subpart C of this part and the default CH_4 and N_2O emissions factors listed in table AA–2 to this subpart.

(3) Biogenic CO_2 emissions from conversion of $CaCO_3$ to CaO are included in the biogenic CO_2 estimates calculated for the chemical recovery furnace in paragraph (a)(3) of this section.

(4) Calculate biogenic CO_2 emissions from combustion of biomass with other fuels according to the applicable methodology for stationary combustion sources in § 98.33(e).

(d) For makeup chemical use, you must calculate CO_2 emissions by using direct or indirect measurement of the quantity of chemicals added and ratios of the molecular weights of CO_2 and the makeup chemicals, according to equation AA–3 to this section:

$$CO_2 = \left[M_{(CaCO_3)} * \frac{44}{100} + M_{(NaCO_3)} * \frac{44}{105.99}\right] * 1000 \text{ kg/metric ton} \qquad \text{(Eq. AA–3)}$$

Where:
CO_2 = CO_2 mass emissions from makeup chemicals (kilograms/yr).
M ($CaCO_3$) = Make-up quantity of $CaCO_3$ used for the reporting year (metric tons per year).
M ($NaCO_3$) = Make-up quantity of Na_2CO_3 used for the reporting year (metric tons per year).
44 = Molecular weight of CO_2.
100 = Molecular weight of $CaCO_3$.
105.99 = Molecular weight of Na_2CO_3.

■ 65. Amend § 98.276 by revising paragraph (a) to read as follows:

§ 98.276 Data reporting requirements.

* * * * *

(a) Annual emissions of CO_2, biogenic CO_2, CH_4, and N_2O (metric tons per year).

* * * * *

■ 66. Amend § 98.277 by revising paragraph (d) to read as follows:

§ 98.277 Records that must be retained.

* * * * *

(d) Annual quantity of spent liquor solids combusted in each chemical recovery furnace and chemical recovery combustion unit, and the basis for determining the annual quantity of the spent liquor solids combusted (whether based on T650 om-05 Solids Content of Black Liquor, TAPPI (incorporated by reference, see § 98.7) or an online measurement system). If an online measurement system is used, you must retain records of the calculations used to determine the annual quantity of spent liquor solids combusted from the continuous measurements.

* * * * *

Subpart BB—Silicon Carbide Production

■ 67. Amend § 98.286 by revising the introductory text and adding paragraph (c) to read as follows:

§ 98.286 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the information specified

in paragraph (a) or (b) of this section, and paragraph (c) of this section, as applicable for each silicon carbide production facility.

* * * * *

(c) If methane abatement technology is used at the silicon carbide production facility, you must report the information in paragraphs (c)(1) through (3) of this section. Upon reporting this information once in an annual report, you are not required to report this information again unless the information changes during a reporting year, in which case, the reporter must include any updates in the annual report for the reporting year in which the change occurred.

(1) Type of methane abatement technology used on each silicon carbide process unit or production furnace, and date of installation for each.

(2) Methane destruction efficiency for each methane abatement technology (percent destruction). You must either use the manufacturer's specified destruction efficiency or the destruction efficiency determined via a performance test. If you report the destruction efficiency determined via a performance test, you must also report the test method that was used during the performance test.

(3) Percentage of annual operating hours that methane abatement technology was in use for all silicon carbide process units or production furnaces combined.

■ 68. Amend § 98.287 by revising the introductory text and adding paragraph (d) to read as follows:

§ 98.287 Records that must be retained.

In addition to the records required by § 98.3(g), you must retain the records specified in paragraphs (a) through (d) of this section for each silicon carbide production facility.

* * * * *

(d) Records of all information reported as required under § 98.286(c).

■ 69. Revise and republish subpart DD consisting of §§ 98.300 through 98.308 to read as follows:

Subpart DD—Electrical Transmission and Distribution Equipment Use

Sec.

98.300 Definition of the source category.
98.301 Reporting threshold.
98.302 GHGs to report.
98.303 Calculating GHG emissions.
98.304 Monitoring and QA/QC requirements.
98.305 Procedures for estimating missing data.
98.306 Data reporting requirements.
98.307 Records that must be retained.
98.308 Definitions.

§ 98.300 Definition of the source category.

(a) The electrical transmission and distribution equipment use source category consists of all electric transmission and distribution equipment and servicing inventory insulated with or containing fluorinated GHGs, including but not limited to sulfur hexafluoride (SF_6) and perfluorocarbons (PFCs), used within an electric power system. Electric transmission and distribution equipment and servicing inventory includes, but is not limited to:

(1) Gas-insulated substations.

(2) Circuit breakers.

(3) Switchgear, including closed-pressure and hermetically sealed-pressure switchgear and gas-insulated lines containing fluorinated GHGs, including but not limited to SF_6 and PFCs.

(4) Gas containers such as pressurized cylinders.

(5) Gas carts.

(6) Electric power transformers.

(7) Other containers of fluorinated GHG, including but not limited to SF_6 and PFCs.

(b) [Reserved]

§ 98.301 Reporting threshold.

(a) You must report GHG emissions under this subpart if you are an electric power system as defined in § 98.308 and your facility meets the requirements of § 98.2(a)(1). To calculate total annual GHG emissions for comparison to the 25,000 metric ton CO_2e per year emission threshold in table A–3 to subpart A to this part, you must calculate emissions of each fluorinated GHG that is a component of a reportable insulating gas and then sum the emissions of each fluorinated GHG resulting from the use of electrical transmission and distribution equipment for threshold applicability purposes using equation DD–1 to this section.

$$E = \sum_j \sum_i NC_{EPS,j} * GHG_{i,w} * GWP_i * EF * 0.000453592 \quad \text{(Eq. DD–1)}$$

Where:

E = Annual emissions for threshold applicability purposes (metric tons CO_2e).

$NC_{EPS,j}$ = the total nameplate capacity of equipment containing reportable insulating gas j (excluding hermetically sealed-pressure equipment) located within the facility plus the total nameplate capacity of equipment containing reportable insulting gas j (excluding hermetically sealed-pressure equipment) that is not located within the facility but is under common ownership or control (lbs).

$GHG_{i,w}$ = The weight fraction of fluorinated GHG i in reportable insulating gas j in the gas insulated equipment included in the total nameplate capacity $NC_{EPS,j}$, expressed as a decimal fraction. If fluorinated GHG i is not part of a gas mixture, use a value of 1.0.

GWP_i = Gas-appropriate GWP as provided in table A–1 to subpart A of this part.

EF = Emission factor for electrical transmission and distribution equipment (lbs emitted/lbs nameplate capacity). For all gases, use an emission factor or 0.1.

i = Fluorinated GHG contained in the electrical transmission and distribution equipment.

0.000453592 = Conversion factor from lbs to metric tons.

(b) A facility other than an electric power system that is subject to this part because of emissions from any other source category listed in table A–3 or A–4 to subpart A of this part is not required to report emissions under subpart DD of this part unless the total estimated emissions of fluorinated GHGs that are components of reportable insulating gases, as calculated in equation DD–2 to this section, equals or exceeds 25,000 tons CO_2e.

$$E = \sum_j \sum_i NC_{other,j} * GHG_{i,w} * GWP_i * EF * 0.000453592 \quad \text{(Eq. DD–2)}$$

Where:

E = Annual emissions for threshold applicability purposes (metric tons CO_2e).

$NC_{other,j}$ = For a facility other than an electric power system, the total nameplate capacity of equipment containing reportable insulating gas j (excluding hermetically sealed-pressure equipment) located within the facility (lbs).

$GHG_{i,w}$ = The weight fraction of fluorinated GHG i in reportable insulating gas j in the gas insulated equipment included in

the total nameplate capacity $NC_{other,j}$, expressed as a decimal fraction. If fluorinated GHG i is not part of a gas mixture, use a value of 1.0.

GWP_i = Gas-appropriate GWP as provided in table A–1 to subpart A of this part.

EF = Emission factor for electrical transmission and distribution equipment (lbs emitted/lbs nameplate capacity). For all gases, use an emission factor or 0.1.

i = Fluorinated GHG contained in the electrical transmission and distribution equipment.

0.000453592 = Conversion factor from lbs to metric tons.

§ 98.302 GHGs to report.

You must report emissions of each fluorinated GHG, including but not limited to SF_6 and PFCs, from your facility (including emissions from fugitive equipment leaks, installation, servicing, equipment decommissioning and disposal, and from storage cylinders) resulting from the transmission and distribution servicing inventory and equipment listed in § 98.300(a), except you are not required to report emissions of fluorinated GHGs that are components of insulating gases whose weighted average GWPs, as calculated in equation DD–3 to this section, are less than or equal to one. For acquisitions of equipment containing or insulated with fluorinated GHGs, you must report emissions from the equipment after the title to the equipment is transferred to the electric power transmission or distribution entity.

$$GWP_j = \sum_i GHG_{i,w} * GWP_i \quad \text{(Eq. DD–3)}$$

Where:

GWP_j = Weighted average GWP of insulating gas j.

$GHG_{i,w}$ = The weight fraction of GHG i in insulating gas j, expressed as a decimal. fraction. If GHG i is not part of a gas mixture, use a value of 1.0.

GWP_i = Gas-appropriate GWP as provided in table A–1 to subpart A of this part.

i = GHG contained in the electrical transmission and distribution equipment.

§ 98.303 Calculating GHG emissions.

(a) *Calculating GHG emissions.* Calculate the annual emissions of each fluorinated GHG that is a component of any reportable insulating gas using the mass-balance approach in equation DD–4 to this section:

$$\text{User Emissions}_i = \Sigma_j \text{GHG}_{i,w} * [(\text{Decrease in Inventory of Reportable Insulating Gas j}) + (\text{Acquisitions of Reportable Insulating Gas j}) - (\text{Disbursements of Reportable Insulating Gas j}) - (\text{Net Increase in Total Nameplate Capacity of Equipment Operated Containing Reportable Insulating Gas j})] \quad \text{(Eq. DD–4)}$$

Where:

User Emissions_i = Emissions of fluorinated GHG i from the facility (pounds).

$GHG_{i,w}$ = The weight fraction of fluorinated GHG i in reportable insulating gas j if reportable insulating gas j is a gas mixture, expressed as a decimal fraction. If fluorinated GHG i is not part of a gas mixture, use a value of 1.0.

Decrease in Inventory of Reportable Insulating Gas j = (Pounds of reportable insulating gas j stored in containers, but not in energized equipment, at the beginning of the year) − (Pounds of reportable insulating gas j stored in containers, but not in energized equipment, at the end of the year). Reportable insulating gas inside equipment that is not energized is considered to be ''stored in containers.''

Acquisitions of Reportable Insulating gas j = (Pounds of reportable insulating gas j purchased or otherwise acquired from chemical producers, chemical distributors, or other entities in bulk) + (Pounds of reportable insulating gas j purchased or otherwise acquired from equipment manufacturers, equipment distributors, or other entities with or inside equipment, including hermetically sealed-pressure switchgear, while the equipment was not in use) + (Pounds of each SF_6 insulating gas j returned to facility after off-site recycling) + (Pounds of reportable insulating gas j acquired inside equipment, except hermetically sealed-pressure switchgear, that was transferred while the equipment was in use, *e.g.,* through acquisition of all or part of another electric power system).

Disbursements of Reportable Insulating gas j = (Pounds of reportable insulating gas j returned to suppliers) + (Pounds of reportable insulating gas j sent off site for recycling) + (Pounds of reportable insulating gas j sent off-site for destruction) + (Pounds of reportable insulating gas j that was sold or transferred to other entities in bulk) + (Pounds of reportable insulating gas j contained in equipment, including hermetically sealed-pressure switchgear, that was sold or transferred to other entities while the equipment was not in use) + (Pounds of reportable insulating gas j inside equipment, except hermetically sealed-pressure switchgear, that was transferred while the equipment was in use, *e.g.,* through sale of all or part of the electric power system to another electric power system).

Net Increase in Total Nameplate Capacity of Equipment Operated containing reportable insulating gas j = (The Nameplate Capacity of new equipment, as defined at § 98.308, containing reportable insulating gas j in pounds) − (Nameplate Capacity of retiring equipment, as defined at § 98.308, containing reportable insulating gas j in pounds). (Note that Nameplate Capacity refers to the full and proper charge of equipment rather than to the actual charge, which may reflect leakage).

(b) *Nameplate capacity adjustments.* Users of closed-pressure electrical equipment with a voltage capacity greater than 38 kV may measure and adjust the nameplate capacity value specified by the equipment manufacturer on the nameplate attached to that equipment, or within the equipment manufacturer's official product specifications, by following the requirements in paragraphs (b)(1) through (10) of this section. Users of other electrical equipment are not permitted to adjust the nameplate capacity value of the other equipment.

(1) If you elect to measure the nameplate capacity value(s) of one or more pieces of electrical equipment with a voltage capacity greater than 38 kV, you must measure the nameplate capacity values of all the electrical

equipment in your facility that has a voltage capacity greater than 38 kV and that is installed or retired in that reporting year and in subsequent reporting years.

(2) You must adopt the measured nameplate capacity value for any piece of equipment for which the absolute value of the difference between the measured nameplate capacity value and the nameplate capacity value most recently specified by the manufacturer equals or exceeds two percent of the nameplate capacity value most recently specified by the manufacturer.

(3) You may adopt the measured nameplate capacity value for equipment for which the absolute value of the difference between the measured nameplate capacity value and the nameplate capacity value most recently specified by the manufacturer is less than two percent of the nameplate capacity value most recently specified by the manufacturer, but if you elect to adopt the measured nameplate capacity for that equipment, then you must adopt the measured nameplate capacity value for all of the equipment for which the difference between the measured nameplate capacity value and the nameplate capacity value most recently specified by the manufacturer is less than two percent of the nameplate capacity value most recently specified by the manufacturer. This applies in the reporting year in which you first adopt the measured nameplate capacity for the equipment and in subsequent reporting years.

(4) Users of electrical equipment measuring the nameplate capacity of any new electrical equipment must:

(i) Record the amount of insulating gas in the equipment at the time the equipment was acquired (pounds), either per information provided by the manufacturer, or by transferring insulating gas from the equipment to a gas container and measuring the amount of insulating gas transferred. The equipment user is responsible for ensuring the gas is accounted for consistent with the methodologies specified in paragraphs (b)(4)(ii) through (iii) and (b)(5) of this section. If no insulating gas was in the device when it was acquired, record this value as zero.

(ii) If insulating gas is added to the equipment subsequent to the acquisition of the equipment to energize it the first time, transfer the insulating gas to the equipment to reach the temperature-compensated design operating pressure per manufacturer specifications. Follow the manufacturer-specified procedure to ensure that the measured temperature accurately reflects the temperature of the insulating gas, *e.g.,* by measuring the insulating gas pressure and vessel temperature after allowing appropriate time for the temperature of the transferred gas to equilibrate with the vessel temperature. Measure and calculate the total amount of reportable insulating gas added to the device using one of the methods specified in paragraphs (b)(4)(ii)(A) and (B) of this section.

(A) To determine the amount of reportable insulating gas transferred to the electrical equipment, weigh the gas container being used to fill the device prior to, and after, the addition of the reportable insulating gas to the electrical equipment, and subtract the second value (after-transfer gas container weight) from the first value (prior-to-transfer gas container weight). Account for any gas contained in hoses before and after the transfer.

(B) Connect a mass flow meter between the electrical equipment and a gas cart. Transfer gas to the equipment to reach the temperature-compensated design operating pressure per manufacturer specifications. During gas transfer, you must keep the mass flow rate within the range specified by the mass flow meter manufacturer to assure an accurate and precise mass flow meter reading. Close the connection to the GIE from the mass flow meter hose and ensure that the gas trapped in the filling hose returns through the mass flow meter. Calculate the amount of gas transferred from the mass reading on the mass flow meter.

(iii) Sum the results of paragraphs (b)(4)(i) and (ii) to obtain the measured nameplate capacity for the new equipment.

(5) Electrical equipment users measuring the nameplate capacity of any retiring electrical equipment must:

(i) Measure and record the initial system pressure and vessel temperature prior to removing any insulating gas.

(ii) Compare the initial system pressure and temperature to the equipment manufacturer's temperature/pressure curve for that equipment and insulating gas.

(iii) If the temperature-compensated initial system pressure of the electrical equipment does not match the temperature-compensated design operating pressure specified by the equipment manufacturer, you may either:

(A) Add or remove insulating gas to/from the electrical equipment until the manufacturer-specified value is reached, or

(B) If the temperature-compensated initial system pressure of the electrical equipment is no higher than the temperature-compensated design operating pressure specified by the manufacturer and no lower than five pounds per square inch (5 psi) less than the temperature-compensated design operating pressure specified by the manufacturer, use equation DD–5 to this section to calculate the nameplate capacity based on the mass recorded under paragraph (b)(5)(vi) of this section.

(iv) Weigh the gas container being used to receive the gas and record this value.

(v) Recover insulating gas from the electrical equipment until five minutes after the pressure in the electrical equipment reaches a pressure of at most five pounds per square inch absolute (5 psia).

(vi) Record the amount of insulating gas recovered (pounds) by weighing the gas container that received the gas and subtracting the weight recorded pursuant to paragraph (b)(5)(iv)(B) of this section from this value. Account for any gas contained in hoses before and after the transfer. The amount of gas recovered shall be the measured nameplate capacity for the electrical equipment unless the final temperature-compensated pressure of the electrical equipment exceeds 0.068 psia (3.5 Torr) or the electrical equipment user is calculating the nameplate capacity pursuant to paragraph (b)(5)(iii)(B) of this section, in which cases the measured nameplate capacity shall be the result of equation DD–5 to this section.

(vii) If you are calculating the nameplate capacity pursuant to paragraph (b)(5)(iii)(B) of this section, use equation DD–5 to this section to do so.

$$NC_C = \frac{P_{NC}}{(P_i - P_f)} \times M_R \qquad \text{(Eq. DD–5)}$$

Where:

NC_C = Nameplate capacity of the equipment measured and calculated by the equipment user (pounds).

P_i = Initial temperature-compensated pressure of the equipment, based on the temperature-pressure curve for the insulating gas (psia).

P_f = Final temperature-compensated pressure of the equipment, based on the temperature-pressure curve for the insulating gas (psia). This may be equated to zero if the final temperature-compensated pressure of the equipment is equal to or lower than 0.068 psia (3.5 Torr).

P_{NC} = Temperature-compensated pressure of the equipment at the manufacturer-specified filling density of the equipment (*i.e.,* at the full and proper charge, psia).

M_R = Mass of insulating gas recovered from the equipment, measured in paragraph (b)(5)(vi) of this section (pounds).

(viii) Record the final system pressure and vessel temperature.

(6) Instead of measuring the nameplate capacity of electrical equipment when it is retired, users may measure the nameplate capacity of electrical equipment during maintenance activities that require opening the gas compartment, but they must follow the procedures set forth in paragraph (b)(5) of this section.

(7) If the electrical equipment will remain energized, and the electrical equipment user is adopting the user-measured nameplate capacity, the electrical equipment user must affix a revised nameplate capacity label, showing the revised nameplate value and the year the nameplate capacity adjustment process was performed, to the device by the end of the calendar year in which the process was completed. The manufacturer's previous nameplate capacity label must remain visible after the revised nameplate capacity label is affixed to the device.

(8) For each piece of electrical equipment whose nameplate capacity was adjusted during the reporting year, the revised nameplate capacity value must be used in all provisions wherein the nameplate capacity is required to be recorded, reported, or used in a calculation in this subpart unless otherwise specified herein.

(9) The nameplate capacity of a piece of electrical equipment may only be adjusted more than once if the physical capacity of the device has changed (*e.g.,* replacement of bushings) after the initial adjustment was performed, in which case the equipment user must adjust the nameplate capacity pursuant to the provisions of this paragraph (b).

(10) Measuring devices used to measure the nameplate capacity of electrical equipment under this paragraph (b) must meet the following accuracy and precision requirements:

(i) Flow meters must be certified by the manufacturer to be accurate and precise to within one percent of the largest value that the flow meter can, according to the manufacturer's specifications, accurately record.

(ii) Pressure gauges must be certified by the manufacturer to be accurate and precise to within 0.5% of the largest value that the gauge can, according to the manufacturer's specifications, accurately record.

(iii) Temperature gauges must be certified by the manufacturer to be accurate and precise to within $+/-1.0$ °F.

(iv) Scales must be certified by the manufacturer to be accurate and precise to within one percent of the true weight.

§ 98.304 Monitoring and QA/QC requirements.

(a) [Reserved]

(b) You must adhere to the following QA/QC methods for reviewing the completeness and accuracy of reporting:

(1) Review inputs to equation DD–4 to § 98.303 to ensure inputs and outputs to the company's system are included.

(2) Do not enter negative inputs and confirm that negative emissions are not calculated. However, the Decrease in fluorinated GHG Inventory and the Net Increase in Total Nameplate Capacity may be calculated as negative numbers.

(3) Ensure that beginning-of-year inventory matches end-of-year inventory from the previous year.

(4) Ensure that in addition to fluorinated GHG purchased from bulk gas distributors, fluorinated GHG purchased from Original Equipment Manufacturers (OEM) and fluorinated GHG returned to the facility from off-site recycling are also accounted for among the total additions.

(c) Ensure the following QA/QC methods are employed throughout the year:

(1) Ensure that cylinders returned to the gas supplier are consistently weighed on a scale that is certified to be accurate and precise to within 2 pounds of true weight and is periodically recalibrated per the manufacturer's specifications. Either measure residual gas (the amount of gas remaining in returned cylinders) or have the gas supplier measure it. If the gas supplier weighs the residual gas, obtain from the gas supplier a detailed monthly accounting, within ±2 pounds, of residual gas amounts in the cylinders returned to the gas supplier.

(2) Ensure that cylinders weighed for the beginning and end of year inventory measurements are weighed on a scale that is certified to be accurate and precise to within 2 pounds of true weight and is periodically recalibrated per the manufacturer's specifications. All scales used to measure quantities that are to be reported under § 98.306 must be calibrated using calibration procedures specified by the scale manufacturer. Calibration must be performed prior to the first reporting year. After the initial calibration, recalibration must be performed at the minimum frequency specified by the manufacturer.

(3) Ensure all substations have provided information to the manager compiling the emissions report (if it is not already handled through an electronic inventory system).

(d) GHG Monitoring Plans, as described in § 98.3(g)(5), must be completed by April 1, 2011.

§ 98.305 Procedures for estimating missing data.

A complete record of all measured parameters used in the GHG emissions calculations is required. Replace missing data, if needed, based on data from equipment with a similar nameplate capacity for fluorinated GHGs, and from similar equipment repair, replacement, and maintenance operations.

§ 98.306 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the following information for each electric power system, by chemical:

(a) Nameplate capacity of equipment (pounds) containing each insulating gas:

(1) Existing at the beginning of the year (excluding hermetically sealed-pressure switchgear).

(2) New hermetically sealed-pressure switchgear during the year.

(3) New equipment other than hermetically sealed-pressure switchgear during the year.

(4) Retired hermetically sealed-pressure switchgear during the year.

(5) Retired equipment other than hermetically sealed-pressure switchgear during the year.

(b) Transmission miles (length of lines carrying voltages above 35 kilovolts).

(c) Distribution miles (length of lines carrying voltages at or below 35 kilovolts).

(d) Pounds of each reportable insulating gas stored in containers, but not in energized equipment, at the beginning of the year.

(e) Pounds of each reportable insulating gas stored in containers, but not in energized equipment, at the end of the year.

(f) Pounds of each reportable insulating gas purchased or otherwise acquired in bulk from chemical producers, chemical distributors, or other entities.

(g) Pounds of each reportable insulating gas purchased or otherwise acquired from equipment manufacturers, equipment distributors, or other entities with or inside equipment, including hermetically sealed-pressure switchgear, while the equipment was not in use.

(h) Pounds of each reportable insulating gas returned to facility after off-site recycling.

(i) Pounds of each reportable insulating gas acquired inside equipment, except hermetically sealed-pressure switchgear, that was transferred while the equipment was in use, *e.g.,* through acquisition of all or part of another electric power system.

(j) Pounds of each reportable insulating gas returned to suppliers.

(k) Pounds of each reportable insulating gas that was sold or transferred to other entities in bulk.

(l) Pounds of each reportable insulating gas sent off-site for recycling.

(m) Pounds of each reportable insulating gas sent off-site for destruction.

(n) Pounds of each reportable insulating gas contained in equipment, including hermetically sealed-pressure switchgear, that was sold or transferred to other entities while the equipment was not in use.

(o) Pounds of each reportable insulating gas disbursed inside equipment, except hermetically sealed-pressure switchgear, that was transferred while the equipment was in use, *e.g.,* through sale of all or part of the electric power system to another electric power system.

(p) State(s) or territory in which the facility lies.

(q) The number of reportable-insulating-gas-containing pieces of equipment in each of the following equipment categories:

(1) New hermetically sealed-pressure switchgear during the year.

(2) New equipment other than hermetically sealed-pressure switchgear during the year.

(3) Retired hermetically sealed-pressure switchgear during the year.

(4) Retired equipment other than hermetically sealed-pressure switchgear during the year.

(r) The total of the nameplate capacity values most recently assigned by the electrical equipment manufacturer(s) to each of the following groups of equipment:

(1) All new equipment whose nameplate capacity values were measured by the user under this subpart and for which the user adopted the user-measured nameplate capacity value during the year.

(2) All retiring equipment whose nameplate capacity values were measured by the user under this subpart and for which the user adopted the user-measured nameplate capacity value during the year.

(s) The total of the nameplate capacity values measured by the electrical equipment user for each of the following groups of equipment:

(1) All new equipment whose nameplate capacity values were measured by the user under this subpart and for which the user adopted the user-measured nameplate capacity value during the year.

(2) All retiring equipment whose nameplate capacity values were measured by the user under this subpart and for which the user adopted the user-measured nameplate capacity value during the year.

(t) For each reportable insulating gas reported in paragraphs (a), (d) through (o), and (q) of this section, an ID number or other appropriate descriptor that is unique to that reportable insulating gas.

(u) For each ID number or descriptor reported in paragraph (t) of this section for each unique insulating gas, the name (as required in § 98.3(c)(4)(iii)(G)(1)) and weight percent of each fluorinated gas in the insulating gas.

§ 98.307 Records that must be retained.

(a) In addition to the information required by § 98.3(g), you must retain records of the information reported and listed in § 98.306.

(b) For each piece of electrical equipment whose nameplate capacity is measured by the equipment user, retain records of the following:

(1) Equipment manufacturer name.

(2) Year equipment was manufactured. If the date year the equipment was manufactured cannot be determined, report a best estimate of the year of manufacture and record how the estimated year was determined.

(3) Manufacturer serial number. For any piece of equipment whose serial number is unknown (*e.g.,* the serial number does not exist or is not visible), another unique identifier must be recorded as the manufacturer serial number. The electrical equipment user must retain documentation that allows for each electrical equipment to be readily identifiable.

(4) Equipment type (*i.e.,* closed-pressure vs. hermetically sealed-pressure).

(5) Equipment voltage capacity (in kilovolts).

(6) The name and GWP of each insulating gas used.

(7) Nameplate capacity value (pounds), as specified by the equipment manufacturer. The value must reflect the latest value specified by the manufacturer during the reporting year.

(8) Nameplate capacity value (pounds) measured by the equipment user.

(9) The date the nameplate capacity measurement process was completed.

(10) The measurements and calculations used to calculate the value in paragraph (b)(8) of this section.

(11) The temperature-pressure curve and/or other information used to derive the initial and final temperature-adjusted pressures of the equipment.

(12) Whether or not the nameplate capacity value in paragraph (b)(8) of this section has been adopted for the piece of electrical equipment.

§ 98.308 Definitions.

Except as specified in this section, all terms used in this subpart have the same meaning given in the Clean Air Act and subpart A of this part.

Facility, with respect to an electric power system, means the electric power system as set out in this definition. An electric power system is comprised of all electric transmission and distribution equipment insulated with or containing fluorinated GHGs that is linked through electric power transmission or distribution lines and functions as an integrated unit, that is owned, serviced, or maintained by a single electric power transmission or distribution entity (or multiple entities with a common owner), and that is located between:

(1) The point(s) at which electric energy is obtained from an electricity generating unit or a different electric power transmission or distribution entity that does not have a common owner; and

(2) The point(s) at which any customer or another electric power transmission or distribution entity that does not have a common owner receives the electric energy. The facility also includes servicing inventory for such equipment that contains fluorinated GHGs.

Electric power transmission or distribution entity means any entity that transmits, distributes, or supplies electricity to a consumer or other user, including any company, electric cooperative, public electric supply corporation, a similar Federal department (including the Bureau of Reclamation or the Corps of Engineers), a municipally owned electric department offering service to the

public, an electric public utility district, or a jointly owned electric supply project.

Energized, for the purposes of this subpart, means connected through busbars or cables to an electrical power system or fully-charged, ready for service, and being prepared for connection to the electrical power system. Energized equipment does not include spare gas insulated equipment (including hermetically-sealed pressure switchgear) in storage that has been acquired by the facility, and is intended for use by the facility, but that is not being used or prepared for connection to the electrical power system.

Insulating gas, for the purposes of this subpart, means any fluorinated GHG or fluorinated GHG mixture, including but not limited to SF_6 and PFCs, that is used as an insulating and/or arc-quenching gas in electrical equipment.

New equipment, for the purposes of this subpart, means either any gas insulated equipment, including hermetically-sealed pressure switchgear, that is not energized at the beginning of the reporting year but is energized at the end of the reporting year, or any gas insulated equipment other than hermetically-sealed pressure switchgear that has been transferred while in use, meaning it has been added to the facility's inventory without being taken out of active service (*e.g.,* when the equipment is sold to or acquired by the facility while remaining in place and continuing operation).

Operator, for the purposes of this subpart, means any person who operates or supervises a facility, excluding a person whose sole responsibility is to ensure reliability, balance load or otherwise address electricity flow.

Reportable insulating gas, for purposes of this subpart, means an insulating gas whose weighted average GWP, as calculated in equation DD–3 to § 98.302, is greater than one. A fluorinated GHG that makes up either part or all of a reportable insulating gas is considered to be a component of the reportable insulating gas.

Retired equipment, for the purposes of this subpart, means either any gas insulated equipment including hermetically-sealed pressure switchgear, that is energized at the beginning of the reporting year but is not energized at the end of the reporting year, or any gas insulated equipment other than hermetically-sealed pressure switchgear that has been transferred while in use, meaning it has been removed from the facility's inventory without being taken out of active service (*e.g.,* when the equipment is acquired by a new facility while remaining in place and continuing operation).

Subpart FF—Underground Coal Mines

■ 70. Amend § 98.323 by revising parameter ''MCFi'' of equation FF–3 in paragraph (b) introductory text to read as follows:

§ 98.323 Calculating GHG emissions.

* * * * *

(b) * * *

MCF_i = Moisture correction factor for the measurement period, volumetric basis.
= 1 when V_i and C_i are measured on a dry basis or if both are measured on a wet basis.
= $1 - (fH2O)_i$ when V_i is measured on a wet basis and C_i is measured on a dry basis.
= $1/[1 - (fH2O)_i]$ when V_i is measured on a dry basis and C_i is measured on a wet basis.

* * * * *

■ 71. Amend § 98.326 by revising paragraph (t) to read as follows:

§ 98.326 Data reporting requirements.

* * * * *

(t) Mine Safety and Health Administration (MSHA) identification number for this coal mine.

Subpart GG—Zinc Production

■ 72. Amend § 98.333 by revising paragraph (b)(1) introductory text to read as follows:

§ 98.333 Calculating GHG emissions.

* * * * *

(b) * * *

(1) For each Waelz kiln or electrothermic furnace at your facility used for zinc production, you must determine the mass of carbon in each carbon-containing material, other than fuel, that is fed, charged, or otherwise introduced into each Waelz kiln and electrothermic furnace at your facility for each year and calculate annual CO_2 process emissions from each affected unit at your facility using equation GG–1 to this section. For electrothermic furnaces, carbon containing input materials include carbon electrodes and carbonaceous reducing agents. For Waelz kilns, carbon containing input materials include carbonaceous reducing agents. If you document that a specific material contributes less than 1 percent of the total carbon into the process, you do not have to include the material in your calculation using equation R–1 to § 98.183.

* * * * *

■ 73. Amend § 98.336 by adding paragraphs (a)(6) and (b)(6) to read as follows:

§ 98.336 Data reporting requirements.

* * * * *

(a) * * *

(6) Total amount of electric arc furnace dust annually consumed by all Waelz kilns at the facility (tons).

(b) * * *

(6) Total amount of electric arc furnace dust annually consumed by all Waelz kilns at the facility (tons).

* * * * *

Subpart HH—Municipal Solid Waste Landfills

■ 74. Amend § 98.343 by revising paragraphs (a)(2) and (c)(3) to read as follows:

§ 98.343 Calculating GHG emissions.

(a) * * *

(2) For years when material-specific waste quantity data are available, apply equation HH–1 to this section for each waste quantity type and sum the CH_4 generation rates for all waste types to calculate the total modeled CH_4 generation rate for the landfill. Use the appropriate parameter values for k, DOC, MCF, DOC_F, and F shown in table HH–1 to this subpart. The annual quantity of each type of waste disposed must be calculated as the sum of the daily quantities of waste (of that type) disposed. You may use the uncharacterized MSW parameters for a portion of your waste materials when using the material-specific modeling approach for mixed waste streams that cannot be designated to a specific material type. For years when waste composition data are not available, use the bulk waste parameter values for k and DOC in table HH–1 to this subpart for the total quantity of waste disposed in those years.

* * * * *

(c) * * *

(3) For landfills with landfill gas collection systems, calculate CH_4 emissions using the methodologies specified in paragraphs (c)(3)(i) and (ii) of this section.

(i) Calculate CH_4 emissions from the modeled CH_4 generation and measured CH_4 recovery using equation HH–6 to this section.

$$\text{Emissions} = \left[\left(G_{CH4} - \sum_{n=1}^{N} R_n\right) \times (1 - OX) + \sum_{n=1}^{N}\left\{R_n \times \left(1 - (DE_n \times F_{Dest,n})\right)\right\}\right] \quad \text{(Eq. HH–6)}$$

Where:

Emissions = Methane emissions from the landfill in the reporting year (metric tons CH_4).

G_{CH4} = Modeled methane generation rate in reporting year from equation HH–1 to this section or the quantity of recovered CH_4 from equation HH–4 to this section, whichever is greater (metric tons CH_4).

N = Number of landfill gas measurement locations (associated with a destruction device or gas sent off-site). If a single monitoring location is used to monitor volumetric flow and CH_4 concentration of the recovered gas sent to one or multiple destruction devices, then N = 1.

R_n = Quantity of recovered CH_4 from equation HH–4 to this section for the nth measurement location (metric tons CH_4).

OX = Oxidation fraction. Use the appropriate oxidation fraction default value from table HH–4 to this subpart.

DE_n = Destruction efficiency (lesser of manufacturer's specified destruction efficiency and 0.99) for the nth measurement location. If the gas is transported off-site for destruction, use DE = 1. If the volumetric flow and CH_4 concentration of the recovered gas is measured at a single location providing landfill gas to multiple destruction devices (including some gas destroyed on-site and some gas sent off-site for destruction), calculate DE_n as the arithmetic average of the DE values determined for each destruction device associated with that measurement location.

$f_{Dest,n}$ = Fraction of hours the destruction device associated with the nth measurement location was operating during active gas flow calculated as the annual operating hours for the destruction device divided by the annual hours flow was sent to the destruction device. The annual operating hours for the destruction device should include only those periods when flow was sent to the destruction device and the destruction device was operating at its intended temperature or other parameter indicative of effective operation. For flares, times when there is no flame present must be excluded from the annual operating hours for the destruction device. If the gas is transported off-site for destruction, use $f_{Dest,n}$ = 1. If the volumetric flow and CH_4 concentration of the recovered gas is measured at a single location providing landfill gas to multiple destruction devices (including some gas destroyed on-site and some gas sent off-site for destruction), calculate $f_{Dest,n}$ as the arithmetic average of the f_{Dest} values determined for each destruction device associated with that measurement location.

(ii) Calculate CH_4 generation and CH_4 emissions using measured CH_4 recovery and estimated gas collection efficiency and equations HH–7 and HH–8 to this section.

$$MG = \left[\frac{1}{CE}\sum_{c=1}^{C}\left[\frac{\sum_{x=1}^{X} R_{x,c}}{f_{Rec,c}}\right] \times (1 - OX)\right] \quad \text{(Eq. HH–7)}$$

$$\text{Emissions} = \left[\left(\frac{1}{CE}\sum_{c=1}^{C}\left[\frac{\sum_{x=1}^{X} R_{x,c}}{f_{Rec,c}}\right] - \sum_{n=1}^{N} R_n\right) \times (1 - OX) + \sum_{n=1}^{N}\left\{R_n \times \left(1 - \left(DE_n \times f_{Dest,n}\right)\right)\right\}\right] \quad \text{(Eq. HH–8)}$$

Where:

MG = Methane generation, adjusted for oxidation, from the landfill in the reporting year (metric tons CH_4).

Emissions = Methane emissions from the landfill in the reporting year (metric tons CH_4).

C = Number of landfill gas collection systems operated at the landfill.

X = Number of landfill gas measurement locations associated with landfill gas collection system ''c''.

N = Number of landfill gas measurement locations (associated with a destruction device or gas sent off-site). If a single monitoring location is used to monitor volumetric flow and CH_4 concentration of the recovered gas sent to one or multiple destruction devices, then N = 1. Note that $N = \Sigma_{(c=1)}{}^{C}[\Sigma_{(x=1)}{}^{X}[1]]$.

$R_{x,c}$ = Quantity of recovered CH_4 from equation HH–4 to this section for the xth measurement location for landfill gas collection system ''c'' (metric tons CH_4).

R_n = Quantity of recovered CH_4 from equation HH–4 to this section for the nth measurement location (metric tons CH_4).

CE = Collection efficiency estimated at landfill, taking into account system coverage, operation, measurement practices, and cover system materials from table HH–3 to this subpart. If area by soil cover type information is not available, use applicable default value for CE4 in table HH–3 to this subpart for all areas under active influence of the collection system.

$f_{Rec,c}$ = Fraction of hours the landfill gas collection system ''c'' was operating normally (annual operating hours/8760 hours per year or annual operating hours/8784 hours per year for a leap year). Do not include periods of shutdown or poor operation, such as times when pressure, temperature, or other parameters indicative of operation are outside of normal variances, in the annual operating hours.

OX = Oxidation fraction. Use appropriate oxidation fraction default value from table HH–4 to this subpart.

DE_n = Destruction efficiency, (lesser of manufacturer's specified destruction efficiency and 0.99) for the nth measurement location. If the gas is transported off-site for destruction, use DE = 1. If the volumetric flow and CH_4 concentration of the recovered gas is measured at a single location providing landfill gas to multiple destruction devices (including some gas destroyed on-site and some gas sent off-site for destruction), calculate DE_n as the arithmetic average of the DE values determined for each destruction device associated with that measurement location.

$f_{Dest,n}$ = Fraction of hours the destruction device associated with the nth measurement location was operating during active gas flow calculated as the annual operating hours for the destruction device divided by the annual hours flow was sent to the destruction device. The annual operating hours for the destruction device should include only those periods when flow was sent to the destruction device and the destruction device was operating at its intended temperature or other parameter indicative of effective operation. For flares, times when there is no flame present must be excluded from the annual operating hours for the destruction device. If the gas is transported off-site for destruction, use $f_{Dest,n}$ = 1. If the volumetric flow and CH_4 concentration of the recovered gas is measured at a single location providing landfill gas to multiple destruction devices (including some gas destroyed on-site and some gas sent off-site for destruction), calculate $f_{Dest,n}$ as the arithmetic average of the f_{Dest} values determined for each destruction device

associated with that measurement location.

■ 75. Amend § 98.346 by:
■ a. Redesignating paragraphs (h) and (i) as paragraphs (i) and (j), respectively.
■ b. Adding new paragraph (h); and
■ c. Revising newly redesignated paragraphs (j)(5) through (7).

The addition and revisions read as follows:

§ 98.346 Data reporting requirements.

* * * * *

(h) An indication of the applicability of part 60 or part 62 of this chapter requirements to the landfill (part 60, subparts WWW and XXX of this chapter, approved state plan implementing part 60, subparts Cc or Cf of this chapter, Federal plan as implemented at part 62, subparts GGG or OOO of this chapter, or not subject to part 60 or part 62 of this chapter municipal solid waste landfill rules), and if the landfill is subject to a part 60 or part 62 of this chapter municipal solid waste landfill rule, an indication of whether the landfill gas collection system is required under part 60 or part 62 of this chapter.

* * * * *

(j) * * *

(5) The number of gas collection systems at the landfill facility.

(6) For each gas collection system at the facility report:

(i) A unique name or ID number for the gas collection system.

(ii) A description of the gas collection system (manufacturer, capacity, and number of wells).

(iii) The annual hours the gas collection system was operating normally. Do not include periods of shut down or poor operation, such as times when pressure, temperature, or other parameters indicative of operation are outside of normal variances, in the annual operating hours.

(iv) The number of measurement locations associated with the gas collection system.

(v) For each measurement location associated with the gas collection system, report:

(A) A unique name or ID number for the measurement location.

(B) Annual quantity of recovered CH_4 (metric tons CH_4) calculated using equation HH–4 to § 98.343.

(C) An indication of whether destruction occurs at the landfill facility, off-site, or both for the measurement location.

(D) If destruction occurs at the landfill facility for the measurement location (in full or in part), also report the number of destruction devices associated with the measurement location that are located at the landfill facility and the information in paragraphs (j)(6)(v)(D)(1) through (6) of this section for each destruction device located at the landfill facility.

(*1*) A unique name or ID number for the destruction device.

(*2*) The type of destruction device (flare, a landfill gas to energy project (*i.e.,* engine or turbine), off-site, or other (specify)).

(*3*) The destruction efficiency (decimal).

(*4*) The total annual hours where active gas flow was sent to the destruction device.

(*5*) The annual operating hours where active gas flow was sent to the destruction device and the destruction device was operating at its intended temperature or other parameter indicative of effective operation. For flares, times when there is no flame present must be excluded from the annual operating hours for the destruction device.

(*6*) The estimated fraction of the recovered CH4 reported for the measurement location directed to the destruction device based on best available data or engineering judgement (decimal, must total to 1 for each measurement location).

(*7*) The following information about the landfill.

(i) The surface area (square meters) and estimated waste depth (meters) for each area specified in table HH–3 to this subpart.

(ii) The estimated gas collection system efficiency for the landfill.

(iii) An indication of whether passive vents and/or passive flares (vents or flares that are not considered part of the gas collection system as defined in § 98.6) are present at the landfill.

* * * * *

■ 76. Revise table HH–1 to subpart HH to read as follows:

TABLE HH–1 TO SUBPART HH OF PART 98—EMISSIONS FACTORS, OXIDATION FACTORS AND METHODS

Factor	Default value	Units
DOC and k values—Bulk waste option:		
DOC (bulk waste) for disposal years prior to 2010	0.20	Weight fraction, wet basis.
DOC (bulk waste) for disposal years 2010 and later	0.17	Weight fraction, wet basis.
k (precipitation plus recirculated leachate [a] <20 inches/year) for disposal years prior to 2010.	0.02	yr^{-1}.
k (precipitation plus recirculated leachate [a] <20 inches/year) for disposal years 2010 and later.	0.033	yr^{-1}.
k (precipitation plus recirculated leachate [a] 20–40 inches/year) for disposal years prior to 2010.	0.038	yr^{-1}.
k (precipitation plus recirculated leachate [a] 20–40 inches/year) for disposal years 2010 and later.	0.067	yr^{-1}.
k (precipitation plus recirculated leachate [a] >40 inches/year) for disposal years prior to 2010.	0.057	yr^{-1}.
k (precipitation plus recirculated leachate [a] >40 inches/year) for disposal years 2010 and later.	0.098	yr^{-1}.
DOC and k values—Modified bulk MSW option:		
DOC (bulk MSW, excluding inerts and C&D waste) for disposal years prior to 2010.	0.31	Weight fraction, wet basis.
DOC (bulk MSW, excluding inerts and C&D waste) for disposal years 2010 and later.	0.27	Weight fraction, wet basis.
DOC (inerts, *e.g.,* glass, plastics, metal, concrete)	0.00	Weight fraction, wet basis.
DOC (C&D waste)	0.08	Weight fraction, wet basis.
k (bulk MSW, excluding inerts and C&D waste) for disposal years prior to 2010.	0.02 to 0.057 [b]	yr^{-1}.
k (bulk MSW, excluding inerts and C&D waste) for disposal years 2010 and later.	0.033 to 0.098 [b]	yr^{-1}.

TABLE HH–1 TO SUBPART HH OF PART 98—EMISSIONS FACTORS, OXIDATION FACTORS AND METHODS—Continued

Factor	Default value	Units
k (inerts, *e.g.,* glass, plastics, metal, concrete)	0.00	yr^{-1}.
k (C&D waste)	0.02 to 0.04 [b]	yr^{-1}.
DOC and k values—Waste composition option:		
DOC (food waste)	0.15	Weight fraction, wet basis.
DOC (garden)	0.2	Weight fraction, wet basis.
DOC (paper)	0.4	Weight fraction, wet basis.
DOC (wood and straw)	0.43	Weight fraction, wet basis.
DOC (textiles)	0.24	Weight fraction, wet basis.
DOC (diapers)	0.24	Weight fraction, wet basis.
DOC (sewage sludge)	0.05	Weight fraction, wet basis.
DOC (inerts, *e.g.,* glass, plastics, metal, cement)	0.00	Weight fraction, wet basis.
DOC (Uncharacterized MSW	0.32	Weight fraction, wet basis.
k (food waste)	0.06 to 0.185 [c]	yr^{-1}.
k (garden)	0.05 to 0.10 [c]	yr^{-1}.
k (paper)	0.04 to 0.06 [c]	yr^{-1}.
k (wood and straw)	0.02 to 0.03 [c]	yr^{-1}.
k (textiles)	0.04 to 0.06 [c]	yr^{-1}.
k (diapers)	0.05 to 0.10 [c]	yr^{-1}.
k (sewage sludge)	0.06 to 0.185 [c]	yr^{-1}.
k (inerts, *e.g.,* glass, plastics, metal, concrete)	0.00	yr^{-1}.
k (uncharacterized MSW)	0.033 to 0.098 [b]	yr^{-1}.
Other parameters—All MSW landfills:		
MCF	1.	
DOC_F	0.5.	
F	0.5.	
OX	See table HH–4 to this subpart.	
DE	0.99.	

[a] Recirculated leachate (in inches/year) is the total volume of leachate recirculated from company records or engineering estimates divided by the area of the portion of the landfill containing waste with appropriate unit conversions. Alternatively, landfills that use leachate recirculation can elect to use the k value of 0.098 rather than calculating the recirculated leachate rate.

[b] Use the lesser value when precipitation plus recirculated leachate is less than 20 inches/year. Use the greater value when precipitation plus recirculated leachate is greater than 40 inches/year. Use the average of the range of values when precipitation plus recirculated leachate is 20 to 40 inches/year (inclusive). Alternatively, landfills that use leachate recirculation can elect to use the greater value rather than calculating the recirculated leachate rate.

[c] Use the lesser value when the potential evapotranspiration rate exceeds the mean annual precipitation rate plus recirculated leachate. Use the greater value when the potential evapotranspiration rate does not exceed the mean annual precipitation rate plus recirculated leachate. Alternatively, landfills that use leachate recirculation can elect to use the greater value rather than assessing the potential evapotranspiration rate or recirculated leachate rate.

■ 77. Revise table HH–3 to subpart HH to read as follows:

TABLE HH–3 TO SUBPART HH OF PART 98—LANDFILL GAS COLLECTION EFFICIENCIES

Description	Term ID	Landfill gas collection efficiency
A1: Area with no waste in-place	Not applicable; do not use this area in the calculation.	
A2: Area without active gas collection, regardless of cover type	CE2	0%.
A3: Area with daily soil cover and active gas collection	CE3	50%.
A4: Area with an intermediate soil cover, or a final soil cover not meeting the criteria for A5 below, and active gas collection.	CE4	65%.
A5: Area with a final soil cover of 3 feet or thicker of clay or final cover (as approved by the relevant agency) and/or geomembrane cover system and active gas collection.	CE5	85%.
Area weighted average collection efficiency for landfills	CEave1 = (A2*CE2 + A3*CE3 + A4*CE4 + A5*CE5)/(A2 + A3 + A4 + A5).	

■ 78. Revise footnote ''b'' to table HH—4 to subpart HH to read as follows:

TABLE HH–4 TO SUBPART HH OF PART 98—LANDFILL METHANE OXIDATION FRACTIONS

Under these conditions:	Use this landfill methane oxidation fraction:
* * * * * * *	
* * * * * * *	

[b] Methane flux rate (in grams per square meter per day; g/m^2/d) is the mass flow rate of methane per unit area at the bottom of the surface soil prior to any oxidation and is calculated as follows:

For equation HH–5 to § 98.343, or for equation TT–6 to § 98.463,

$MF = K \times G_{CH4}/SArea$

For equation HH–6 to § 98.343,

$$MF = K \times \left(G_{CH4} - \sum_{n=1}^{N} R_n \right) \Big/ SArea$$

For equation HH–7 to § 98.343,

$$MF = K \times \left(\frac{1}{CE} \sum_{c=1}^{C} \left[\frac{\sum_{x=1}^{X} R_{x,c}}{f_{Rec,c}} \right] \right) \Big/ Sarea$$

For equation HH–8 to § 98.343,

$$MF = K \times \left(\frac{1}{CE} \sum_{c=1}^{C} \left[\frac{\sum_{x=1}^{X} R_{x,c}}{f_{Rec,c}} \right] - \sum_{n=1}^{N} R_n \right) \Big/ Sarea$$

Where:

MF = Methane flux rate from the landfill in the reporting year (grams per square meter per day, g/m^2/d).

K = unit conversion factor = 10^6/365 (g/metric ton per days/year) or 10^6/366 for a leap year.

SArea = The surface area of the landfill containing waste at the beginning of the reporting year (square meters, m^2).

G_{CH4} = Modeled methane generation rate in reporting year from equation HH–1 to § 98.343 or equation TT–1 to § 98.463, as applicable, except for application with equation HH–6 to § 98.343 (metric tons CH_4). For application with equation HH–6 to § 98.343, the greater of the modeled methane generation rate in reporting year from equation HH–1 to § 98.343 or equation TT–1 to § 98.463, as applicable, and the quantity of recovered CH_4 from equation HH–4 to § 98.343 (metric tons CH_4).

CE = Collection efficiency estimated at landfill, taking into account system coverage, operation, measurement practices, and cover system materials from table HH–3 to this subpart. If area by soil cover type information is not available, use applicable default value for CE4 in table HH–3 to this subpart for all areas under active influence of the collection system.

C = Number of landfill gas collection systems operated at the landfill.

X = Number of landfill gas measurement locations associated with landfill gas collection system ''c''.

N = Number of landfill gas measurement locations (associated with a destruction device or gas sent off-site). If a single monitoring location is used to monitor volumetric flow and CH_4 concentration of the recovered gas sent to one or multiple destruction devices, then N = 1. Note that $N = \Sigma_{c=1}{}^{C}[\Sigma_{x=1}{}^{X}[1]]$.

$R_{x,c}$ = Quantity of recovered CH_4 from equation HH–4 to § 98.343 for the x^{th} measurement location for landfill gas collection system ''c'' (metric tons CH_4).

R_n = Quantity of recovered CH_4 from equation HH–4 to § 98.343 for the n^{th} measurement location (metric tons CH_4).

$f_{Rec,c}$ = Fraction of hours the landfill gas collection system ''c'' was operating normally (annual operating hours/8,760 hours per year or annual operating hours/8,784 hours per year for a leap year). Do not include periods of shutdown or poor operation, such as times when pressure, temperature, or other parameters indicative of operation are outside of normal variances, in the annual operating hours.

Subpart OO—Suppliers of Industrial Greenhouse Gases

■ 79. Amend § 98.416 by revising paragraphs (c) introductory text, (c)(6) and (7), (d) introductory text, and (d)(4), and adding paragraph (k) to read as follows:

§ 98.416 Data reporting requirements.

* * * * *

(c) Each bulk importer of fluorinated GHGs, fluorinated heat transfer fluids (HTFs), or nitrous oxide shall submit an annual report that summarizes its imports at the corporate level, except importers may exclude shipments including less than twenty-five kilograms of fluorinated GHGs, fluorinated HTFs, or nitrous oxide; transshipments if the importer also excludes transshipments from reporting of exports under paragraph (d) of this section; and heels that meet the conditions set forth at § 98.417(e) if the importer also excludes heels from any reporting of exports under paragraph (d) of this section. The report shall contain

the following information for each import:

* * * * *

(6) Harmonized tariff system (HTS) code of the fluorinated GHGs, fluorinated HTFs, or nitrous oxide shipped.

(7) Customs entry number and importer number for each shipment.

* * * * *

(d) Each bulk exporter of fluorinated GHGs, fluorinated HTFs, or nitrous oxide shall submit an annual report that summarizes its exports at the corporate level, except reporters may exclude shipments including less than twenty-five kilograms of fluorinated GHGs, fluorinated HTFs, or nitrous oxide; transshipments if the exporter also excludes transshipments from reporting of imports under paragraph (c) of this section; and heels if the exporter also excludes heels from any reporting of imports under paragraph (c) of this section. The report shall contain the following information for each export:

* * * * *

(4) Harmonized tariff system (HTS) code of the fluorinated GHGs, fluorinated HTFs, or nitrous oxide shipped.

* * * * *

(k) For nitrous oxide, saturated perfluorocarbons, sulfur hexafluoride, and fluorinated heat transfer fluids as defined at § 98.6, report the end use(s) for which each GHG or fluorinated HTF is transferred and the aggregated annual quantity of that GHG or fluorinated HTF in metric tons that is transferred to that end use application, if known.

Subpart PP—Suppliers of Carbon Dioxide

■ 80. Amend § 98.420 by adding paragraph (a)(4) to read as follows:

§ 98.420 Definition of the source category.

(a) * * *

(4) Facilities with process units, including but not limited to direct air capture (DAC), that capture a CO_2 stream from ambient air for purposes of supplying CO_2 for commercial applications or that capture and maintain custody of a CO_2 stream in order to sequester or otherwise inject it underground.

* * * * *

■ 81. Amend § 98.422 by adding paragraph (e) to read as follows:

§ 98.422 GHGs to report.

* * * * *

(e) Mass of CO_2 captured from DAC process units.

(1) Mass of CO_2 captured from ambient air.

(2) Mass of CO_2 captured from any on-site heat and/or electricity generation, where applicable.

■ 82. Amend § 98.423 by revising paragraphs (a)(3)(i) introductory text and (a)(3)(ii) introductory text to read as follows:

§ 98.423 Calculating CO_2 supply.

(a) * * *

(3) * * *

(i) For facilities with production process units, DAC process units, or production wells that capture or extract a CO_2 stream and either measure it after segregation or do not segregate the flow, calculate the total CO_2 supplied in accordance with equation PP–3a to paragraph (a)(3)(i) of this section.

* * * * *

(ii) For facilities with production process units or DAC process units that capture a CO_2 stream and measure it ahead of segregation, calculate the total CO_2 supplied in accordance with equation PP–3b to paragraph (a)(3)(ii) of this section.

* * * * *

■ 83. Amend § 98.426 by:

■ a. Redesignating paragraphs (f)(12) and (13) as paragraphs (f)(13) and (14), respectively;

■ b. Adding new paragraph (f)(12);

■ c. Revising paragraph (h); and

■ d. Adding paragraph (i).

The additions and revision read as follows:

§ 98.426 Data reporting requirements.

* * * * *

(f) * * *

(12) Geologic sequestration of carbon dioxide with enhanced oil recovery that is covered by subpart VV of this part.

* * * * *

(h) If you capture a CO_2 stream from a facility that is subject to this part and transfer CO_2 to any facilities that are subject to subpart RR or VV of this part, you must:

(1) Report the facility identification number associated with the annual GHG report for the facility that is the source of the captured CO_2 stream;

(2) Report each facility identification number associated with the annual GHG reports for each subpart RR and subpart VV facility to which CO_2 is transferred; and

(3) Report the annual quantity of CO_2 in metric tons that is transferred to each subpart RR and subpart VV facility.

(i) If you capture a CO_2 stream at a facility with a DAC process unit, report the annual quantity of on-site and off-site electricity and heat generated for each DAC process unit as specified in paragraphs (i)(1) through (3) of this section. The quantities specified in paragraphs (i)(1) through (3) of this section must be provided per energy source if known and must represent the electricity and heat used for the DAC process unit starting with air intake and ending with the compressed CO_2 stream (*i.e.,* the CO_2 stream ready for supply for commercial applications or, if maintaining custody of the stream, sequestration or injection of the stream underground).

(1) *Electricity excluding combined heat and power (CHP).* If electricity is provided to a dedicated meter for the DAC process unit, report the annual quantity of electricity consumed, in megawatt hours (MWh), and the information in paragraph (i)(1)(i) or (ii) of this section.

(i) If the electricity is sourced from a grid connection, report the following information:

(A) State where the facility with the DAC process unit is located.

(B) County where the facility with the DAC process unit is located.

(C) Name of the electric utility company that supplied the electricity as shown on the last monthly bill issued by the utility company during the reporting period.

(D) Name of the electric utility company that delivered the electricity. In states with regulated electric utility markets, this will generally be the same utility reported under paragraph (i)(1)(i)(C) of this section, but in states with deregulated electric utility markets, this may be a different utility company.

(E) Annual quantity of electricity consumed in MWh, calculated as the sum of the total energy usage values specified in all billing statements received during the reporting year. Most customers will receive 12 monthly billing statements during the reporting year. Many utilities bill their customers per kilowatt-hour (kWh); usage values on bills that are based on kWh should be divided by 1,000 to report the usage in MWh as required under this paragraph (i)(1)(i)(E).

(ii) If electricity is sourced from on-site or through a contractual mechanism for dedicated off-site generation, for each applicable energy source specified in paragraphs (i)(1)(ii)(A) through (G) of this section, report the annual quantity of electricity consumed, in MWh. If the on-site electricity source is natural gas, oil, or coal, also indicate whether flue gas is also captured by the DAC process unit.

(A) Non-hydropower renewable sources including solar, wind, geothermal and tidal.

(B) Hydropower.

(C) Natural gas.
(D) Oil.
(E) Coal.
(F) Nuclear.
(G) Other.

(2) *Heat excluding CHP.* For each applicable energy source specified in paragraphs (i)(2)(i) through (vii) of this section, report the annual quantity of heat, steam, or other forms of thermal energy sourced from on-site or through a contractual mechanism for dedicated off-site generation, in megajoules (MJ). If the on-site heat source is natural gas, oil, or coal, also indicate whether flue gas is also captured by the DAC process unit.

(i) Solar.
(ii) Geothermal.
(iii) Natural gas.
(iv) Oil.
(v) Coal.
(vi) Nuclear.
(vii) Other.

(3) *CHP—(i) Electricity from CHP.* If electricity from CHP is sourced from on-site or through a contractual mechanism for dedicated off-site generation, for each applicable energy source specified in paragraphs (i)(3)(i)(A) through (G) of this section, report the annual quantity consumed, in MWh. If the on-site electricity source for CHP is natural gas, oil, or coal, also indicate whether flue gas is also captured by the DAC process unit.

(A) Non-hydropower renewable sources including solar, wind, geothermal and tidal.
(B) Hydropower.
(C) Natural gas.
(D) Oil.
(E) Coal.
(F) Nuclear.
(G) Other.

(ii) *Heat from CHP.* For each applicable energy source specified in paragraphs (i)(3)(ii)(A) through (G) of this section, report the quantity of heat, steam, or other forms of thermal energy from CHP sourced from on-site or through a contractual mechanism for dedicated off-site generation, in MJ. If the on-site heat source is natural gas, oil, or coal, also indicate whether flue gas is also captured by the DAC process unit.

(A) Solar.
(B) Geothermal.
(C) Natural gas.
(D) Oil.
(E) Coal.
(F) Nuclear.
(G) Other.

■ 84. Amend § 98.427 by revising paragraph (a) to read as follows:

§ 98.427 Records that must be retained.

* * * * *

(a) The owner or operator of a facility containing production process units or DAC process units must retain quarterly records of captured or transferred CO_2 streams and composition.

* * * * *

Subpart QQ—Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged Equipment or Closed-Cell Foams

■ 85. Amend § 98.436 by adding paragraphs (a)(7) and (b)(7) to read as follows:

§ 98.436 Data reporting requirements.

(a) * * *

(7) The Harmonized tariff system (HTS) code for each type of pre-charged equipment or closed-cell foam imported.

(b) * * *

(7) The Schedule B code for each type of pre-charged equipment or closed-cell foam exported.

Subpart RR—Geologic Sequestration of Carbon Dioxide

■ 86. Amend § 98.449 by adding the definition ''Offshore'' in alphabetical order to read as follows:

§ 98.449 Definitions.

* * * * *

Offshore means seaward of the terrestrial borders of the United States, including waters subject to the ebb and flow of the tide, as well as adjacent bays, lakes or other normally standing waters, and extending to the outer boundaries of the jurisdiction and control of the United States under the Outer Continental Shelf Lands Act.

* * * * *

■ 87. Revise subpart SS consisting of §§ 98.450 through 98.458 to read as follows:

Subpart SS—Electrical Equipment Manufacture or Refurbishment

Sec.

98.450 Definition of the source category.
98.451 Reporting threshold.
98.452 GHGs to report.
98.453 Calculating GHG emissions.
98.454 Monitoring and QA/QC requirements.
98.455 Procedures for estimating missing data.
98.456 Data reporting requirements.
98.457 Records that must be retained.
98.458 Definitions.

§ 98.450 Definition of the source category.

The electrical equipment manufacturing or refurbishment category consists of processes that manufacture or refurbish gas-insulated substations, circuit breakers, other switchgear, gas-insulated lines, or power transformers (including gas-containing components of such equipment) containing fluorinated GHGs, including but not limited to sulfur-hexafluoride (SF_6) and perfluorocarbons (PFCs). The processes include equipment testing, installation, manufacturing, decommissioning and disposal, refurbishing, and storage in gas cylinders and other containers.

§ 98.451 Reporting threshold.

You must report GHG emissions under this subpart if your facility contains an electrical equipment manufacturing or refurbishing process and the facility meets the requirements of § 98.2(a)(2). To calculate total annual GHG emissions for comparison to the 25,000 metric ton CO_2e per year emission threshold in § 98.2(a)(2), follow the requirements of § 98.2(b), with one exception. Instead of following the requirement of § 98.453 to calculate emissions from electrical equipment manufacture or refurbishment, you must calculate emissions of each fluorinated GHG that is a component of a reportable insulating gas and then sum the emissions of each fluorinated GHG resulting from manufacturing and refurbishing electrical equipment using equation SS–1 to this section.

$$E = \sum_j \sum_i P_j * GHG_{i,w} * GWP_i * EF * 0.000453592 \quad \text{(Eq. SS–1)}$$

Where:

E = Annual production process emissions for threshold applicability purposes (metric tons CO_2e).

P_j = Total annual purchases of reportable insulating gas j (lbs).

$GHG_{i,w}$ = The weight fraction of fluorinated GHG i in reportable insulating gas j if reportable insulating gas j is a gas mixture. If not a mixture, use 1.

GWP_i = Gas-appropriate GWP as provided in table A–1 to subpart A of this part.

EF = Emission factor for electrical transmission and distribution equipment (lbs emitted/lbs purchased). For all gases, use an emission factor of 0.1.

i = Fluorinated GHG contained in the electrical transmission and distribution equipment.
0.000453592 = Conversion factor from lbs to metric tons.

§ 98.452 GHGs to report.

(a) You must report emissions of each fluorinated GHG, including but not limited to SF6 and PFCs, at the facility level, except you are not required to report emissions of fluorinated GHGs that are components of insulating gases whose weighted average GWPs, as calculated in equation SS–2 to this section, are less than or equal to one. You are, however, required to report certain quantities of insulating gases whose weighted average GWPs are less than or equal to one as specified in § 98.456(f), (g), (k) and (q) through (s).

$$GWP_j = \sum_i GHG_{i,w} * GWP_i \quad \text{(Eq. SS–2)}$$

Where:

GWP_j = Weighted average GWP of insulating gas j.
$GHG_{i,w}$ = The weight fraction of GHG i in insulating gas j, expressed as a decimal. fraction. If GHG i is not part of a gas mixture, use a value of 1.0.
GWP_i = Gas-appropriate GWP as provided in table A–1 to subpart A of this part.
i = GHG contained in the electrical transmission and distribution equipment.

(b) You must report CO_2, N_2O and CH_4 emissions from each stationary combustion unit. You must calculate and report these emissions under subpart C of this part by following the requirements of subpart C of this part. Annual emissions from the facility must include fluorinated GHG emissions from equipment that is installed at an off-site electric power transmission or distribution location whenever emissions from installation activities (*e.g.,* filling) occur before the title to the equipment is transferred to the electric power transmission or distribution entity.

§ 98.453 Calculating GHG emissions.

(a) For each electrical equipment manufacturer or refurbisher, estimate the annual emissions of each fluorinated GHG that is a component of any reportable insulating gas using the mass-balance approach in equation SS–3 to this section:

$$\text{User emissions}_i = \Sigma_j GHG_{i,w} * [(\text{Decrease in Inventory of Reportable Insulating Gas j Inventory}) + (\text{Acquisitions of Reportable Insulating Gas j}) - (\text{Disbursements of Reportable Insulating Gas j})] \quad \text{(Eq. SS–3)}$$

Where:

User emissions$_i$ = Annual emissions of each fluorinated GHG i (pounds).
$GHG_{i,w}$ = The weight fraction of fluorinated GHG i in reportable insulating gas j if insulating gas j is a gas mixture, expressed as a decimal fraction. If fluorinated GHG i is not part of a gas mixture, use a value of 1.0.
Decrease in Inventory of Reportable Insulating Gas j Inventory = (Pounds of reportable insulating gas j stored in containers at the beginning of the year)—(Pounds of reportable insulating gas j stored in containers at the end of the year).
Acquisitions of Reportable Insulating Gas j = (Pounds of reportable insulating gas j purchased from chemical producers or suppliers in bulk) + (Pounds of reportable insulating gas j returned by equipment users) + (Pounds of reportable insulating gas j returned to site after off-site recycling).
Disbursements of Reportable Insulating Gas j = (Pounds of reportable insulating gas j contained in new equipment delivered to customers) + (Pounds of reportable insulating gas j delivered to equipment users in containers) + (Pounds of reportable insulating gas j returned to suppliers) + (Pounds of reportable insulating gas j sent off site for recycling) + (Pounds of reportable insulating gas j sent off-site for destruction).

(b) [Reserved]

(c) Estimate the disbursements of reportable insulating gas j sent to customers in new equipment or cylinders or sent off-site for other purposes including for recycling, for destruction or to be returned to suppliers using equation SS–4 to this section:

$$D_{GHG} = \sum_{p=1}^{n} Q_p \quad \text{(Eq. SS–4)}$$

Where:

D_{GHG} = The annual disbursement of reportable insulating gas j sent to customers in new equipment or cylinders or sent off-site for other purposes including for recycling, for destruction or to be returned to suppliers.
Q_p = The mass of reportable insulating gas j charged into equipment or containers over the period p sent to customers or sent off-site for other purposes including for recycling, for destruction or to be returned to suppliers.
n = The number of periods in the year.

(d) Estimate the mass of each insulating gas j disbursed to customers in new equipment or cylinders over the period p by monitoring the mass flow of each insulating gas j into the new equipment or cylinders using a flowmeter, or by weighing containers before and after gas from containers is used to fill equipment or cylinders, or by using the nameplate capacity of the equipment.

(e) If the mass of insulating gas j disbursed to customers in new equipment or cylinders over the period p is estimated by weighing containers before and after gas from containers is used to fill equipment or cylinders, estimate this quantity using equation SS–5 to this section:

$$Q_p = M_B - M_E - E_L \quad \text{(Eq. SS–5)}$$

Where:

Q_p = The mass of insulating gas j charged into equipment or containers over the period p sent to customers or sent off-site for other purposes including for recycling, for destruction or to be returned to suppliers.

M_B = The mass of the contents of the containers used to fill equipment or cylinders at the beginning of period p.

M_E = The mass of the contents of the containers used to fill equipment or cylinders at the end of period p.

E_L = The mass of insulating gas j emitted during the period p downstream of the containers used to fill equipment or cylinders and in cases where a flowmeter is used, downstream of the flowmeter during the period p (*e.g.,* emissions from hoses or other flow lines that connect the container to the equipment or cylinder that is being filled).

(f) If the mass of insulating gas j disbursed to customers in new equipment or cylinders over the period p is determined using a flowmeter, estimate this quantity using equation SS–6 to this section:

$$Q_p = M_{mr} - E_L \quad \text{(Eq. SS–6)}$$

Where:

Q_p = The mass of insulating gas j charged into equipment or containers over the period p sent to customers or sent off-site for other purposes including for recycling, for destruction or to be returned to suppliers.

M_{mr} = The mass of insulating gas j that has flowed through the flowmeter during the period p.

E_L = The mass of insulating gas j emitted during the period p downstream of the containers used to fill equipment or cylinders and in cases where a flowmeter is used, downstream of the flowmeter during the period p (*e.g.,* emissions from hoses or other flow lines that connect the container to the equipment that is being filled).

(g) Estimate the mass of insulating gas j emitted during the period p downstream of the containers used to fill equipment or cylinders (*e.g.,* emissions from hoses or other flow lines that connect the container to the equipment or cylinder that is being filled) using equation SS–7 to this section:

$$E_L = \sum_{j=0}^{n} F_{Ci} * EF_{Ci} \quad \text{(Eq. SS–7)}$$

Where:

E_L = The mass of insulating gas j emitted during the period p downstream of the containers used to fill equipment or cylinders and in cases where a flowmeter is used, downstream of the flowmeter during the period p (*e.g.,* emissions from hoses or other flow lines that connect the container to the equipment or cylinder that is being filled).

FC_i = The total number of fill operations over the period p for the valve-hose combination Ci.

EF_{Ci} = The emission factor for the valve-hose combination Ci.

n=The number of different valve-hose combinations C used during the period p.

(h) If the mass of insulating gas j disbursed to customers in new equipment or cylinders over the period p is determined by using the nameplate capacity, or by using the nameplate capacity of the equipment and calculating the partial shipping charge, use the methods in either paragraph (h)(1) or (2) of this section.

(1) Determine the equipment's actual nameplate capacity, by measuring the nameplate capacities of a representative sample of each make and model and calculating the mean value for each make and model as specified at § 98.454(f).

(2) If equipment is shipped with a partial charge, calculate the partial shipping charge by multiplying the nameplate capacity of the equipment by the ratio of the densities of the partial charge to the full charge.

(i) Estimate the annual emissions of reportable insulating gas j from the equipment that is installed at an off-site electric power transmission or distribution location before the title to the equipment is transferred by using equation SS–8 to this section:

$$EI = GHG_{i,w} * (M_F + M_C - N_I) \quad \text{Eq. SS–8}$$

Where:

EI = Total annual emissions of reportable insulating gas j from equipment installation at electric transmission or distribution facilities.

$GHG_{i,w}$ = The weight fraction of fluorinated GHG i in reportable insulating gas j if reportable insulating gas j is a gas mixture, expressed as a decimal fraction. If the GHG i is not part of a gas mixture, use a value of 1.0.

M_F = The total annual mass of reportable insulating gas j, in pounds, used to fill equipment during equipment installation at electric transmission or distribution facilities.

M_C = The total annual mass of reportable insulating gas j, in pounds, used to charge the equipment prior to leaving the electrical equipment manufacturer facility.

N_I = The total annual nameplate capacity of the equipment, in pounds, installed at electric transmission or distribution facilities.

§ 98.454 Monitoring and QA/QC requirements.

(a) [Reserved]

(b) Ensure that all the quantities required by the equations of this subpart have been measured using either flowmeters with an accuracy and precision of ±1 percent of full scale or better or scales with an accuracy and precision of ±1 percent of the filled weight (gas plus tare) of the containers of each reportable insulating gas that are typically weighed on the scale. For scales that are generally used to weigh cylinders containing 115 pounds of gas when full, this equates to ±1 percent of the sum of 115 pounds and approximately 120 pounds tare, or slightly more than ±2 pounds. Account for the tare weights of the containers. You may accept gas masses or weights provided by the gas supplier (*e.g.,* for the contents of cylinders containing

new gas or for the heels remaining in cylinders returned to the gas supplier) if the supplier provides documentation verifying that accuracy standards are met; however, you remain responsible for the accuracy of these masses and weights under this subpart.

(c) All flow meters, weigh scales, and combinations of volumetric and density measures that are used to measure or calculate quantities under this subpart must be calibrated using calibration procedures specified by the flowmeter, scale, volumetric or density measure equipment manufacturer. Calibration must be performed prior to the first reporting year. After the initial calibration, recalibration must be performed at the minimum frequency specified by the manufacturer.

(d) For purposes of equation SS–7 to § 98.453, the emission factor for the valve-hose combination (EFC) must be estimated using measurements and/or engineering assessments or calculations based on chemical engineering principles or physical or chemical laws or properties. Such assessments or calculations may be based on, as applicable, the internal volume of hose or line that is open to the atmosphere during coupling and decoupling activities, the internal pressure of the hose or line, the time the hose or line is open to the atmosphere during coupling and decoupling activities, the frequency with which the hose or line is purged and the flow rate during purges. You must develop a value for EFc (or use an industry-developed value) for each combination of hose and valve fitting, to use in equation SS–7 to § 98.453. The value for EFC must be determined for each combination of hose and valve fitting of a given diameter or size. The calculation must be recalculated annually to account for changes to the specifications of the valves or hoses that may occur throughout the year.

(e) Electrical equipment manufacturers and refurbishers must account for emissions of each reportable insulating gas that occur as a result of unexpected events or accidental losses, such as a malfunctioning hose or leak in the flow line, during the filling of equipment or containers for disbursement by including these losses in the estimated mass of each reportable insulating gas emitted downstream of the container or flowmeter during the period p.

(f) If the mass of each reportable insulating gas j disbursed to customers in new equipment over the period p is determined by assuming that it is equal to the equipment's nameplate capacity or, in cases where equipment is shipped with a partial charge, equal to its partial shipping charge, equipment samples for conducting the nameplate capacity tests must be selected using the following stratified sampling strategy in this paragraph (f). For each make and model, group the measurement conditions to reflect predictable variability in the facility's filling practices and conditions (*e.g.,* temperatures at which equipment is filled). Then, independently select equipment samples at random from each make and model under each group of conditions. To account for variability, a certain number of these measurements must be performed to develop a robust and representative average nameplate capacity (or shipping charge) for each make, model, and group of conditions. A Student T distribution calculation should be conducted to determine how many samples are needed for each make, model, and group of conditions as a function of the relative standard deviation of the sample measurements. To determine a sufficiently precise estimate of the nameplate capacity, the number of measurements required must be calculated to achieve a precision of one percent of the true mean, using a 95 percent confidence interval. To estimate the nameplate capacity for a given make and model, you must use the lowest mean value among the different groups of conditions, or provide justification for the use of a different mean value for the group of conditions that represents the typical practices and conditions for that make and model. Measurements can be conducted using SF6, another gas, or a liquid. Re-measurement of nameplate capacities should be conducted every five years to reflect cumulative changes in manufacturing methods and conditions over time.

(g) Ensure the following QA/QC methods are employed throughout the year:

(1) Procedures are in place and followed to track and weigh all cylinders or other containers at the beginning and end of the year.

(2) [Reserved]

(h) You must adhere to the following QA/QC methods for reviewing the completeness and accuracy of reporting:

(1) Review inputs to equation SS–3 to § 98.453 to ensure inputs and outputs to the company's system are included.

(2) Do not enter negative inputs and confirm that negative emissions are not calculated. However, the decrease in the inventory for each reportable insulating gas may be calculated as negative.

(3) Ensure that for each reportable insulating gas, the beginning-of-year inventory matches the end-of-year inventory from the previous year.

(4) Ensure that for each reportable insulating gas, in addition to the reportable insulating gas purchased from bulk gas distributors, the reportable insulating gas returned from equipment users with or inside equipment and the reportable insulating gas returned from off-site recycling are also accounted for among the total additions.

§ 98.455 Procedures for estimating missing data.

A complete record of all measured parameters used in the GHG emissions calculations is required. Replace missing data, if needed, based on data from similar manufacturing operations, and from similar equipment testing and decommissioning activities for which data are available.

§ 98.456 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the following information for each chemical at the facility level:

(a) Pounds of each reportable insulating gas stored in containers at the beginning of the year.

(b) Pounds of each reportable insulating gas stored in containers at the end of the year.

(c) Pounds of each reportable insulating gas purchased in bulk.

(d) Pounds of each reportable insulating gas returned by equipment users with or inside equipment.

(e) Pounds of each reportable insulating gas returned to site from off site after recycling.

(f) Pounds of each insulating gas inside new equipment delivered to customers.

(g) Pounds of each insulating gas delivered to equipment users in containers.

(h) Pounds of each reportable insulating gas returned to suppliers.

(i) Pounds of each reportable insulating gas sent off site for destruction.

(j) Pounds of each reportable insulating gas sent off site to be recycled.

(k) The nameplate capacity of the equipment, in pounds, delivered to customers with each insulating gas inside, if different from the quantity in paragraph (f) of this section.

(l) A description of the engineering methods and calculations used to determine emissions from hoses or other flow lines that connect the container to the equipment that is being filled.

(m) The values for EF_{ci} of equation SS–7 to § 98.453 for each hose and valve combination and the associated valve fitting sizes and hose diameters.

(n) The total number of fill operations for each hose and valve combination, or, FC_i of equation SS–7 to § 98.453.

(o) If the mass of each reportable insulating gas disbursed to customers in new equipment over the period p is determined according to the methods required in § 98.453(h), report the mean value of nameplate capacity in pounds for each make, model, and group of conditions.

(p) If the mass of each reportable insulating gas disbursed to customers in new equipment over the period p is determined according to the methods required in § 98.453(h), report the number of samples and the upper and lower bounds on the 95-percent confidence interval for each make, model, and group of conditions.

(q) Pounds of each insulating gas used to fill equipment at off-site electric power transmission or distribution locations, or MF, of equation SS–8 to § 98.453.

(r) Pounds of each insulating gas used to charge the equipment prior to leaving the electrical equipment manufacturer or refurbishment facility, or MC, of equation SS–8 to § 98.453.

(s) The nameplate capacity of the equipment, in pounds, installed at off-site electric power transmission or distribution locations used to determine emissions from installation, or N_I, of equation SS–8 to § 98.453.

(t) For any missing data, you must report the reason the data were missing, the parameters for which the data were missing, the substitute parameters used to estimate emissions in their absence, and the quantity of emissions thereby estimated.

(u) For each insulating gas reported in paragraphs (a) through (j) and (o) through (r) of this section, an ID number or other appropriate descriptor unique to that insulating gas.

(v) For each ID number or descriptor reported in paragraph (u) of this section for each unique insulating gas, the name (as required in § 98.3(c)(4)(iii)(G)(*1*)) and weight percent of each fluorinated gas in the insulating gas.

§ 98.457 Records that must be retained.

In addition to the information required by § 98.3(g), you must retain the following records:

(a) All information reported and listed in § 98.456.

(b) Accuracy certifications and calibration records for all scales and monitoring equipment, including the method or manufacturer's specification used for calibration.

(c) Certifications of the quantity of gas, in pounds, charged into equipment at the electrical equipment manufacturer or refurbishment facility as well as the actual quantity of gas, in pounds, charged into equipment at installation.

(d) Check-out and weigh-in sheets and procedures for cylinders.

(e) Residual gas amounts, in pounds, in cylinders sent back to suppliers.

(f) Invoices for gas purchases and sales.

(g) GHG Monitoring Plans, as described in § 98.3(g)(5), must be completed by April 1, 2011.

§ 98.458 Definitions.

Except as specified in this section, all terms used in this subpart have the same meaning given in the CAA and subpart A of this part.

Insulating gas, for the purposes of this subpart, means any fluorinated GHG or fluorinated GHG mixture, including but not limited to SF_6 and PFCs, that is used as an insulating and/or arc-quenching gas in electrical equipment.

Reportable insulating gas, for purposes of this subpart, means an insulating gas whose weighted average GWP, as calculated in equation SS–2 to § 98.452, is greater than one. A fluorinated GHG that makes up either part or all of a reportable insulating gas is considered to be a component of the reportable insulating gas.

Subpart UU—Injection of Carbon Dioxide

■ 88. Revise and republish § 98.470 to read as follows:

§ 98.470 Definition of the source category.

(a) The injection of carbon dioxide (CO_2) source category comprises any well or group of wells that inject a CO_2 stream into the subsurface.

(b) If you report under subpart RR of this part for a well or group of wells, you shall not report under this subpart for that well or group of wells.

(c) If you report under subpart VV of this part for a well or group of wells, you shall not report under this subpart for that well or group of wells. If you previously met the source category definition for subpart UU of this part for a project where CO_2 is injected in enhanced recovery operations for oil and other hydrocarbons (CO_2–EOR) and then began using the standard designated as CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7) such that you met the definition of the source category for subpart VV during a reporting year, you must report under subpart UU for the portion of the year before you began using CSA/ANSI ISO 27916:19 and report under subpart VV for the portion of the year after you began using CSA/ANSI ISO 27916:19.

(d) A facility that is subject to this part only because it is subject to subpart UU of this part is not required to report emissions under subpart C of this part or any other subpart listed in § 98.2(a)(1) or (2).

■ 89. Add subpart VV consisting of §§ 98.480 through 98.489, subpart WW consisting of §§ 98.490 through 98.498, subpart XX consisting of §§ 98.500 through 98.508, subpart YY consisting of §§ 98.510 through 98.518, and subpart ZZ consisting of §§ 98.520 through 98.528 to part 98 to read as follows:

Subpart VV—Geologic Sequestration of Carbon Dioxide With Enhanced Oil Recovery Using ISO 27916

Sec.

98.480 Definition of the source category.
98.481 Reporting threshold.
98.482 GHGs to report.
98.483 Calculating CO_2 geologic sequestration.
98.484 Monitoring and QA/QC requirements.
98.485 Procedures for estimating missing data.
98.486 Data reporting requirements.
98.487 Records that must be retained.
98.488 EOR Operations Management Plan.
98.489 Definitions.

§ 98.480 Definition of the source category.

(a) This source category pertains to carbon dioxide (CO_2) that is injected in enhanced recovery operations for oil and other hydrocarbons (CO_2–EOR) in which all of the following apply:

(1) You are using the standard designated as CSA/ANSI ISO 27916:19, (incorporated by reference, see § 98.7) as a method of quantifying geologic sequestration of CO_2 in association with EOR operations.

(2) You are not reporting under subpart RR of this part.

(b) This source category does not include wells permitted as Class VI under the Underground Injection Control program.

(c) If you are subject to only this subpart, you are not required to report emissions under subpart C of this part or any other subpart listed in § 98.2(a)(1) or (2).

§ 98.481 Reporting threshold.

(a) You must report under this subpart if your CO_2–EOR project uses CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7) as a method of quantifying geologic sequestration of CO_2 in association with CO_2–EOR operations. There is no threshold for reporting.

(b) The requirements of § 98.2(i) do not apply to this subpart. Once a CO_2–EOR project becomes subject to the

requirements of this subpart, you must continue for each year thereafter to comply with all requirements of this subpart, including the requirement to submit annual reports until the facility has met the requirements of paragraphs (b)(1) and (2) of this section and submitted a notification to discontinue reporting according to paragraph (b)(3) of this section.

(1) Discontinuation of reporting under this subpart must follow the requirements set forth under Clause 10 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7).

(2) CO_2–EOR project termination is completed when all of the following occur:

(i) Cessation of CO_2 injection.

(ii) Cessation of hydrocarbon production from the project reservoir; and

(iii) Wells are plugged and abandoned unless otherwise required by the appropriate regulatory authority.

(3) You must notify the Administrator of your intent to cease reporting and provide a copy of the CO_2–EOR project termination documentation.

(c) If you previously met the source category definition for subpart UU of this part for your CO_2–EOR project and then began using CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7) as a method of quantifying geologic sequestration of CO_2 in association with CO_2–EOR operations during a reporting year, you must report under subpart UU of this part for the portion of the year before you began using CSA/ANSI ISO 27916:19 and report under subpart VV for the portion of the year after you began using CSA/ANSI ISO 27916:19.

§ 98.482 GHGs to report.

You must report the following from Clause 8 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7):

(a) The mass of CO_2 received by the CO_2–EOR project.

(b) The mass of CO_2 loss from the CO_2–EOR project operations.

(c) The mass of native CO_2 produced and captured.

(d) The mass of CO_2 produced and sent off-site.

(e) The mass of CO_2 loss from the EOR complex.

(f) The mass of CO_2 stored in association with CO_2–EOR.

§ 98.483 Calculating CO_2 geologic sequestration.

You must calculate CO_2 sequestered using the following quantification principles from Clause 8.2 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7).

(a) You must calculate the mass of CO_2 stored in association with CO_2–EOR (m_{stored}) in the reporting year by subtracting the mass of CO_2 loss from operations and the mass of CO_2 loss from the EOR complex from the total mass of CO_2 input (as specified in equation 1 to this paragraph (a)).

Equation 1 to paragraph (a)

$$m_{stored} = m_{input} - m_{loss\ operations} - m_{loss\ EOR\ complex}$$

Where:

m_{stored} = The annual quantity of associated storage in metric tons of CO_2 mass.

m_{input} = The total mass of CO_2 $m_{received}$ by the EOR project plus m_{native} (see Clause 8.3 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7) and paragraph (c) of this section), metric tons. Native CO_2 produced and captured in the CO_2–EOR project (m_{native}) can be quantified and included in m_{input}.

$m_{loss\ operations}$ = The total mass of CO_2 loss from project operations (see Clauses 8.4.1 through 8.4.5 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7) and paragraph (d) of this section), metric tons.

$m_{loss\ EOR\ complex}$ = The total mass of CO_2 loss from the EOR complex (see Clause 8.4.6 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7)), metric tons.

(b) The manner by which associated storage is quantified must assure completeness and preclude double counting. The annual mass of CO_2 that is recycled and reinjected into the EOR complex must not be quantified as associated storage. Loss from the CO_2 recycling facilities must be quantified.

(c) You must quantify the total mass of CO_2 input (m_{input}) in the reporting year according to paragraphs (g)(1) through (3) of this section.

(1) You must include the total mass of CO_2 received at the custody transfer meter by the CO_2–EOR project ($m_{received}$).

(2) The CO_2 stream received (including CO_2 transferred from another CO_2–EOR project) must be metered.

(i) The native CO_2 recovered and included as m_{native} must be documented.

(ii) CO_2 delivered to multiple CO_2–EOR projects must be allocated among those CO_2–EOR projects.

(3) The sum of the quantities of allocated CO_2 must not exceed the total quantities of CO_2 received.

(d) You must calculate the total mass of CO_2 from project operations ($m_{loss\ operations}$) in the reporting year as specified in equation 2 to this paragraph (d).

Equation 2 to paragraph (d)

$$m_{loss\ operations} = m_{loss\ leakage\ facilites} + m_{loss\frac{vent}{flare}} + m_{loss\ entrained} + m_{loss\ transfer}$$

Where:

$m_{loss\ leakage\ facilities}$ = Loss of CO_2 due to leakage from production, handling, and recycling CO_2–EOR facilities (infrastructure including wellheads), metric tons.

$m_{loss\ vent/flare}$ = Loss of CO_2 from venting/flaring from production operations, metric tons.

$m_{loss\ entrained}$ = Loss of CO_2 due to entrainment within produced gas/oil/water when this CO_2 is not separated and reinjected, metric tons.

$m_{loss\ transfer}$=Loss of CO_2 due to any transfer of CO_2 outside the CO_2–EOR project, metric tons. You must quantify any CO_2 that is subsequently produced from the EOR complex and transferred offsite.

§ 98.484 Monitoring and QA/QC requirements.

You must use the applicable monitoring and quality assurance requirements set forth in Clause 6.2 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7).

§ 98.485 Procedures for estimating missing data.

Whenever the value of a parameter is unavailable or the quality assurance procedures set forth in § 98.484 cannot be followed, you must follow the procedures set forth in Clause 9.2 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7).

§ 98.486 Data reporting requirements.

In addition to the information required by § 98.3(c), the annual report shall contain the following information, as applicable:

(a) The annual quantity of associated storage in metric tons of CO_2 (m_{stored}).

(b) The density of CO_2 if volumetric units are converted to mass in order to be reported for annual quantity of CO_2 stored.

(c) The annual quantity of CO_2 input (m_{input}) and the information in paragraphs (c)(1) and (2) of this section.

(1) The annual total mass of CO_2 received at the custody transfer meter by the CO_2–EOR project, including CO_2

transferred from another CO_2–EOR project ($m_{received}$).

(2) The annual mass of native CO_2 produced and captured in the CO_2–EOR project (m_{native}).

(d) The annual mass of CO_2 that is recycled and reinjected into the EOR complex.

(e) The annual total mass of CO_2 loss from project operations ($m_{loss\ operations}$), and the information in paragraphs (e)(1) through (4) of this section.

(1) Loss of CO_2 due to leakage from production, handling, and recycling CO_2–EOR facilities (infrastructure including wellheads) ($m_{loss\ leakage\ facilities}$).

(2) Loss of CO_2 from venting/flaring from production operations ($m_{loss\ vent/flare}$).

(3) Loss of CO_2 due to entrainment within produced gas/oil/water when this CO2 is not separated and reinjected ($m_{loss\ entrained}$).

(4) Loss of CO_2 due to any transfer of CO_2 outside the CO_2–EOR project ($m_{loss\ transfer}$).

(f) The total mass of CO_2 loss from the EOR complex ($m_{loss\ EOR\ complex}$).

(g) Annual documentation that contains the following components as described in Clause 4.4 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7):

(1) The formulas used to quantify the annual mass of associated storage, including the mass of CO_2 delivered to the CO_2–EOR project and losses during the period covered by the documentation (see Clause 8 and Annex B of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7)).

(2) The methods used to estimate missing data and the amounts estimated as described in Clause 9.2 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7).

(3) The approach and method for quantification utilized by the operator, including accuracy, precision, and uncertainties (see Clause 8 and Annex B of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7)).

(4) A statement describing the nature of validation or verification including the date of review, process, findings, and responsible person or entity.

(5) Source of each CO_2 stream quantified as associated storage (see Clause 8.3 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7)).

(6) A description of the procedures used to detect and characterize the total CO_2 leakage from the EOR complex.

(7) If only the mass of anthropogenic CO_2 is considered for mstored, a description of the derivation and application of anthropogenic CO_2 allocation ratios for all the terms described in Clauses 8.1 to 8.4.6 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7).

(8) Any documentation provided by a qualified independent engineer or geologist, who certifies that the documentation provided, including the mass balance calculations as well as information regarding monitoring and containment assurance, is accurate and complete.

(h) Any changes made within the reporting year to containment assurance and monitoring approaches and procedures in the EOR operations management plan.

§ 98.487 Records that must be retained.

You must follow the record retention requirements specified by § 98.3(g). In addition to the records required by § 98.3(g), you must comply with the record retention requirements in Clause 9.1 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7).

§ 98.488 EOR Operations Management Plan.

(a) You must prepare and update, as necessary, a general EOR operations management plan that provides a description of the EOR complex and engineered system (see Clause 4.3(a) of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7)), establishes that the EOR complex is adequate to provide safe, long-term containment of CO_2, and includes site-specific and other information including:

(1) Geologic characterization of the EOR complex.

(2) A description of the facilities within the CO_2–EOR project.

(3) A description of all wells and other engineered features in the CO_2–EOR project.

(4) The operations history of the project reservoir.

(5) The information set forth in Clauses 5 and 6 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7).

(b) You must prepare initial documentation at the beginning of the quantification period, and include the following as described in the EOR operations management plan:

(1) A description of the EOR complex and engineered systems (see Clause 5 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7)).

(2) The initial containment assurance (see Clause 6.1.2 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7)).

(3) The monitoring program (see Clause 6.2 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7)).

(4) The quantification method to be used (see Clause 8 and Annex B of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7)).

(5) The total mass of previously injected CO_2 (if any) within the EOR complex at the beginning of the CO_2–EOR project (see Clause 8.5 and Annex B of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7)).

(c) The EOR operation management plan in paragraph (a) of this section and initial documentation in paragraph (b) of this section must be submitted to the Administrator with the annual report covering the first reporting year that the facility reports under this subpart. In addition, any documentation provided by a qualified independent engineer or geologist, who certifies that the documentation provided is accurate and complete, must also be provided to the Administrator.

(d) If the EOR operations management plan is updated, the updated EOR management plan must be submitted to the Administrator with the annual report covering the first reporting year for which the updated EOR operation management plan is applicable.

§ 98.489 Definitions.

Except as provided in paragraphs (a) and (b) of this section, all terms used in this subpart have the same meaning given in the Clean Air Act and subpart A of this part.

Additional terms and definitions are provided in Clause 3 of CSA/ANSI ISO 27916:19 (incorporated by reference, see § 98.7).

Subpart WW—Coke Calciners

Sec.

98.490 Definition of the source category.
98.491 Reporting threshold.
98.492 GHGs to report.
98.493 Calculating GHG emissions.
98.494 Monitoring and QA/QC requirements.
98.495 Procedures for estimating missing data.
98.496 Data reporting requirements.
98.497 Records that must be retained.
98.498 Definitions.

§ 98.490 Definition of the source category.

(a) A coke calciner is a process unit that heats petroleum coke to high temperatures for the purpose of removing impurities or volatile substances in the petroleum coke feedstock.

(b) This source category consists of rotary kilns, rotary hearth furnaces, or similar process units used to calcine petroleum coke and also includes afterburners or other emission control systems used to treat the coke calcining unit's process exhaust gas.

§ 98.491 Reporting threshold.

You must report GHG emissions under this subpart if your facility contains a coke calciner and the facility meets the requirements of either § 98.2(a)(1) or (2).

§ 98.492 GHGs to report.

You must report:

(a) CO_2, CH_4, and N_2O emissions from each coke calcining unit under this subpart.

(b) CO_2, CH_4, and N_2O emissions from auxiliary fuel used in the coke calcining unit and afterburner, if applicable, or other control system used to treat the coke calcining unit's process off-gas under subpart C of this part by following the requirements of subpart C.

§ 98.493 Calculating GHG emissions.

(a) Calculate GHG emissions required to be reported in § 98.492(a) using the applicable methods in paragraph (b) of this section.

(b) For each coke calcining unit, calculate GHG emissions according to the applicable provisions in paragraphs (b)(1) through (4) of this section.

(1) If you operate and maintain a CEMS that measures CO_2 emissions according to subpart C of this part, you must calculate and report CO_2 emissions under this subpart by following the Tier 4 Calculation Methodology specified in § 98.33(a)(4) and all associated requirements for Tier 4 in subpart C of this part. Auxiliary fuel use CO_2 emissions should be calculated in accordance with subpart C of this part and subtracted from the CO_2 CEMS emissions to determine process CO_2 emissions. Other coke calcining units must either install a CEMS that complies with the Tier 4 Calculation Methodology in subpart C of this part or follow the requirements of paragraph (b)(2) of this section.

(2) Calculate the CO_2 emissions from the coke calcining unit using monthly measurements and equation 1 to this paragraph (b)(2).

Equation 1 to paragraph (b)(2)

$$CO_2 = \frac{44}{12} \times \sum_{m=1}^{12}\left(M_{in,m} \times CC_{GC,m} - \left(M_{out,m} + M_{dust,m}\right) \times CC_{MPC,m}\right)$$

Where:

CO_2 = Annual CO_2 emissions (metric tons CO_2/year).

m = Month index.

$M_{in,m}$ = Mass of green coke fed to the coke calcining unit in month ''m'' from facility records (metric tons/year).

$CC_{GC.m}$ = Mass fraction carbon content of green coke fed to the coke calcining unit from facility measurement data in month ''m'' (metric ton carbon/metric ton green coke). If measurements are made more frequently than monthly, determine the monthly average as the arithmetic average for all measurements made during the calendar month.

$M_{out,m}$ = Mass of marketable petroleum coke produced by the coke calcining unit in month ''m'' from facility records (metric tons petroleum coke/year).

$M_{dust,m}$ = Mass of petroleum coke dust removed from the process through the dust collection system of the coke calcining unit in month ''m'' from facility records (metric ton petroleum coke dust/year). For coke calcining units that recycle the collected dust, the mass of coke dust removed from the process is the mass of coke dust collected less the mass of coke dust recycled to the process.

$CC_{MPC,m}$ = Mass fraction carbon content of marketable petroleum coke produced by the coke calcining unit in month ''m'' from facility measurement data (metric ton carbon/metric ton petroleum coke). If measurements are made more frequently than monthly, determine the monthly average as the arithmetic average for all measurements made during the calendar month.

44 = Molecular weight of CO_2 (kg/kg-mole).

12 = Atomic weight of C (kg/kg-mole).

(3) Calculate CH4 emissions using equation 2 to this paragraph (b)(3).

Equation 2 to paragraph (b)(3)

$$CH_4 = \left(CO_2 \times \frac{EmF_2}{EmF_1}\right)$$

Where:

CH_4 = Annual methane emissions (metric tons CH_4/year).

CO_2 = Annual CO_2 emissions calculated in paragraph (b)(1) or (2) of this section, as applicable (metric tons CO_2/year).

EmF_1 = Default CO_2 emission factor for petroleum coke from table C–1 to subpart C of this part (kg CO_2/MMBtu).

EmF_2 = Default CH_4 emission factor for ''Petroleum Products (All fuel types in table C–1)'' from table C–2 to subpart C of this part (kg CH_4/MMBtu).

(4) Calculate N_2O emissions using equation 3 to this paragraph (b)(4).

Equation 3 to paragraph (b)(4)

$$N_2O = \left(CO_2 \times \frac{EmF_3}{EmF_1}\right)$$

Where:

N_2O = Annual nitrous oxide emissions (metric tons N_2O/year).

CO_2 = Annual CO_2 emissions calculated in paragraph (b)(1) or (2) of this section, as applicable (metric tons CO_2/year).

EmF_1 = Default CO_2 emission factor for petroleum coke from table C–1 to subpart C of this part (kg CO_2/MMBtu).

EmF_3 = Default N_2O emission factor for ''Petroleum Products (All fuel types in table C–1)'' from table C–2 to subpart C of this part (kg N_2O/MMBtu).

§ 98.494 Monitoring and QA/QC requirements.

(a) Flow meters, gas composition monitors, and heating value monitors that are associated with sources that use a CEMS to measure CO_2 emissions according to subpart C of this part or that are associated with stationary combustion sources must meet the applicable monitoring and QA/QC requirements in § 98.34.

(b) Determine the mass of petroleum coke monthly as required by equation 1 to § 98.493(b)(2) using mass measurement equipment meeting the requirements for commercial weighing equipment as described in NIST HB 44–2023 (incorporated by reference, see § 98.7). Calibrate the measurement device according to the procedures specified by NIST HB 44–2023 (incorporated by reference, see § 98.7) or the procedures specified by the

manufacturer. Recalibrate either biennially or at the minimum frequency specified by the manufacturer.

(c) Determine the carbon content of petroleum coke as required by equation 1 § 98.493(b)(2) using any one of the following methods. Calibrate the measurement device according to procedures specified by the method or procedures specified by the measurement device manufacturer.

(1) ASTM D3176–15 (incorporated by reference, see § 98.7).

(2) ASTM D5291–16 (incorporated by reference, see § 98.7).

(3) ASTM D5373–21 (incorporated by reference, see § 98.7).

(d) The owner or operator must document the procedures used to ensure the accuracy of the monitoring systems used including but not limited to calibration of weighing equipment, flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded.

§ 98.495 Procedures for estimating missing data.

A complete record of all measured parameters used in the GHG emissions calculations is required (*e.g.,* concentrations, flow rates, fuel heating values, carbon content values). Therefore, whenever a quality-assured value of a required parameter is unavailable (*e.g.,* if a CEMS malfunctions during unit operation or if a required sample is not taken), a substitute data value for the missing parameter must be used in the calculations.

(a) For missing auxiliary fuel use data, use the missing data procedures in subpart C of this part.

(b) For each missing value of mass or carbon content of coke, substitute the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If the ''after'' value is not obtained by the end of the reporting year, you may use the ''before'' value for the missing data substitution. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value must be the first quality-assured value obtained after the missing data period.

(c) For missing CEMS data, you must use the missing data procedures in § 98.35.

§ 98.496 Data reporting requirements.

In addition to the reporting requirements of § 98.3(c), you must report the information specified in paragraphs (a) through (i) of this section for each coke calcining unit.

(a) The unit ID number (if applicable).

(b) Maximum rated throughput of the unit, in metric tons coke calcined/stream day.

(c) The calculated CO_2, CH_4, and N_2O annual process emissions, expressed in metric tons of each pollutant emitted.

(d) A description of the method used to calculate the CO_2 emissions for each unit (*e.g.,* CEMS or equation 1 to § 98.493(b)(2)).

(e) Annual mass of green coke fed to the coke calcining unit from facility records (metric tons/year).

(f) Annual mass of marketable petroleum coke produced by the coke calcining unit from facility records (metric tons/year).

(g) Annual mass of petroleum coke dust removed from the process through the dust collection system of the coke calcining unit from facility records (metric tons/year) and an indication of whether coke dust is recycled to the unit (*e.g.,* all dust is recycled, a portion of the dust is recycled, or none of the dust is recycled).

(h) Annual average mass fraction carbon content of green coke fed to the coke calcining unit from facility measurement data (metric tons C per metric ton green coke).

(i) Annual average mass fraction carbon content of marketable petroleum coke produced by the coke calcining unit from facility measurement data (metric tons C per metric ton petroleum coke).

§ 98.497 Records that must be retained.

In addition to the records required by § 98.3(g), you must retain the records specified in paragraphs (a) and (b) of this section.

(a) The records of all parameters monitored under § 98.494.

(b) The applicable verification software records as identified in this paragraph (b). You must keep a record of the file generated by the verification software specified in § 98.5(b) for the applicable data specified in paragraphs (b)(1) through (5) of this section. Retention of this file satisfies the recordkeeping requirement for the data in paragraphs (b)(1) through (5) of this section.

(1) Monthly mass of green coke fed to the coke calcining unit from facility records (metric tons/year) (equation 1 to § 98.493(b)(2)).

(2) Monthly mass of marketable petroleum coke produced by the coke calcining unit from facility records (metric tons/year) (equation 1 to § 98.493(b)(2)).

(3) Monthly mass of petroleum coke dust removed from the process through the dust collection system of the coke calcining unit from facility records (metric tons/year) (equation 1 to § 98.493(b)(2)).

(4) Average monthly mass fraction carbon content of green coke fed to the coke calcining unit from facility measurement data (metric tons C per metric ton green coke) (equation 1 to § 98.493(b)(2)).

(5) Average monthly mass fraction carbon content of marketable petroleum coke produced by the coke calcining unit from facility measurement data (metric tons C per metric ton petroleum coke) (equation 1 to § 98.493(b)(2)).

§ 98.498 Definitions.

All terms used in this subpart have the same meaning given in the Clean Air Act and subpart A of this part.

Subpart XX—Calcium Carbide Production

Sec.

98.500 Definition of the source category.
98.501 Reporting threshold.
98.502 GHGs to report.
98.503 Calculating GHG emissions.
98.504 Monitoring and QA/QC requirements.
98.505 Procedures for estimating missing data.
98.506 Data reporting requirements.
98.507 Records that must be retained.
98.508 Definitions.

§ 98.500 Definition of the source category.

The calcium carbide production source category consists of any facility that produces calcium carbide.

§ 98.501 Reporting threshold.

You must report GHG emissions under this subpart if your facility contains a calcium carbide production process and the facility meets the requirements of either § 98.2(a)(1) or (2).

§ 98.502 GHGs to report.

You must report:

(a) Process CO_2 emissions from each calcium carbide process unit or furnace used for the production of calcium carbide.

(b) CO_2, CH_4, and N_2O emissions from each stationary combustion unit following the requirements of subpart C of this part. You must report these emissions under subpart C of this part by following the requirements of subpart C.

§ 98.503 Calculating GHG emissions.

You must calculate and report the annual process CO_2 emissions from each calcium carbide process unit not subject to paragraph (c) of this section using the procedures in either paragraph (a) or (b) of this section.

(a) Calculate and report under this subpart the combined process and

combustion CO_2 emissions by operating and maintaining CEMS according to the Tier 4 Calculation Methodology in § 98.33(a)(4) and all associated requirements for Tier 4 in subpart C of this part.

(b) Calculate and report under this subpart the annual process CO_2 emissions from the calcium carbide process unit using the carbon mass balance procedure specified in paragraphs (b)(1) and (2) of this section.

(1) For each calcium carbide process unit, determine the annual mass of carbon in each carbon-containing input and output material for the calcium carbide process unit and estimate annual process CO_2 emissions from the calcium carbide process unit using equation 1 to this paragraph (b)(1). Carbon-containing input materials include carbon electrodes and carbonaceous reducing agents. If you document that a specific input or output material contributes less than 1 percent of the total carbon into or out of the process, you do not have to include the material in your calculation using equation 1.

Equation 1 to paragraph (b)(1)

$$E_{CO2} = \frac{44}{12} \times \frac{2000}{2205} \times \sum_1^i \left(M_{\text{reducing agent}_i} \times C_{\text{reducing agent}_i}\right)$$

$$+ \frac{44}{12} \times \frac{2000}{2205} \times \sum_1^m \left(M_{\text{electrode}_m} \times C_{\text{electrode}_m}\right)$$

$$- \frac{44}{12} \times \frac{2000}{2205} \times \sum_1^k \left(M_{\text{product outgoing}_k} \times C_{\text{product outgoing}_k}\right)$$

$$- \frac{44}{12} \times \frac{2000}{2205} \times \sum_1^l \left(M_{\text{non-product outgoing}_l} \times C_{\text{non-product outgoing}_l}\right)$$

Where:

E_{CO2} = Annual process CO_2 emissions from an individual calcium carbide process unit (metric tons).

44/12 = Ratio of molecular weights, CO_2 to carbon.

2000/2205 = Conversion factor to convert tons to metric tons.

$M_{reducing\ agent_i}$ = Annual mass of reducing agent i fed, charged, or otherwise introduced into the calcium carbide process unit (tons).

$C_{reducing\ agent_i}$ = Carbon content in reducing agent i (percent by weight, expressed as a decimal fraction).

$M_{electrode_m}$ = Annual mass of carbon electrode m consumed in the calcium carbide process unit (tons).

$C_{electrode_m}$ = Carbon content of the carbon electrode m (percent by weight, expressed as a decimal fraction).

$M_{product\ outgoing_k}$ = Annual mass of alloy product k tapped from the calcium carbide process unit (tons).

$C_{product\ outgoing_k}$ = Carbon content in alloy product k (percent by weight, expressed as a decimal fraction).

$M_{non\text{-}product\ outgoing_l}$ = Annual mass of non-product outgoing material l removed from the calcium carbide unit (tons).

$C_{non\text{-}product\ outgoing}$ = Carbon content in non-product outgoing material l (percent by weight, expressed as a decimal fraction).

(2) Determine the combined annual process CO_2 emissions from the calcium carbide process units at your facility using equation 2 to this paragraph (b)(2).

Equation 2 to paragraph (b)(2)

$$CO_2 = \Sigma 1^k E_{CO2_k}$$

Where:

CO_2 = Annual process CO_2 emissions from calcium carbide process units at a facility used for the production of calcium carbide (metric tons).

E_{CO2_k} = Annual process CO_2 emissions calculated from calcium carbide process unit k calculated using equation 1 to paragraph (b)(1) of this section (metric tons).

k = Total number of calcium carbide process units at facility.

(c) If all GHG emissions from a calcium carbide process unit are vented through the same stack as any combustion unit or process equipment that reports CO_2 emissions using a CEMS that complies with the Tier 4 Calculation Methodology in subpart C of this part, then the calculation methodology in paragraph (b) of this section must not be used to calculate process emissions. The owner or operator must report under this subpart the combined stack emissions according to the Tier 4 Calculation Methodology in § 98.33(a)(4) and all associated requirements for Tier 4 in subpart C of this part.

§ 98.504 Monitoring and QA/QC requirements.

If you determine annual process CO_2 emissions using the carbon mass balance procedure in § 98.503(b), you must meet the requirements specified in paragraphs (a) and (b) of this section.

(a) Determine the annual mass for each material used for the calculations of annual process CO_2 emissions using equation 1 to § 98.503(b)(1) by summing the monthly mass for the material determined for each month of the calendar year. The monthly mass may be determined using plant instruments used for accounting purposes, including either direct measurement of the quantity of the material placed in the unit or by calculations using process operating information.

(b) For each material identified in paragraph (a) of this section, you must determine the average carbon content of the material consumed, used, or produced in the calendar year using the methods specified in either paragraph (b)(1) or (2) of this section. If you document that a specific process input or output contributes less than one percent of the total mass of carbon into or out of the process, you do not have to determine the monthly mass or annual carbon content of that input or output.

(1) Information provided by your material supplier.

(2) Collecting and analyzing at least three representative samples of the material inputs and outputs each year. The carbon content of the material must be analyzed at least annually using the standard methods (and their QA/QC procedures) specified in paragraphs (b)(2)(i) and (ii) of this section, as applicable.

(i) ASTM D5373–08 (incorporated by reference, see § 98.7), for analysis of carbonaceous reducing agents and carbon electrodes.

(ii) ASTM C25–06 (incorporated by reference, see § 98.7) for analysis of materials such as limestone or dolomite.

§ 98.505 Procedures for estimating missing data.

A complete record of all measured parameters used in the GHG emissions

calculations in § 98.503 is required. Therefore, whenever a quality-assured value of a required parameter is unavailable, a substitute data value for the missing parameter must be used in the calculations as specified in the paragraphs (a) and (b) of this section. You must document and keep records of the procedures used for all such estimates.

(a) If you determine CO_2 emissions for the calcium carbide process unit at your facility using the carbon mass balance procedure in § 98.503(b), 100 percent data availability is required for the carbon content of the input and output materials. You must repeat the test for average carbon contents of inputs according to the procedures in § 98.504(b) if data are missing.

(b) For missing records of the monthly mass of carbon-containing inputs and outputs, the substitute data value must be based on the best available estimate of the mass of the inputs and outputs from all available process data or data used for accounting purposes, such as purchase records.

§ 98.506 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the information specified in paragraphs (a) through (h) of this section, as applicable:

(a) Annual facility calcium carbide production capacity (tons).

(b) The annual facility production of calcium carbide (tons).

(c) Total number of calcium carbide process units at facility used for production of calcium carbide.

(d) Annual facility consumption of petroleum coke (tons).

(e) Each end use of any calcium carbide produced and sent off site.

(f) If the facility produces acetylene on site, provide the information in paragraphs (f)(1) through (3) of this section.

(1) The annual production of acetylene at the facility (tons).

(2) The annual quantity of calcium carbide used for the production of acetylene at the facility (tons).

(3) Each end use of any acetylene produced on-site.

(g) If a CEMS is used to measure CO_2 emissions, then you must report under this subpart the relevant information required by § 98.36 for the Tier 4 Calculation Methodology and the information specified in paragraphs (g)(1) and (2) of this section.

(1) Annual CO_2 emissions (in metric tons) from each CEMS monitoring location measuring process emissions from the calcium carbide process unit.

(2) Identification number of each process unit.

(h) If a CEMS is not used to measure CO_2 process emissions, and the carbon mass balance procedure is used to determine CO_2 emissions according to the requirements in § 98.503(b), then you must report the information specified in paragraphs (h)(1) through (3) of this section.

(1) Annual process CO_2 emissions (in metric tons) from each calcium carbide process unit.

(2) List the method used for the determination of carbon content for each input and output material included in the calculation of annual process CO_2 emissions for each calcium carbide process unit (*i.e.,* supplier provided information, analyses of representative samples you collected).

(3) If you use the missing data procedures in § 98.505(b), you must report for each calcium carbide production process unit how monthly mass of carbon-containing inputs and outputs with missing data were determined and the number of months the missing data procedures were used.

§ 98.507 Records that must be retained.

In addition to the records required by § 98.3(g), you must retain the records specified in paragraphs (a) through (d) of this section for each calcium carbide process unit, as applicable.

(a) If a CEMS is used to measure CO_2 emissions according to the requirements in § 98.503(a), then you must retain under this subpart the records required for the Tier 4 Calculation Methodology in § 98.37 and the information specified in paragraphs (a)(1) through (3) of this section.

(1) Monthly calcium carbide process unit production quantity (tons).

(2) Number of calcium carbide processing unit operating hours each month.

(3) Number of calcium carbide processing unit operating hours in a calendar year.

(b) If the carbon mass balance procedure is used to determine CO_2 emissions according to the requirements in § 98.503(b)(2), then you must retain records for the information specified in paragraphs (b)(1) through (5) of this section.

(1) Monthly calcium carbide process unit production quantity (tons).

(2) Number of calcium carbide process unit operating hours each month.

(3) Number of calcium carbide process unit operating hours in a calendar year.

(4) Monthly material quantity consumed, used, or produced for each material included for the calculations of annual process CO_2 emissions (tons).

(5) Average carbon content determined and records of the supplier provided information or analyses used for the determination for each material included for the calculations of annual process CO_2 emissions.

(c) You must keep records that include a detailed explanation of how company records of measurements are used to estimate the carbon input and output to each calcium carbide process unit, including documentation of specific input or output materials excluded from equation 1 to § 98.503(b)(1) that contribute less than 1 percent of the total carbon into or out of the process. You also must document the procedures used to ensure the accuracy of the measurements of materials fed, charged, or placed in a calcium carbide process unit including, but not limited to, calibration of weighing equipment and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded, and the technical basis for these estimates must be provided.

(d) The applicable verification software records as identified in this paragraph (d). You must keep a record of the file generated by the verification software specified in § 98.5(b) for the applicable data specified in paragraphs (d)(1) through (8) of this section. Retention of this file satisfies the recordkeeping requirement for the data in paragraphs (d)(1) through (8) of this section.

(1) Carbon content in reducing agent (percent by weight, expressed as a decimal fraction) (equation 1 to § 98.503(b)(1)).

(2) Annual mass of reducing agent fed, charged, or otherwise introduced into the calcium carbide process unit (tons) (equation 1 to § 98.503(b)(1)).

(3) Carbon content of carbon electrode (percent by weight, expressed as a decimal fraction) (equation 1 to § 98.503(b)(1)).

(4) Annual mass of carbon electrode consumed in the calcium carbide process unit (tons) (equation 1 to § 98.503(b)(1)).

(5) Carbon content in product (percent by weight, expressed as a decimal fraction) (equation 1 to § 98.503(b)(1)).

(6) Annual mass of product produced/tapped in the calcium carbide process unit (tons) (equation 1 to § 98.503(b)(1)).

(7) Carbon content in non-product outgoing material (percent by weight, expressed as a decimal fraction) (equation 1 to § 98.503(b)(1)).

(8) Annual mass of non-product outgoing material removed from calcium carbide process unit (tons) (equation 1 to § 98.503(b)(1)).

§ 98.508 Definitions.

All terms used of this subpart have the same meaning given in the Clean Air Act and subpart A of this part.

Subpart YY—Caprolactam, Glyoxal, and Glyoxylic Acid Production

Sec.

98.510 Definition of the source category.
98.511 Reporting threshold.
98.512 GHGs to report.
98.513 Calculating GHG emissions.
98.514 Monitoring and QA/QC requirements.
98.515 Procedures for estimating missing data.
98.516 Data reporting requirements.
98.517 Records that must be retained.
98.518 Definitions.
Table 1 to Subpart YY of Part 98—N_2O Generation Factors

§ 98.510 Definition of the source category.

This source category includes any facility that produces caprolactam, glyoxal, or glyoxylic acid. This source category excludes the production of glyoxal through the LaPorte process (*i.e.,* the gas-phase catalytic oxidation of ethylene glycol with air in the presence of a silver or copper catalyst).

§ 98.511 Reporting threshold.

You must report GHG emissions under this subpart if your facility meets the requirements of either § 98.2(a)(1) or (2) and the definition of source category in § 98.510.

§ 98.512 GHGs to report.

(a) You must report N_2O process emissions from the production of caprolactam, glyoxal, and glyoxylic acid as required by this subpart.

(b) You must report under subpart C of this part the emissions of CO_2, CH_4, and N_2O from each stationary combustion unit by following the requirements of subpart C of this part.

§ 98.513 Calculating GHG emissions.

(a) You must determine annual N_2O process emissions from each caprolactam, glyoxal, and glyoxylic acid process line using the appropriate default N_2O generation factor(s) from table 1 to this subpart, the site-specific N_2O destruction factor(s) for each N_2O abatement device, and site-specific production data according to paragraphs (b) through (e) of this section.

(b) You must determine the total annual amount of product *i* (caprolactam, glyoxal, or glyoxylic acid) produced on each process line *t* (metric tons product), according to § 98.514(b).

(c) If process line *t* exhausts to any N_2O abatement technology *j*, you must determine the destruction efficiency for each N_2O abatement technology according to paragraph (c)(1) or (2) of this section.

(1) Use the control device manufacturer's specified destruction efficiency.

(2) Estimate the destruction efficiency through process knowledge. Examples of information that could constitute process knowledge include calculations based on material balances, process stoichiometry, or previous test results provided the results are still relevant to the current vent stream conditions. You must document how process knowledge (if applicable) was used to determine the destruction efficiency.

(d) If process line *t* exhausts to any N_2O abatement technology *j*, you must determine the abatement utilization factor for each N_2O abatement technology according to paragraph (d)(1) or (2) of this section.

(1) If the abatement technology *j* has no downtime during the year, use 1.

(2) If the abatement technology *j* was not operational while product *i* was being produced on process line *t*, calculate the abatement utilization factor according to equation 1 to this paragraph (d)(2).

Equation 1 to paragraph (d)(2)

$$AF_j = \frac{T_{i,j}}{T_i}$$

Where:

AF_j = Monthly abatement utilization factor of N_2O abatement technology *j* from process unit *t* (fraction of time that abatement technology is operating).

$T_{i,j}$ = Total number of hours during month that product *i* (caprolactam, glyoxal, or glyoxylic acid), was produced from process unit *t* during which N_2O abatement technology *j* was operational (hours).

T_i = Total number of hours during month that product *i* (caprolactam, glyoxal, or glyoxylic acid), was produced from process unit *t* (hours).

(e) You must calculate N_2O emissions for each product *i* from each process line *t* and each N_2O control technology *j* according to equation 2 to this paragraph (e).

Equation 2 to paragraph (e)

$$E_{N2Ot} = \sum_{i,j}\left[EF_i * P_i * \left(1 - \left(DE_j * AF_j\right)\right)\right] * 0.001$$

Where:

E_{N2Ot} = Monthly process emissions of N_2O, metric tons from process line *t*.

EF_i = N_2O generation factor for product *i* (caprolactam, glyoxal, or glyoxylic acid), kg N_2O/metric ton of product produced, as shown in table 1 to this subpart.

P_i = Monthly production of product *i*, (caprolactam, glyoxal, or glyoxylic acid), metric tons.

DE_j = Destruction efficiency of N_2O abatement technology type *j*, fraction (decimal fraction of N_2O removed from vent stream).

AF_j = Monthly abatement utilization factor for N_2O abatement technology type *j*, fraction, calculated using equation 1 to paragraph (d)(2) of this section.

0.001 = Conversion factor from kg to metric tons.

(f) You must determine the annual emissions combined from each process line at your facility using equation 3 to this paragraph (f):

Equation 3 to paragraph (f)

$$N_2O = \sum_{1}^{12} E_{N2Ot}$$

Where:

N_2O = Annual process N_2O emissions from each process line for product *i* (caprolactam, glyoxal, or glyoxylic acid) (metric tons).

E_{N2Oi} = Monthly process emissions of N_2O from each process line for product *i* (caprolactam, glyoxal, or glyoxylic acid) (metric tons).

§ 98.514 Monitoring and QA/QC requirements.

(a) You must determine the total monthly amount of caprolactam, glyoxal, and glyoxylic acid produced. These monthly amounts are determined according to the methods in paragraph (a)(1) or (2) of this section.

(1) Direct measurement of production (such as using flow meters, weigh scales, etc.).

(2) Existing plant procedures used for accounting purposes (*i.e.,* dedicated tank-level and acid concentration measurements).

(b) You must determine the annual amount of caprolactam, glyoxal, and glyoxylic acid produced. These annual amounts are determined by summing the respective monthly quantities determined in paragraph (a) of this section.

§ 98.515 Procedures for estimating missing data.

A complete record of all measured parameters used in the GHG emissions calculations is required. Therefore, whenever a quality-assured value of a required parameter is unavailable, a substitute data value for the missing parameter must be used in the calculations as specified in paragraphs (a) and (b) of this section.

(a) For each missing value of caprolactam, glyoxal, or glyoxylic acid production, the substitute data must be the best available estimate based on all available process data or data used for accounting purposes (such as sales records).

(b) For missing values related to the N_2O abatement device, assuming that the operation is generally constant from year to year, the substitute data value should be the most recent quality-assured value.

§ 98.516 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the information specified in paragraphs (a) through (j) of this section.

(a) Process line identification number.

(b) Annual process N_2O emissions from each process line according to paragraphs (b)(1) through (3) of this section.

(1) N_2O from caprolactam production (metric tons).

(2) N_2O from glyoxal production (metric tons).

(3) N_2O from glyoxylic acid production (metric tons).

(c) Annual production quantities from all process lines at the caprolactam, glyoxal, or glyoxylic acid production facility according to paragraphs (c)(1) through (3) of this section.

(1) Caprolactam production (metric tons).

(2) Glyoxal production (metric tons).

(3) Glyoxylic acid production (metric tons).

(d) Annual production capacity from all process lines at the caprolactam, glyoxal, or glyoxylic acid production facility, as applicable, in paragraphs (d)(1) through (3) of this section.

(1) Caprolactam production capacity (metric tons).

(2) Glyoxal production capacity (metric tons).

(3) Glyoxylic acid production capacity (metric tons).

(e) Number of process lines at the caprolactam, glyoxal, or glyoxylic acid production facility, by product, in paragraphs (e)(1) through (3) of this section.

(1) Total number of process lines producing caprolactam.

(2) Total number of process lines producing glyoxal.

(3) Total number of process lines producing glyoxylic acid.

(f) Number of operating hours in the calendar year for each process line at the caprolactam, glyoxal, or glyoxylic acid production facility (hours).

(g) N_2O abatement technologies used (if applicable) and date of installation of abatement technology at the caprolactam, glyoxal, or glyoxylic acid production facility.

(h) Monthly abatement utilization factor for each N_2O abatement technology for each process line at the caprolactam, glyoxal, or glyoxylic acid production facility.

(i) Number of times in the reporting year that missing data procedures were followed to measure production quantities of caprolactam, glyoxal, or glyoxylic acid (months).

(j) Annual percent N_2O emission reduction per chemical produced at the caprolactam, glyoxal, or glyoxylic acid production facility, as applicable, in paragraphs (j)(1) through (3) of this section.

(1) Annual percent N_2O emission reduction for all caprolactam production process lines.

(2) Annual percent N_2O emission reduction for all glyoxal production process lines.

(3) Annual percent N_2O emission reduction for all glyoxylic acid production process lines.

§ 98.517 Records that must be retained.

In addition to the information required by § 98.3(g), you must retain the records specified in paragraphs (a) through (d) of this section for each caprolactam, glyoxal, or glyoxylic acid production facility:

(a) Documentation of how accounting procedures were used to estimate production rate.

(b) Documentation of how process knowledge was used to estimate abatement technology destruction efficiency (if applicable).

(c) Documentation of the procedures used to ensure the accuracy of the measurements of all reported parameters, including but not limited to, calibration of weighing equipment, flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded, and the technical basis for these estimates must be provided.

(d) The applicable verification software records as identified in this paragraph (d). You must keep a record of the file generated by the verification software specified in § 98.5(b) for the applicable data specified in paragraphs (d)(1) through (4) of this section. Retention of this file satisfies the recordkeeping requirement for the data in paragraphs (d)(1) through (4) of this section.

(1) Monthly production quantity of caprolactam from each process line at the caprolactam, glyoxal, or glyoxylic acid production facility (metric tons).

(2) Monthly production quantity of glyoxal from each process line at the caprolactam, glyoxal, or glyoxylic acid production facility (metric tons).

(3) Monthly production quantity of glyoxylic acid from each process line at the caprolactam, glyoxal, or glyoxylic acid production facility (metric tons).

(4) Destruction efficiency of N_2O abatement technology from each process line, fraction (decimal fraction of N_2O removed from vent stream).

§ 98.518 Definitions.

All terms used in this subpart have the same meaning given in the Clean Air Act and subpart A of this part.

TABLE 1 TO SUBPART YY OF PART 98—N_2O GENERATION FACTORS

Product	N_2O generation factor [a]
Caprolactam	9.0
Glyoxal	520

TABLE 1 TO SUBPART YY OF PART 98—N_2O GENERATION FACTORS—Continued

Product	N_2O generation factor [a]
Glyoxylic acid	100

[a] Generation factors in units of kilograms of N_2O emitted per metric ton of product produced.

Subpart ZZ—Ceramics Manufacturing

Sec.
98.520 Definition of the source category.
98.521 Reporting threshold.
98.522 GHGs to report.
98.523 Calculating GHG emissions.
98.524 Monitoring and QA/QC requirements.
98.525 Procedures for estimating missing data.
98.526 Data reporting requirements.
98.527 Records that must be retained.
98.528 Definitions.
Table 1 to Subpart ZZ of Part 98—CO_2 Emission Factors for Carbonate-Based Raw Materials

§ 98.520 Definition of the source category.

(a) The ceramics manufacturing source category consists of any facility that uses nonmetallic, inorganic materials, many of which are clay-based, to produce ceramic products such as bricks and roof tiles, wall and floor tiles, table and ornamental ware (household ceramics), sanitary ware, refractory products, vitrified clay pipes, expanded clay products, inorganic bonded abrasives, and technical ceramics (*e.g.,* aerospace, automotive, electronic, or biomedical applications). For the purposes of this subpart, ceramics manufacturing processes include facilities that annually consume at least 2,000 tons of carbonates, either as raw materials or as a constituent in clay, which is heated to a temperature sufficient to allow the calcination reaction to occur, and operate a ceramics manufacturing process unit.

(b) A ceramics manufacturing process unit is a kiln, dryer, or oven used to calcine clay or other carbonate-based materials for the production of a ceramics product.

§ 98.521 Reporting threshold.

You must report GHG emissions under this subpart if your facility contains a ceramics manufacturing process and the facility meets the requirements of either § 98.2(a)(1) or (2).

§ 98.522 GHGs to report.

You must report:

(a) CO_2 process emissions from each ceramics process unit (*e.g.,* kiln, dryer, or oven).

(b) CO_2 combustion emissions from each ceramics process unit.

(c) CH_4 and N_2O combustion emissions from each ceramics process unit. You must calculate and report these emissions under subpart C of this part by following the requirements of subpart C of this part.

(d) CO_2, CH_4, and N_2O combustion emissions from each stationary fuel combustion unit other than kilns, dryers, or ovens. You must report these emissions under subpart C of this part by following the requirements of subpart C of this part.

§ 98.523 Calculating GHG emissions.

You must calculate and report the annual process CO_2 emissions from each ceramics process unit using the procedures in paragraphs (a) through (c) of this section.

(a) For each ceramics process unit that meets the conditions specified in § 98.33(b)(4)(ii) or (iii), you must calculate and report under this subpart the combined process and combustion CO_2 emissions by operating and maintaining a CEMS to measure CO_2 emissions according to the Tier 4 Calculation Methodology specified in § 98.33(a)(4) and all associated requirements for Tier 4 in subpart C of this part.

(b) For each ceramics process unit that is not subject to the requirements in paragraph (a) of this section, calculate and report the process and combustion CO_2 emissions from the ceramics process unit separately by using the procedures specified in paragraphs (b)(1) through (6) of this section, except as specified in paragraph (c) of this section.

(1) For each carbonate-based raw material (including clay) charged to the ceramics process unit, either obtain the mass fractions of any carbonate-based minerals from the supplier of the raw material or by sampling the raw material, or use a default value of 1.0 as the mass fraction for the raw material.

(2) Determine the quantity of each carbonate-based raw material charged to the ceramics process unit.

(3) Apply the appropriate emission factor for each carbonate-based raw material charged to the ceramics process unit. Table 1 to this subpart provides emission factors based on stoichiometric ratios for carbonate-based minerals.

(4) Use equation 1 to this paragraph (b)(4) to calculate process mass emissions of CO_2 for each ceramics process unit:

Equation 1 to paragraph (b)(4)

$$E_{CO2} = \sum_j \left[\left(M_j \bullet \frac{2000}{2205} \right) \bullet \sum_i (MF_i \bullet EF_i \bullet F_i) \right]$$

Where:

E_{CO2} = Annual process CO_2 emissions (metric tons/year).

M_j = Annual mass of the carbonate-based raw material *j* consumed (tons/year).

2000/2205 = Conversion factor to convert tons to metric tons.

MF_i = Annual average decimal mass fraction of carbonate-based mineral *i* in carbonate-based raw material *j*.

EF_i = Emission factor for the carbonate-based mineral *i*, (metric tons CO_2/metric ton carbonate, see table 1 to this subpart).

F_i = Decimal fraction of calcination achieved for carbonate-based mineral *i*, assumed to be equal to 1.0.

i = Index for carbonate-based mineral in each carbonate-based raw material.

j = Index for carbonate-based raw material.

(5) Determine the combined annual process CO_2 emissions from the ceramic process units at your facility using equation 2 to this paragraph (b)(5):

Equation 2 to paragraph (b)(5)

$$CO_2 = \Sigma^k{}_1 E_{CO2_k}$$

Where:

CO_2 = Annual process CO_2 emissions from ceramic process units at a facility (metric tons).

E_{CO2_k} = Annual process CO_2 emissions calculated from ceramic process unit k calculated using equation 1 to paragraph (b)(4) of this section (metric tons).

k = Total number of ceramic process units at facility.

(6) Calculate and report under subpart C of this part the combustion CO_2 emissions in the ceramics process unit according to the applicable requirements in subpart C of this part.

(c) A value of 1.0 can be used for the mass fraction (MF_i) of carbonate-based mineral i in each carbonate-based raw material *j* in equation 1 to paragraph (b)(4) of this section. The use of 1.0 for the mass fraction assumes that the carbonate-based raw material comprises 100% of one carbonate-based mineral. As an alternative to the default value, you may use data provided by either the raw material supplier or a lab analysis.

§ 98.524 Monitoring and QA/QC requirements.

(a) You must measure annual amounts of carbonate-based raw materials charged to each ceramics process unit from monthly measurements using plant instruments used for accounting purposes, such as calibrated scales or weigh hoppers. Total annual mass charged to ceramics process units at the facility must be compared to records of raw material purchases for the year.

(b) You must use the default value of 1.0 for the mass fraction of a carbonate-based mineral, or you may opt to obtain the mass fraction of any carbonate-based materials from the supplier of the raw material or by sampling the raw material. If you opt to obtain the mass fractions of any carbonate-based minerals from the supplier of the raw material or by sampling the raw material, you must measure the carbonate-based mineral mass fractions at least annually to verify the mass fraction data. You may conduct the sampling and chemical analysis using any x-ray fluorescence test, x-ray diffraction test, or other enhanced testing method published by an industry consensus standards organization (*e.g.,* ASTM, ASME, API). If it is determined that the mass fraction of a carbonate based raw material is below the detection limit of available industry testing standards, you may use a default value of 0.005.

(c) You must use the default value of 1.0 for the mass fraction of a carbonate-based mineral, or you may opt to obtain the mass fraction of any carbonate-based materials from the supplier of the raw material or by sampling the raw material. If you obtain the mass fractions of any carbonate-based minerals from the supplier of the raw material or by sampling the raw material, you must determine the annual average mass fraction for the carbonate-based mineral in each carbonate-based raw material at least annually by calculating an arithmetic average of the data obtained from raw material suppliers or sampling and chemical analysis.

(d) You must use the default value of 1.0 for the calcination fraction of a carbonate-based mineral. Alternatively, you may opt to obtain the calcination fraction of any carbonate-based mineral by sampling. If you opt to obtain the calcination fraction of any carbonate-based minerals from sampling, you must determine on an annual basis the calcination fraction for each carbonate-based mineral consumed based on sampling and chemical analysis. You may conduct the sampling and chemical analysis using any x-ray fluorescence test, x-ray diffraction test, or other enhanced testing method published by an industry consensus standards organization (*e.g.,* ASTM, ASME, API).

§ 98.525 Procedures for estimating missing data.

A complete record of all measured parameters used in the GHG emissions calculations in § 98.523 is required. If the monitoring and quality assurance procedures in § 98.524 cannot be followed and data is unavailable, you must use the most appropriate of the missing data procedures in paragraphs (a) and (b) of this section in the calculations. You must document and keep records of the procedures used for all such missing value estimates.

(a) If the CEMS approach is used to determine combined process and combustion CO_2 emissions, the missing data procedures in § 98.35 apply.

(b) For missing data on the monthly amounts of carbonate-based raw materials charged to any ceramics process unit, use the best available estimate(s) of the parameter(s) based on all available process data or data used for accounting purposes, such as purchase records.

(c) For missing data on the mass fractions of carbonate-based minerals in the carbonate-based raw materials, assume that the mass fraction of a carbonate-based mineral is 1.0, which assumes that one carbonate-based mineral comprises 100 percent of the carbonate-based raw material.

§ 98.526 Data reporting requirements.

In addition to the information required by § 98.3(c), each annual report must contain the information specified in paragraphs (a) through (c) of this section, as applicable:

(a) The total number of ceramics process units at the facility and the number of units that operated during the reporting year.

(b) If a CEMS is used to measure CO_2 emissions from ceramics process units, then you must report under this subpart the relevant information required under § 98.36 for the Tier 4 Calculation Methodology and the following information specified in paragraphs (b)(1) through (3) of this section.

(1) The annual quantity of each carbonate-based raw material (including clay) charged to each ceramics process unit and for all units combined (tons).

(2) Annual quantity of each type of ceramics product manufactured by each ceramics process unit and by all units combined (tons).

(3) Annual production capacity for each ceramics process unit (tons).

(c) If a CEMS is not used to measure CO_2 emissions from ceramics process units and process CO_2 emissions are calculated according to the procedures specified in § 98.523(b), then you must report the following information specified in paragraphs (c)(1) through (7) of this section.

(1) Annual process emissions of CO_2 (metric tons) for each ceramics process unit and for all units combined.

(2) The annual quantity of each carbonate-based raw material (including clay) charged to each ceramics process unit and for all units combined (tons).

(3) Results of all tests used to verify each carbonate-based mineral mass fraction for each carbonate-based raw material charged to a ceramics process unit, as specified in paragraphs (c)(3)(i) through (iii) of this section.

(i) Date of test.

(ii) Method(s) and any variations used in the analyses.

(iii) Mass fraction of each sample analyzed.

(4) Method used to determine the decimal mass fraction of carbonate-based mineral, unless you used the default value of 1.0 (*e.g.,* supplier provided information, analyses of representative samples you collected, or use of a default value of 0.005 as specified by § 98.524(b)).

(5) Annual quantity of each type of ceramics product manufactured by each ceramics process unit and by all units combined (tons).

(6) Annual production capacity for each ceramics process unit (tons).

(7) If you use the missing data procedures in § 98.525(b), you must report for each applicable ceramics process unit the number of times in the reporting year that missing data procedures were followed to measure monthly quantities of carbonate-based raw materials or mass fraction of the carbonate-based minerals (months).

§ 98.527 Records that must be retained.

In addition to the records required by § 98.3(g), you must retain the records specified in paragraphs (a) through (d) of this section for each ceramics process unit, as applicable.

(a) If a CEMS is used to measure CO_2 emissions according to the requirements in § 98.523(a), then you must retain under this subpart the records required under § 98.37 for the Tier 4 Calculation Methodology and the information specified in paragraphs (a)(1) and (2) of this section.

(1) Monthly ceramics production rate for each ceramics process unit (tons).

(2) Monthly amount of each carbonate-based raw material charged to each ceramics process unit (tons).

(b) If process CO_2 emissions are calculated according to the procedures

specified in § 98.523(b), you must retain the records in paragraphs (b)(1) through (6) of this section.

(1) Monthly ceramics production rate for each ceramics process unit (metric tons).

(2) Monthly amount of each carbonate-based raw material charged to each ceramics process unit (metric tons).

(3) Data on carbonate-based mineral mass fractions provided by the raw material supplier for all raw materials consumed annually and included in calculating process emissions in equation 1 to § 98.523(b)(4), if applicable.

(4) Results of all tests, if applicable, used to verify the carbonate-based mineral mass fraction for each carbonate-based raw material charged to a ceramics process unit, including the data specified in paragraphs (b)(4)(i) through (v) of this section.

(i) Date of test.

(ii) Method(s), and any variations of methods, used in the analyses.

(iii) Mass fraction of each sample analyzed.

(iv) Relevant calibration data for the instrument(s) used in the analyses.

(v) Name and address of laboratory that conducted the tests.

(5) Each carbonate-based mineral mass fraction for each carbonate-based raw material, if a value other than 1.0 is used to calculate process mass emissions of CO_2.

(6) Number of annual operating hours of each ceramics process unit.

(c) All other documentation used to support the reported GHG emissions.

(d) The applicable verification software records as identified in this paragraph (d). You must keep a record of the file generated by the verification software specified in § 98.5(b) for the applicable data specified in paragraphs (d)(1) through (3) of this section. Retention of this file satisfies the recordkeeping requirement for the data in paragraphs (d)(1) through (3) of this section.

(1) Annual average decimal mass fraction of each carbonate-based mineral in each carbonate-based raw material for each ceramics process unit (specify the default value, if used, or the value determined according to § 98.524) (percent by weight, expressed as a decimal fraction) (equation 1 to § 98.523(b)(4)).

(2) Annual mass of each carbonate-based raw material charged to each ceramics process unit (tons) (equation 1 to § 98.523(b)(4)).

(3) Decimal fraction of calcination achieved for each carbonate-based raw material for each ceramics process unit (specify the default value, if used, or the value determined according to § 98.524) (percent by weight, expressed as a decimal fraction) (equation 1 to § 98.523(b)(4)).

§ 98.528 Definitions.

All terms used of this subpart have the same meaning given in the Clean Air Act and subpart A of this part.

TABLE 1 TO SUBPART ZZ OF PART 98—CO_2 EMISSION FACTORS FOR CARBONATE-BASED RAW MATERIALS

Carbonate	Mineral name(s)	CO_2 emission factor [a]
$BaCO_3$	Witherite, Barium carbonate	0.223
$CaCO_3$	Limestone, Calcium Carbonate, Calcite, Aragonite	0.440
$Ca(Fe,Mg,Mn)(CO_3)_2$	Ankerite [b]	0.408–0.476
$CaMg(CO_3)_2$	Dolomite	0.477
$FeCO_3$	Siderite	0.380
K_2CO_3	Potassium carbonate	0.318
Li_2CO_3	Lithium carbonate	0.596
$MgCO_3$	Magnesite	0.522
$MnCO_3$	Rhodochrosite	0.383
Na_2CO_3	Sodium carbonate, Soda ash	0.415
$SrCO_3$	Strontium carbonate, Strontianite	0.298

[a] Emission factors are in units of metric tons of CO_2 emitted per metric ton of carbonate-based material.

[b] Ankerite emission factors are based on a formula weight range that assumes Fe, Mg, and Mn are present in amounts of at least 1.0 percent.

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Resources

IN THIS SECTION

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Resources

- FAQs Regarding California Climate Disclosure Requirements (posted 7/9/25)
- Climate Related Financial Risk Report Checklist (posted 9/2/25)
- Preliminary List of Reporting/Covered Entities (posted 9/24/25)
    - To help validate the information in CARB's preliminary list of entities, CARB is seeking stakeholder feedback through a voluntary survey tool. Entities that believe they may be subject to these requirements, or may qualify for an exemption, are encouraged to complete the survey, available here.
    - Each potentially-regulated entity remains responsible for compliance with statutory requirements, regardless of whether it was included in staff's preliminary list or outreach.
- Draft Scope 1 and 2 GHG Reporting Template (posted 10/10/25)
    - CARB is seeking public comment on a draft reporting template for Scope 1 and Scope 2 greenhouse gas (GHG) emissions. CARB is also seeking public comment on a memo containing guidance on using the template under the Corporate Greenhouse Gas Reporting Program. Please submit your feedback to our public docket, which will remain open through October 27, 2025.

- **Notice:** Following the California Air Resources Board's (CARB) August 2025 workshop, CARB staff have made available public resources to solicit feedback from stakeholders, including a Climate-Related Financial Risk Report Checklist (09/02/25), a preliminary list of regulated entities and voluntary stakeholder survey tool (09/24/25), and a draft reporting template for Scope 1 and Scope 2 GHG Emissions (10/10/25). Given the large volume of public comments staff have received, and given ongoing input related to identifying the range of covered entities, CARB is proposing an updated timeline for bringing the initial rulemaking (including the fee-related provisions) to the board in Q1 2026. **CARB is continuing to take feedback on the draft reporting template for Scope 1 and Scope 2 GHG emissions at CARB's public docket through 10/27/25. Feedback related to the preliminary list of covered entities can be submitted through an online survey. Other comments or inquiries can be submitted to Climatedisclosure@arb.ca.gov.**

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Determine Organizational Boundaries

The GHG Protocol defines methods for setting boundaries for a greenhouse gas (GHG) inventory in its Corporate Accounting and Reporting Standard <https://ghgprotocol.org/corporate-standard> and Corporate Value Chain (Scope 3) Accounting and Reporting Standard <https://ghgprotocol.org/standards/scope-3-standard>.

Note that this page focuses on organizational boundaries: these determine which entities (e.g., subsidiaries, joint ventures, partnerships) and assets (e.g., facilities, vehicles) will be included in the scope 1 and scope 2 GHG emissions inventory. Operational boundaries, on the other hand, define the specific emissions sources (e.g., natural gas boilers or purchased electricity) that are included in an organization's scope 1 and 2 inventory. The GHG inventory guidance <https://epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance> documents provide information on defining operational boundaries.

In setting organizational boundaries, an organization chooses an approach for consolidating GHG emissions and then consistently applies that approach to define the entities and assets included in scope 1 and scope 2. The GHG Protocol defines three consolidation approaches: equity share, financial control, and operational control (Table 1 below).

Table 1: Consolidation Approaches for Setting Organizational Boundaries

Consolidation Approach	Description

Consolidation Approach	Description
Equity share	An organization accounts for GHG emissions from operations and assets according to its share of equity in the operation. The equity share reflects economic interest, which is the extent of rights an organization has to the risks and rewards flowing from an operation.
Financial control	An organization accounts for 100 percent of the GHG emissions over which it has financial control. It does not account for GHG emissions from operations it owns equity in but does not have financial control over. The organization has financial control over the operation if it can direct the operation's financial and operating policies with a view to gaining economic benefits from the operation's activities. The organization may have financial control over the operation even if it has less than a 50 percent equity in that operation.
Operational control	An organization accounts for 100 percent of the GHG emissions over which it has operational control. It does not account for GHG emissions from operations it owns equity in but does not have operational control over. An organization accounts for 100 percent of emissions from operations over which it or one of its subsidiaries has operational control. Generally, if the organization is the operator of a facility, it will have the full authority to introduce and implement its operating policies and thus has operational control.

Table 2 below shows several types of entities and assets and how they are included in the scope 1 and scope 2 inventory under the three different approaches. Each box represents the percent of emissions included in the boundary.

Table 2. Percent of Scope 1 and 2 Emissions for Entities or Assets Included Under Each Consolidation Approach

Entity or Asset	Equity Share	Financial Control	Operational Control
Wholly owned asset	100%	100%	100%
Group company/subsidiary/ franchise	Equity share	100% if controlled; 0% if not	100% if controlled; 0% if not
Joint venture/partnership	Equity share	Equity share	100% if controlled; 0% if not
Associated/affiliated company	Equity share	100% if controlled; 0% if not	0%
Leased asset—finance/capital lease	100%	100%	100%
Leased asset—operating lease	0%	0%	100% if controlled; 0% if not

In practice, these three approaches differ most for leased facilities or vehicles where there is an operating lease. These assets are not included in the inventory under the equity share or financial control approaches, but they are generally included in the inventory under the operational control approach. For more information on treatment of leased assets, see GHG Protocol, Appendix F, Categorizing GHG Emissions Associated

with Leased Assets (pdf) <https://ghgprotocol.org/sites/default/files/standards_supporting/categorizing%20ghg%20emissions%20from%20leased%20assets.pdf> (105 KB).

The equity share and financial control approaches are similar with nuanced differences, as explained in detail in the GHG Protocol's Corporate Standard <https://ghgprotocol.org/corporate-standard> and Corporate Value Chain Standard <https://ghgprotocol.org/standards/scope-3-standard>.

The operational control approach is the most common: it typically aligns best with what an organization feels it is responsible for, and it also often leads to the most comprehensive inclusion of assets in the inventory. Industries with complex ownership structures may be more likely to follow the equity share approach to align the reporting boundary with stakeholder interests. An organization may choose the equity share or financial control approach to align its GHG reporting with the assets included in its financial reporting.

Once an organizational boundary is chosen, all levels of the organization and its subsidiaries need to follow the same approach to allow for consistent reporting. For example, if the parent organization uses the operational control approach, it is not appropriate to use the equity share approach for a subsidiary. Internal financial, accounting, or facilities staff may need to be consulted to define the entities and assets that fall within the boundary.

Organizational Boundaries and Scope 3 Emissions

After setting the organizational boundary to identify the entities and assets that are included in scopes 1 and 2, an organization can determine which activities fall into scope 3. This affects scope 3 emissions in several different ways.

- **Assets (e.g., facilities, vehicles).** For example, under the operational control approach, emissions from operating leases for facilities or vehicles are typically included in scope 1 and scope 2. Under the equity share approach, these emissions would be included in scope 3, category 8 (upstream leased assets).

- **Entities (e.g., subsidiaries, joint ventures, partnerships).** Scope 3 includes the value chain emissions of the entities included in scope 1 and scope 2 and does not include value chain emissions of entities outside the organizational boundary. For example, if a subsidiary is included in the scope 1 and 2 boundary and a joint venture is not, upstream scope 3 categories will include emissions associated with the purchases of the subsidiary but not the purchases of the joint venture. Likewise, downstream scope 3 categories will include emissions from the subsidiary's products, but not from the joint venture's products. When a joint venture is excluded from the scope 1 and 2 boundary, its emissions will be included in scope 3, category 15 (investments).
- **Emissions calculation.** Two scope 3 categories are based on the boundaries of the assets included in scope 1 and scope 2:
  - Category 3 (fuel- and energy-related activities) includes emissions associated with the fuels and electricity consumed only in facilities and vehicles included in scope 1 and scope 2.
  - Category 5 (waste generated in operations) includes emissions associated with waste generated only in facilities or vehicles included scope 1 and scope 2.

Last updated on March 3, 2025

No. 25-5327

United States Court of Appeals for the Ninth Circuit

CHAMBER OF COMMERCE OF THE UNITED STATES OF AMERICA, CALIFORNIA CHAMBER OF COMMERCE, AMERICAN FARM BUREAU FEDERATION, LOS ANGELES COUNTY BUSINESS FEDERATION, CENTRAL VALLEY BUSINESS FEDERATION, and WESTERN GROWERS ASSOCIATION,

Plaintiffs-Appellants,

v.

LAUREN SANCHEZ, in her official capacity as Chair of the California Air Resources Board, STEVEN S. CLIFF, in his official capacity as the Executive Officer of the California Air Resources Board, and ROBERT A. BONTA, in his official capacity as Attorney General of California,

Defendants-Appellees.

On Appeal from an order of the
United States District Court for the Central District of California,
Case No. 2:24-cv-801, Judge Otis D. Wright, II

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INTRODUCTION

California set out to "move the nation and the world" by transforming the economy through compelled, state-scripted speech about climate responsibility, "forcing" the "biggest businesses" to "accoun[t]" publicly for not "doing their part to tackle the climate crisis." 8-ER-1946-1947 (Assemb. Zbur); 8-ER-2035 (Sen. Wiener). SB 261 and SB 253 are extraordinary by design: they use mandatory, government-scripted narratives to "activate" corporate behavior and reshape the marketplace itself. SB 253 § 1(*l*).

Yet California now downplays these unprecedented mandates—the "nation's first" (8-ER-2035 (Sen. Wiener))—as nothing more than mundane "securities"-type disclosures (State Br. 1). That characterization cannot be reconciled with the statutes' text, their avowed purpose of forging a "net-zero" economy (SB 253 § 1(*l*)), or the State's own defense that these laws will help achieve California's "emission reduction goals" (State Br. 42 (emphasis omitted)). These laws are not about transparency in the market—they are about transforming it, "far beyond California's borders." 8-ER-1946 (Assemb. Zbur). The State's own amici trumpet the

laws as public-facing mandates geared to influence behavior through reputational and "market pressure." Environmental Defense Fund Br. 35; *see also* FarmSTAND Br. 28.

The State's attempt to rebrand these laws as routine investor disclosures only underscores their constitutional infirmity. The laws compel sweeping, public-facing statements untethered to any product or transaction. They require companies to speak even if they have said nothing about climate change or greenhouse-gas emissions, and to speak in the State's own terms, using State-prescribed methods. And the rationales offered to justify them—"free flow of information," "investor interest," and "usefulness to potential counterparties"—have no limiting principle. Under the State's theory, government could compel any business to speak on any topic that might conceivably be "pertinent" to anyone with any actual or hypothetical connection to the company. That boundless logic is not tailored regulation—it is ideological conscription.

Meanwhile, the State's explicit and tacit concessions give the game away. California does not even attempt to defend its mandates under strict scrutiny. Yet, it never acknowledges that it has the burden to show that a lesser standard applies and is met. And the State concedes key

points that doom both statutes even under the reduced standards it invokes: It admits that the laws compel speech; that they apply regardless of whether a company sells a product or speaks about climate; and that they are intended, in its own words, to "encourage companies . . . to reduce their emissions." Br. 41.

The points the State does press range from implausible to alarming. It denies that companies are forced to associate themselves with emissions of others, but that association is central to both statutes. The State asserts that, once a company says *anything* about climate change, the State is free to dictate what else the company must say—a theory antithetical to the First Amendment. And it argues that disclosure of "Scope 3" emissions is justified because *some* regulator might *someday* regulate *someone* in the company's value chain—a rationale as speculative as it is circular.

At bottom, California's defense rests on sharply curtailing the First Amendment's reach. It would transform commercial-speech doctrine into a blank check for compelled advocacy and replace the constitutional presumption against compelled speech with a presumption in favor of government-managed debate. The First Amendment forbids that inversion.

Because these mandates compel speech in violation of settled First Amendment principles—and because the State nowhere disputes that unconstitutionally compelled speech constitutes irreparable harm—the Court should reverse and direct the district court to issue a preliminary injunction.

ARGUMENT

I. Plaintiffs Are Likely To Succeed On The Merits

The State concedes (Br. 20) that SB 261 and SB 253 compel speech and does not deny that compelled speech presumptively triggers strict scrutiny. Instead, it tries to sidestep (Br. 20-25, 53-55) that standard by calling the mandates "commercial." They are not. The State admits (Br. 22-23) that these mandates do not concern "prices, services, or sales"; that the compelled reports do "not themselves 'propose a commercial transaction'"; and that the laws apply "'regardless of whether the company sells any good or service in California.'" These admissions alone show the mandates are not commercial.

The State's fallback (Br. 54)—that any disclosure "useful" to investors or insurers is "commercial"—is the very theory this Court rejected in

X Corp. v. Bonta, 116 F.4th 888 (9th Cir. 2024). There, the Court explained that the commercial-speech analysis cannot turn on whether speech "may presumably play a role" in someone's decision to buy or invest. *Id.* at 902 n.10. That boundless reasoning would let governments compel speech on any public issue whenever an audience might find it "useful." Strict scrutiny therefore applies—and is dispositive, because the State does not attempt to defend the laws under that standard.

A. These Mandates Are Not Commercial Speech

1. The State's "Commercial Speech" Theory Fails Under Every Recognized Standard

Because it does not dispute that SB 261 and SB 253 fail strict scrutiny, the State's entire defense turns on mischaracterizing these laws as commercial-speech regulations. They are not. The State's approach to commercial-speech doctrine is extraordinary. It dismisses (Br. 25) the Supreme Court's settled framework for identifying commercial speech as "narrow and formulaic," and waves away (Br. 21-22, 25) the *Bolger* factors as beside the point. But those factors are not optional—the State concedes (Br. 21) they are "'important guideposts'" for determining whether speech is commercial, and this Court has confirmed that a State

cannot "simply skip" them. *Dex Media W., Inc. v. City of Seattle*, 696 F.3d 952, 961 (9th Cir. 2012).

The State then compounds its error by misreading this Court's precedent. It dismisses (Br. 24-25) *IMDb.com Inc. v. Becerra*, 962 F.3d 1111 (9th Cir. 2020), as irrelevant because the speech there did not concern a "'commercial transaction.'" But the same is true here—the compelled reports do not concern *any* transaction. The State's effort (Br. 15, 23) to recast the test only confirms the point: It claims that because companies engage in transactions and third parties might want information they assert are related, the reports are "commercial"—logic that would extend the definition of "commercial speech" to virtually any corporate communication.

Nor does the State address *IMDb.com*'s alternative holding. The Court assumed that "even if the [commercial-speech] question were close," the *Bolger* factors would control, and held that the absence of two factors—advertising and product reference—is independently dispositive. 962 F.3d at 1122. That holding decides this case. The State admits (Br. 22-23) these reports are not advertisements and make no product

reference. That ends the matter. *See Dex Media*, 696 F.3d at 959 (holding speech not commercial where two *Bolger* factors absent).

Unable to defend its position under any recognized standard, the State turns (Br. 21, 53) to *PhRMA v. Stolfi*, claiming that commercial speech includes disclosures "provid[ing] parties to 'actual or potential' commercial transactions with information about those transactions." 153 F.4th 795, 821 (9th Cir. 2025) (quoting *X Corp.*, 116 F.4th at 901). But that language defeats, rather than supports, the State's argument. Speech "about those transactions" means speech describing *the transactions*—the obligations, terms, or characteristics of what the speaker is offering. Every case the State cites fits that mold: *Zauderer v. Office of Disciplinary Counsel*, 471 U.S. 626 (1985), involved a client's financial obligation; *CTIA v. City of Berkeley*, a product warning, 928 F.3d 832 (9th Cir. 2019); and *Stolfi*, a drug's pricing, 153 F.4th 795.

Stolfi and *X Corp.* themselves make clear that "about those transactions" refers to speech describing the nature of an exchange. *X Corp.* explained that "all" the speech this Court has deemed commercial "communicates the terms of an actual or potential transaction." 116 F.4th at 901. *Stolfi* quoted that same "actual or potential" language and, in the

next sentence, applied it: "The reports required by [the statute] *likewise communicate the terms of potential commercial transactions*." 153 F.4th at 821 (emphasis added). SB 261 and SB 253 do the opposite. As the State itself describes them, these laws require companies to provide "firm-level" information about their "emissions," "governance" practices, and "climate-related risks"—information "*disconnected* from a particular product or sale." Br. 17, 25, 36 (emphasis added).

While the State calls (Br. 25) such firm-level disclosures "commonplace," it cites no case—and *Stolfi* identified none—that held such speech to be commercial. The State also leans (Br. 55) on *Stolfi*'s observation that the disclosures were "'economic-focused,'" but omits what *Stolfi* said next: disclosures furnish "product-specific" information—data "about [commercial] products," such as "list prices." 153 F.4th at 823. *Stolfi*'s own reasoning confirms the opposite of what the State suggests: speech "divorce[d] . . . from specific product sales" falls outside the commercial-speech doctrine. *Id.* at 823 n.21.

The State's reliance on *CTIA*, 928 F.3d 832, and *Loan Payment Administration LLC v. Hubanks*, 821 F. App'x 687 (9th Cir. 2020), underscores the point. The State cites those decisions to argue (Br. 32) that

the commercial-speech doctrine is not limited to speech about "the terms" of a transaction, but misunderstands what those "terms" encompass. As *Stolfi* explained, commercial disclosures "communicate the terms of potential transactions" by, among other things, "explain[ing] to customers what it is they are paying for." 153 F.4th at 821, 824 n.23. In other words, commercial speech includes not only the express contractual terms, but also, in the State's words (Br. 32), factual information "'about [the] commercial products'" offered for sale—what they are and what they do. That is what *CTIA* and *Loan Payment Administration* involved: factual information "*about commercial products*"—for example, the radiation risk "of the product" the consumer was "about to buy," *CTIA*, 928 F.3d at 848, or whether a mortgage-loan repayment program was affiliated with the original lender, *Loan Payment Admin.*, 821 F. App'x at 688-89. SB 261 and SB 253 are not about "a particular product" (State Br. 25) at all.

The State tries to blur that line, asserting (Br. 22, 54) that these mandates regulate commercial speech because the reports "inform" investors, lenders, and insurers by providing "useful" information "pertinent" to potential transactions. But that argument ignores that these

laws have nothing to do with such transactions. They apply regardless whether a company issues stock, borrows money, or seeks insurance, and they compel no disclosures about the terms or goods in any such dealings. *X Corp.* squarely forecloses the State's "pertinence" theory, holding that commercial-speech analysis cannot "turn on whether the speech is 'directed to potential consumers and may presumably play a role in the decision of whether to use'" a product or service. 116 F.4th at 902 n.10. Otherwise, a State could compel disclosure of anything any audience might find "pertinent"—executives' charitable donations, or a company's hiring of immigrant workers—simply by labeling it "commercial." That is not, and "could not be," the law. *Id.*

2. The State Cannot Hide Behind *Zauderer* Or A New "Government-Reporting" Theory

The State turns (Br. 26-32, 56-57) to *Zauderer*—and, belatedly, to a "government-reporting" theory drawn from dicta in *Stolfi*—as its last refuge. But it bears the burden of showing that these laws fit within any recognized category of diminished First Amendment protection. They do not. *Zauderer* rests on a narrow, historically-grounded exception for compelled disclosure of factual, product-specific or service-specific information designed to prevent consumer deception. The State nowhere

acknowledges that history—or the Supreme Court's repeated admonitions against marking off new categories of speech for reduced protection.

Instead, the State denies that *Zauderer*'s limits exist and seeks to transform a narrow exception into sweeping license for compelling speech whenever the government deems more "information" desirable.

a. The State dismisses (Br. 31) the rule that *Zauderer* applies only to limited supplements appended to the speaker's message, arguing the limitation "does not appear in any prior cases applying *Zauderer*." But it appears in *Zauderer*, which upheld a brief disclaimer attached to an attorney's own advertisement—requiring the lawyer to provide only "somewhat more information than [he] might otherwise be inclined to present." 471 U.S. at 650; *see also id.* at 658 (Brennan, J., concurring) (explaining that "States may require 'some *limited* supplementation'" (quoting *Bates v. State Bar of Arizona*, 433 U.S. 350, 384 (1977))).

The cases the State cites (Br. 31) do not expand the rule. This Court in *X Corp.* declined to apply *Zauderer* altogether, and the out-of-circuit decisions the State invokes only confirm *Zauderer*'s narrow scope. Each involved disclosures that commented upon a product- or service-specific message—short, factual supplements to the company's presentation of

the product explaining "to customers what it is they are paying for," not sweeping, stand-alone reports about a company's overall policies or social impact. *Stolfi*, 153 F.4th at 824 n.23.

In *Rowe*, the First Circuit upheld narrow requirements that pharmacy benefit managers append disclosures of potential conflicts in communications with their pharmacy customers—routine, transaction-specific disclosures to counterparties. *Pharm. Care Mgmt. Ass'n v. Rowe*, 429 F.3d 294, 299, 310 (1st Cir. 2005). In *Chamber of Commerce v. SEC*, the Fifth Circuit approved a rule requiring issuers to report share-repurchase data and the reason for each transaction—factual disclosures tethered to particular trades. 85 F.4th 760, 769-70 (5th Cir. 2023). The same court soon clarified that the SEC's disclosure authority is limited to preventing fraud, not to satisfying a general "demand for any and every kind of information" regulators deem useful. *Alliance for Fair Bd. Recruitment v. SEC*, 125 F.4th 159, 180 (5th Cir. 2024) (en banc). And in *NetChoice v. Paxton*—a decision vacated by the Supreme Court—the Fifth Circuit applied *Zauderer* to permit a requirement that social-media platforms provide factual explanations of their moderation decisions: that was speech directly describing the company's service to its users, not

compelled generalized statements about corporate governance or ideology. 49 F.4th 439, 485-86 (5th Cir. 2022), *vacated sub nom. Moody v. NetChoice, LLC*, 603 U.S. 707 (2024).

b. The State's fallback argument confirms these laws are outside *Zauderer*. The State argues (Br. 32) *Zauderer* applies because the compelled reports "pertain" to the "operations" of the "reporting entity." That framing admits the problem. Speech about a company's *operations* is not speech about "the product or service that is provided." *CTIA*, 928 F.3d at 845. The State concedes (Br. 32) that this product or service limitation was "inherent in the facts" of *Zauderer* itself. And its theory cannot be squared with *X Corp.*, which rejected the notion that any disclosure "about [a company's] activities" is commercial. 116 F.4th at 902.

NIFLA v. Becerra, 585 U.S. 755 (2018), reinforces the point. There, the Court struck down a compelled disclosure that "in no way relate[d] to the services that [the speakers] provide." *Id.* at 769. The State's attempt to distinguish *NIFLA*—on the ground that the laws "pertain" to companies' "operations" (Br. 32)—misreads the decision. In *NIFLA*, California's failure was not that the compelled notice concerned services the clinics "refused to provide" (State Br. 32 (emphasis removed)); it was that

the compelled speech was untethered from services the clinics *did* provide. Likewise, here, reports about a company's "operations" are detached from any product or service a company offers.

The State tries (Br. 32) to paper over the problem that these mandates are not about any product or service by invoking *CTIA* and *Loan Payment Administration*. But those cases confirm the limits of *Zauderer*'s. They hold only that the word "terms" in *Zauderer* encompasses both literal contract provisions and characteristics or attributes of the product or service sold (e.g., whether it emits radiation). *See* pp. 8-9, *supra*. Neither extends *Zauderer* to enterprise-wide reporting divorced from any transaction. If compelled speech merely "pertain[ing]" to a business's "operations" triggered *Zauderer*, there would be no stopping point: any message the government wished to impose on businesses could be compelled. *CTIA* and *Loan Payment Administration* reaffirm the opposite—that *Zauderer* applies only narrowly to factual information "'*about commercial products*.'" *CTIA*, 928 F.3d at 848.

c. These threshold flaws in the State's commercial speech argument are decisive. But even if the Court were to overlook them, *Zauderer* would still not apply because the disclosures SB 261 and SB 253 compel

are anything but "purely factual and uncontroversial." *NIFLA*, 585 U.S. at 768.

The State's insistence (Br. 56) that SB 261 requires disclosure "only" of "operational information" is false. The law forces companies to publish forward-looking assessments of "climate-related financial risk," including speculative judgments about future legislation, litigation, and reputational harm. § 2(b)(1)(A). The law even requires companies to articulate their own views about climate change—for example, to evaluate the "[i]ncreased severity of extreme weather events such as cyclones" and to speculate about how governments might respond "under different" future scenarios. 8-ER-1831. These are not "purely commercial projections," as the State calls them (Br. 10, 57); they are speculative forecasts about meteorology and geopolitics.

And unlike disclosures made solely to regulators, SB 261 requires companies to publish these assessments on their own websites—broadcasting the State's preferred narrative to the public, not simply submitting an administrative filing. That amplifies the ideological message and magnifies the constitutional burden. *See Stolfi*, 153 F.4th at 810 (public-facing mandates heighten compelled-speech concerns).

The State's defense of SB 253 likewise falls short. It argues (Br. 27) the statute compels only "factual" speech because the disclosures take the form of "numerical values." But numbers, in context, can carry great normative weight. Consider *National Association of Manufacturers v. SEC*, 800 F.3d 518 (D.C. Cir. 2015), which struck down a rule requiring companies to list products that were not "conflict free" because that label "convey[ed] moral responsibility for the Congo war." *Id.* at 530. On the State's theory, that case would have come out differently had the government instead required companies to report *the number* of products that were not "conflict free," so that investors and consumers could "make their own determinations" (State Br. 28-29) about which firms were complicit. But the moral message would have been identical: the company had "blood on its hands." 800 F.3d at 530.

Requiring firms to publish "their" emissions likewise uses ostensibly "neutral" numbers to assign moral blame—to announce which companies are "good" and "bad" in the State's view. That is precisely how the statute's author described its purpose: to show who is "doing their part to tackle the climate crisis and create accountability for those that aren't." 8-ER-2035 (Sen. Wiener). *B & L Productions, Inc. v. Newsom*, 104 F.4th

108 (9th Cir. 2024), is no refuge. *Contra* State Br. 29. That case concerned *property* regulation that did not have "the direct or inevitable impact" of burdening "speech," whereas SB 253 plainly does—the very circumstance in which *B & L* recognized that governmental motivation "can" be examined. 104 F.4th at 117 n.16.

The State's brief (Br. 34, 57) confirms that SB 253 compels more than "neutral" data. In seeking to rebut Plaintiffs' showing that the law's true purpose is to force companies to "take moral responsibility for climate change," the State asserts (Br. 28) its goal is "accountability *through* transparency"—that is, to provide data "from which third parties can make their own" judgments. But "accountability" is a moral concept, not a factual one. And the State has no response to its own expert's acknowledgment (Chamber Br. 45) that these disclosures embody normative judgments.

The State is equally mistaken in denying (Br. 28) that SB 253 forces companies to assume responsibility "for the emissions of others." The statute expressly requires firms to "disclos[e] *their* contributions to global [greenhouse-gas] emissions," and it mandates inclusion of indirect, third-party emissions within that total. § 1(f) (emphasis added). A company

cannot avoid "moral" attribution by disclaiming responsibility—it must report as its own (the "reporting entity's . . . emissions," § 2(c)(1)) the emissions of others. That is the whole point: the State's theory (Br. 28) of "accountability *through* transparency" depends on treating those numbers as the company's *own*. The State's brief (Br. 6) confirms as much, proceeding on the premise that SB 253 requires companies "to report *their* GHG emissions." If SB 253 did not require companies to take "'responsibility' for the emissions of others" (State Br. 28), the State's asserted rationale for the law would collapse.

Nor can the State find refuge in claiming (Br. 8, 27) that SB 253 merely codifies a "widely adopted," "globally accepted" voluntary framework—or that it applies "longstanding financial accounting principles." Its defense hinges (Br. 39) on the opposite premise—that voluntary disclosures are "fragmented" and "incomplete," leaving a "massive blind spot" for investors and others. The State cannot have it both ways: if the regime is truly "widely adopted" voluntarily, the law is unnecessary; if it is not, then the State's coercion is precisely what makes the statute constitutionally suspect.

The State's example proves the point. It notes (Br. 10) that U-Haul already makes some statements "consistent with" the laws' requirements, but that underscores the weakness of the State's claim. Saying that some of U-Haul's *voluntary* statements happen to align with parts of a voluntary framework hardly shows that the entire compelled regime is "widely accepted." If anything, it proves the opposite: companies choose which parts of these frameworks they agree with and omit those they do not.

Finally, the State has no answer to the biased framing of these compelled statements. It suggests companies remain free (Br. 28) to "separately" contextualize their calculations—but in the mandated reports themselves, companies must speak the State's language. The State controls the reporting template precisely to prevent companies from speaking in their own terms.

d. The State briefly suggests (Br. 32-34) that SB 253 should receive minimal scrutiny because it functions like a "government reporting" duty. But the Supreme Court has never recognized any such category, and has repeatedly cautioned courts *not* to carve out new forms of speech

for lesser protection. *NIFLA*, 585 U.S. at 767. The dicta the State invokes (Br. 32-33) from *Stolfi* merely observed that certain regulator-facing filings might raise different questions—but the court expressly declined to decide whether a "government-reporting" exception exists. 153 F.4th at 819. And *Stolfi* emphasized that the challenged rule did not compel manufacturers to adopt the State's viewpoint: "[M]anufacturers are free to explicitly *reject* any such message and explain . . . the full range of factors that drive their pricing decisions." *Id.* at 824.

SB 253 is the opposite. It does not mandate mere collection of factual information for regulators; even as amended (State Br. 6 n.2), it forces each company to "publicly disclose" emissions and to conform its speech to the State's mandated calculation method—allowing no space to dissent (State Br. 71 (quoting SB 253 § 2(c)(2)(A)(i)(I)). Every benefit the State identifies flows from public dissemination of information, not from confidential reporting to regulators. The "government-reporting" label is pretext—an attempt to rebrand a public-facing speech mandate as a routine filing requirement.

Regardless, the "government-reporting" theory is waived. The State never argued below that these laws were regulator-facing disclosures or sought reduced scrutiny on that basis. It cannot invoke a novel First Amendment carveout for the first time on appeal—much less at the preliminary-injunction stage. This is the last procedural posture in which a court should experiment with cutting back on core speech rights. The Court should apply the law as it stands, not (as the State urges) announce novel doctrines to deny interim relief from ongoing First Amendment harm.

B. The Laws Fail Under Any Level Of Scrutiny

Even under less than strict scrutiny, none of the State's asserted interests can justify these laws. The State touts (Br. 63) the "tailoring used here," but it identifies neither tailoring that it performed, nor a clear constraining purpose to which the laws were fitted. Instead, the State invokes three *different* rationales—preventing deception, reducing emissions, and satisfying investor demand—and toggles among them to defend whatever aspect of its laws is under fire. The State cannot carry its burden to show its laws are narrowly drawn when it must constantly substitute distinct, inconsistent theories.

In reality, the State simply lifted voluntary frameworks wholesale and imposed them as compulsory obligations—with no tailoring to square them with First Amendment limits. Its "tailoring" defense rests on what it claims (Br. 16) "independent experts" recommended, but those experts described *voluntary* regimes that companies could adopt, modify, or ignore as they saw fit—not government mandates carrying legal penalties. Adopting those flexible, optional standards verbatim as binding law is the opposite of tailoring.

1. The State Admits It Cannot Show Deception

The State barely defends the deception rationale it relied on below. It admits (Br. 47) it cannot "identify a single false statement." Instead, it claims (Br. 46) that the mere "potential" for deception is enough. But "speculation" is insufficient. *Edenfield v. Fane*, 507 U.S. 761, 770 (1993). The State offers no answer to the principle that "a state may not [burden] protected speech to prevent something that does not appear to occur." *Junior Sports Magazines Inc. v. Bonta*, 80 F.4th 1109, 1117 (9th Cir. 2023). Nor does it grapple with *NIFLA*, which rejected California's identical claim that it could compel speech while "point[ing] to nothing" showing anyone was misled. 585 U.S. at 777.

Its only "evidence" of deception—once again—is *truthful* speech. The State now turns (Br. 47) to a study finding that companies participating in a voluntary disclosure program "consistently reported reductions even as their emissions increased." But the emissions measured under that voluntary program *were* declining. 5-SER-1451. The State's quarrel is not with falsehood but with methodology—it disliked that some measures of emissions declined while others rose. *Id.* The district court rejected the attempt to convert this to evidence of deception: "[I]t strains credulity to call a claim misleading when the company explicitly identifies the very metric it is using." 1-ER-37. That assessment stands unrebutted.

The State also runs from Dr. Hsu—the expert on whose declaration it staked its case below. The State now claims (Br. 47) that it was Hsu, not California, who targeted political lobbying. 2-ER-336. But that distinction collapses under the record. In the district court, the State relied on Hsu's testimony to assert that "96% of these statements are misleading" and to argue that "[t]he disclosures required here address *this problem*." 3-ER-378 (emphasis added). Having adopted Hsu's analysis as its own, the State cannot disown it now when it exposes the ideological

premise of its case: that "misleading" speech includes viewpoints the government disfavors, not false statements of fact.

Even setting those flaws aside, the laws fail for a more fundamental reason: they are "broader than reasonably necessary." *NIFLA*, 585 U.S. at 776. The State's defense proves the point. It argues, for example, that narrowing SB 253 to companies making "net-zero" claims would be "underinclusive" because the law also reaches entities "soliciting business and investment through other forms of emission claims or commitments." Br. 49. That concession confirms the defect: even companies making entirely different statements must publish the same exhaustive, state-scripted disclosures on every category of emissions. There is no link between the speech that supposedly poses a risk of deception and the speech the laws compel. The statutes thus conscript every speaker "no matter what" the speaker has said—the very defect in *NIFLA*, 585 U.S. at 777, that Plaintiffs highlighted in their opening brief (Br. 52) and which the State never addressed.

Nor does California rationally explain why it cannot rely on existing anti-fraud laws to combat supposed misleading speech. It says only (Br. 49) that "reliance on existing fraud statutes . . . ignores the harms to

Californians from a vast marketplace of unregulated claims." But that is not an explanation—it is a confession. The "harm" California identifies is not fraud or deception, but unregulated speech itself—the very liberty the First Amendment protects.

2. The Emissions-Reduction Rationale Rests On Speculation, Not Evidence

The State defends both laws largely as tools to reduce emissions. Br. 41-45, 61-62. That argument reveals what this case is really about: not transparency, but California's attempt to use compelled speech to reshape corporate behavior and ultimately the economy. Yet in its rush to conscript every company to broadcast the State's climate message, the State designed a regime that does not even accomplish its ultimate goal. The laws are not rationally related to reducing emissions; they simply compel companies to express the State's view of who is to blame for the emissions.

The most revealing aspect of the State's "emissions reduction" rationale is what it omits: any claim that these mandates *will* reduce emissions. The State offers no such assertion—only conjecture about the "[p]otential for emissions reductions," premised on the notion that disclosure might "lead indirectly" to lower emissions by prompting activists or

consumers to react. Br. 41, 61. But as Plaintiffs showed (Br. 59), this Court has already held that speech burdens cannot rest on such speculative, "indirect" chains of causation. *Retail Digital Network, LLC v. Prieto*, 861 F.3d 839, 851 (9th Cir. 2017) (en banc). A compelled-speech regime must "directly and materially advanc[e]" the government's asserted interest, not merely offer "remote support." *Greater New Orleans Broad. Ass'n v. United States*, 527 U.S. 173, 188 (1999). The State's defense relies entirely on such "indirect" and "remote" effects—it never explains how forcing companies to publish climate assessments and emissions estimates would *directly* reduce emissions, much less directly and meaningfully reduce them within the borders of California, beyond which the State's lawful regulatory interests do not extend.

Nor does the State explain how SB 253 could meaningfully advance its claimed emissions-reduction goal when the statute omits the only metric that could reveal whether emissions are actually improving—per-unit or intensity-based emissions. As Plaintiffs explained (Br. 57), total emissions say nothing about efficiency or overall impact. A company that captures a larger share of the market by producing a more efficient product

may reduce emissions economy-wide, yet appear "worse" under California's metric simply because its total output increases. Meanwhile, a less efficient competitor that loses market share could look "better" despite contributing more emissions per unit. Without intensity data, neither regulators nor the public can tell whether real reductions are occurring—or whether the State's system punishes innovation that actually drives emissions down.

The State's only answer (Br. 44) is that companies "*could*"—its emphasis—include that information voluntarily. But the possibility of voluntary speech is no justification for compelled speech, and a statute that omits the very disclosure supposedly necessary to achieve its goal cannot claim constitutional deference. The omission is not incidental—it exposes the truth. At its core, SB 253 is designed to shape opinion.

Even taking the State's theory at face value, the laws are "broader than reasonably necessary." *NIFLA*, 585 U.S. at 776. While purporting to defend SB 253 as an "emissions-reduction" measure, the State concedes (Br. 42) that the law "will not, on its own, alleviate the harms caused by climate change" and pivots (Br. 43-45) to an entirely different justification—"clos[ing] information gaps." That shift, made in the very

course of defending the emissions-reduction rationale, underscores the absence of tailoring. A speech mandate is not "tailored" when the State itself cannot clearly or consistently identify the purpose to which it was tailored. And in fact, the State simply imposed voluntary international standards wholesale with no attempt to tailor them to First Amendment demands.

The State also does not explain why it cannot estimate emissions itself. Its only answer (Br. 45) is that its own estimates would be "incomplete." But the State bears the burden of justifying these compelled-speech laws, and it offers no evidence that such "incompleteness" matters. Roughly 90 percent of emissions can be estimated using readily available data (Chamber Br. 29); California does not dispute this, nor show that anyone needs to know the precise figure down to the last percent.

Even if completeness were a legitimate goal, forcing thousands of companies to generate speculative estimates does not solve the problem—it multiplies it. The Greenhouse Gas Protocol—the very framework SB 253 mandates—concedes that the emissions estimates the Protocol uses are inherently incomplete. 7-ER-1538. So the State's cure is worse

than the purported disease: in lieu of incomplete government estimates it compels incomplete private ones—and then requires publishing them as if they were authoritative. That makes this scheme doubly constitutionally suspect. Companies must publish contested estimates as if they were facts, so the State may use private speech to advance its views about emissions and who is "accountable."

Nor can the State hide behind "materiality." SB 253 "considers" (Br. 40) materiality only in the sense that it *rejected* it as a limiting concept—a "materiality threshold" is "not compatible" with the protocol (7-ER-1501). The Greenhouse Gas Protocol does not identify what information is material for any company or audience, and the State does not contend that all its mandated disclosures are material to all covered entities. By discarding materiality, the State confirms that it made *no* effort to tailor these laws at all.

3. The Investor-Interest Theory Repeats The Same "Curiosity" Rationale This Court Has Rejected

The State's reliance on investor interest is a repackaged version of the "consumer curiosity" rationale this Court has rejected. *CTIA*, 928 F.3d at 844. Seeking to avoid *CTIA*, California analogizes (Br. 1, 31, 56) these laws to the federal securities regime. That comparison fails.

SB 261 and SB 253 have nothing to do with regulating securities markets; they apply to every business above a revenue threshold, whether or not it has ever issued stock or traded publicly.

Even under the securities laws, disclosures are to protect investors "from fraud"—not to "satisfy the demand" for whatever information policymakers believe might be useful. *Alliance for Fair Bd. Recruitment*, 125 F.4th at 179. In *National Association of Manufacturers v. SEC*, 748 F.3d 359 (D.C. Cir. 2014), the D.C. Circuit rejected the notion that the government may, "using the guise of securities laws," compel "otherwise protected speech" unrelated to preventing fraud. *Id.* at 372. Securities law, the court emphasized, concerns "inherently misleading" statements made in securities sales. *Id.* When "deception is not an issue," compelled statements about "labor conditions," board ideologies, or similar policy matters are "obviously repugnant to the First Amendment." *Id.* Climate policy is no different.

California also never confronts the simpler point that public companies already must disclose all "material" information under federal law—and there is no evidence they do not.

California's "investor interest" rationale is the same justification this Court rejected in *X Corp.* There, as here, the State invoked a supposed "substantial interest" in giving audiences transparency to make "informed decisions." *X. Corp.* Gov't Br. 36. But this Court held that compelled speech cannot be justified merely because it might "play a role" in market participants' choices. 116 F.4th at 902 n.10. Otherwise, the government could force companies to disclose the "political affiliations of [their] managers" simply because investors might care. *Id.*

All this underscores that these mandates are extraordinarily overbroad. As the State's authorities (Br. 38, 61) show, disclosure requirements have traditionally been limited to a single, concrete fact directly relevant to a commercial transaction. *Stolfi*, for example, emphasized a close tie between drug-pricing disclosures and the terms of sale. 153 F.4th at 822. In *American Hospital Association v. Azar*, 983 F.3d 528 (D.C. Cir. 2020), hospitals were required to post "rates negotiated with insurers and formalized in their contracts," information "directly relevant to 'the terms under which [their] services will be available.'" *Id.* at 540. Likewise, *National Electrical Manufacturers Association v. Sorrell*,

272 F.3d 104 (2d Cir. 2001), upheld a rule that "better inform[ed] consumers about the products they purchase," *id.* at 115, and *American Meat Institute v. USDA*, 760 F.3d 18 (D.C. Cir. 2014), involved traditional "country-of-origin" labeling to identify where food was produced—disclosures grounded in product safety and historical tradition, *id.* at 23. Finally, in *Chamber of Commerce v. SEC*, the court said a rule could require issuers to disclose their rationale for stock buybacks—speech tied to a specific transaction. 85 F.4th at 771 (rule vacated on other grounds).

By contrast, *Full Value Advisors v. SEC*, 633 F.3d 1101 (D.C. Cir. 2011), involved nonpublic, regulator-facing disclosures that never required the speaker to communicate anything to the public (and the court expressly declined, on ripeness grounds, to address whether eventual public release would raise First Amendment concerns). *Id.* at 1108, 1110.

Together, those precedents expose California's overreach. Each decision upheld a short, factual supplement about a product, service, or contract term—or, at most, a confidential regulatory filing. SB 261 and SB 253 instead compel public, sprawling, enterprise-wide statements about climate risk and emissions—speech untethered to any transaction or market exchange.

The State tries to justify the laws' sweep by invoking (Br. 1, 54) "investors, lenders, insurers, workers," and "insurance underwriters"—all of whom will supposedly "use" the information. But that argument proves overbreadth. If the State truly believed these disclosures were necessary for specific economic actors, it could have required companies to provide the information directly—and confidentially—to those entities. In fact, *Pharmaceutical Care Management Association v. Rowe*—which the State relies upon (Br. 31)—involved precisely such targeted disclosure: confidential reporting to the counterparty, not compelled publication to the public at large. 429 F.3d at 299.

Meanwhile, the State still cannot explain why its mandates are needed—why market demand, voluntary disclosure, or targeted regulation would not achieve the same ends. The State does not even attempt to address *City of Ladue v. Gilleo*, 512 U.S. 43 (1994), or *International Dairy Foods Association v. Amestoy,* 92 F.3d 67 (2d Cir. 1996)—both of which recognize that when private incentives mitigate the perceived problem, government compulsion is unnecessary (Chamber Br. 67-68). As *Amestoy* explained, those "interested" in information can "exercise the

power of their purses" by doing business only with companies "who voluntarily reveal it." *Id.* at 74. That is how markets work. Large investors like CalPERS already use their leverage to demand climate disclosures they want. 7-ER-1614. Insurers, for their part, routinely obtain detailed data from applicants as a condition of coverage—without any government mandate. *See, e.g.*, 6-SER-1540.

This is not a case of hidden product risk, like radiation exposure in *CTIA*, 928 F.3d 832, where consumers cannot protect themselves without state intervention. It is simply information certain institutions would prefer to have. The First Amendment does not allow the government to transform those preferences into a universal duty to speak.

II. The Equities Overwhelmingly Favor An Injunction

The State concedes (Br. 50) that unconstitutional compelled speech is per se irreparable harm. That alone resolves the equities. When a law violates the First Amendment, "it is always in the public interest to prevent the violation of a party's constitutional rights." *Fellowship of Christian Athletes v. San Jose Unified Sch. Dist.*, 82 F.4th 664, 695 (9th Cir. 2023) (en banc). The balance of hardships therefore "tips sharply" toward Plaintiffs, who face the ongoing loss of their constitutional freedom and

the unrecoverable costs of preparing for mandates the State acknowledges must be satisfied in 2026. *Matsumoto v. Labrador*, 122 F.4th 787, 816 (9th Cir. 2024).

The State's fallback (Br. 18, 50-51)—that the harm is not "imminent"—is meritless. This Court has never required plaintiffs to wait until a constitutional injury is complete before obtaining relief. Harm is imminent when it will occur before the case can be resolved, not only when it will occur tomorrow. *See NetChoice, LLC v. Bonta*, 113 F.4th 1101 (9th Cir. 2024) (affirming preliminary injunction issued a year before law's effective date). Here, the harm will plainly occur long before this case can be resolved. Even prior to the district court staying all deadlines pending the outcome of this appeal, summary-judgment briefing was scheduled to conclude in the summer of 2026, *after* the two laws' reporting requirements take effect. Under the State's own timeline, the First Amendment injury will be complete before final judgment issues.

Meanwhile, covered companies are already diverting staff, budgets, and infrastructure to prepare for compliance. The district court itself recognized that reality, finding that Plaintiffs' witness "has demonstrated that it will need to begin preparing to comply" with the laws now.

1-ER-10 n.4. The State does not acknowledge that finding, much less attempt to show it is "clearly erroneous." *Walczak v. EPL Prolong, Inc.*, 198 F.3d 725, 733 (9th Cir. 1999). Those expenditures are unrecoverable because sovereign immunity bars recovery. Chamber Br. 71-72 (collecting cases).

Having ignored these unrecoverable costs, the State compounds its error by claiming (Br. 51) that such injuries "do not" count. But this Court has squarely held that ongoing economic injury resulting from enforcement of a challenged provision constitutes irreparable harm, as has the Supreme Court. *See Nat'l Inst. of Health v. Am. Pub. Health Ass'n*, 145 S. Ct. 2658 (2025); *Washington v. Trump*, 145 F.4th 1013, 1036 (9th Cir. 2025). The State's contrary position (Br. 51) depends entirely on an out-of-circuit decision from the 1970s—*A.O. Smith Corp. v. FTC*, 530 F.2d 515 (3d Cir. 1976), and two cases citing it—which the issuing court has since flatly rejected, holding that "financial consequences" of compliance *are* irreparable harm. *Pennsylvania v. Trump*, 930 F.3d 543, 574 (3d Cir. 2019), *rev'd on other grounds sub nom. Little Sisters of the Poor v. Pennsylvania*, 591 U.S. 657 (2020).

The record deepens the point. As Plaintiffs noted (Br. 73), the State's own expert estimated that these laws will cost hundreds of thousands of dollars per company to implement—a figure the State never mentions, let alone disputes. That the State clings to discredited 1970s dicta, ignores binding precedent of this Court and Supreme Court, and refuses even to confront its own evidence underscores what this record makes plain: the equities, the public interest, and the Constitution all point one way—an injunction must issue.

CONCLUSION

The Court should reverse the order denying a preliminary injunction and remand with instructions to preliminarily enjoin Defendants from applying or taking any action to enforce SB 253 and SB 261 against Plaintiffs' members.

Respectfully submitted,

Dated: November 6, 2025

s/ Eugene Scalia

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UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

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9th Cir. Case Number(s) 25-5327

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US / SIF
US Sustainable Investment Forum

February 9, 2026
Chair Lauren Sanchez
California Air Resources Board (CARB)
1001 I Street, Sacramento, CA 95814

Re: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Chair Sanchez,

On behalf of the US Sustainable Investment Forum (US SIF), I welcome the opportunity to provide this comment letter in response to the "Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation."

052.1 The California climate disclosure legislation creates an important regime that will provide investors in California and the broader capital markets with the comparable, comprehensive, and consistent information they need to assess public and private companies' climate-related financial risks.

052.2 US SIF broadly supports the proposed definitions and the framework on who should report under both laws. As CARB moves forward with rulemaking, we would like to reiterate the importance of these laws and the information they will provide for investors in making informed investment decisions that both serve their clients and fulfill their own fiduciary duties.

US SIF is a membership organization representing 173 investor firms and trillions of dollars of assets under management. Our members represent investors throughout the capital markets value chain - from asset managers, managing billions in retirement dollars for average Americans, to data providers, financial advisors, and community development financial institutions, supporting local economies.

Climate Risk Is Financial Risk

It is essential that CARB's rulemaking maintains reporting from companies on the corporate value-at-risk from the physical impacts of climate change and on what companies are doing to build resilience to these risks.

052.3 Investors have been calling for increased disclosure around climate-related risks and other long-term systemic risks for decades because they recognize the impact these factors have on their financial returns. Global and U.S. investors rely on timely and accessible corporate data to make meaningful risk and opportunity assessments.

Both investors and companies acknowledge that climate change has a material impact on business. The US SIF Sustainable Investing Trends 2025/2026 Report found that climate change is the most frequently considered environmental factor by investors (77%) due to the ever-solidifying thesis

that climate and nature related risks are material financial risks.[i] The 2024/2025 Sustainable Investing Trends report found that companies reporting headline climate-related risk to the Securities and Exchange Commission (SEC) have grown threefold since 2018.[ii] In addition, a 2025 Morgan Stanley study found that 57% of global corporates report business impact from physical climate events in the past year.[iii]

The Los Angeles (LA) wildfires and other natural disasters emphasize the need for increased information about the financial impacts of physical climate risks. The National Centers for Environmental Information (NCEI) catalogued 27 individual climate and weather disasters costing over $1 billion each in 2024. The total cost of these 27 events is estimated to be $187.2 billion, making 2024 the fourth costliest year on record.[iv] This calculation does not include the devastating wildfires in LA which current estimates say cost $65 billion.[v]

Due to the unpredictability of physical climate risks such as extreme weather events, it is essential that investors have meaningful data on the finanically material climate-related risks that may potentially impact their assets across both the public and private markets. Investors require this information to assess the business continuity of investee companies and their supply chains, identify insurance gaps, and accurately value their assets. SB 261's inclusion of both public and private companies helps narrow the transparency gaps in data disclosures, protects funds from greenwashing risks by having verifiable information, and helps institutional investors meet increasing demands for their carbon footprint disclosure.

Long-Term Fiduciary Duty

The California climate disclosure rules must be developed with the view of safeguarding long-term value and investment returns. Without adequate climate risk disclosures, investment fiduciaries will not have the information they need to implement their fiduciary duties toward the assets of long-term American savers and pension holders.

Opponents of climate change reporting often misstate both investor and corporate fiduciary duties. They typically refer to only some of the applicable investor and corporate legal duties, focusing exclusively on short-term issues. Both investor fiduciaries and corporate directors have long-term legal obligations that make climate change highly financially relevant. This myopic fixation on only short-term risks and opportunities will likely undermine American companies' long-term competitive position and, therefore, impact the investment returns of US investors. According to McKinsey & Company, companies managed with a long-term view substantially outperform their short-term peers over time.[vi]

052.4

An investor's fiduciary duty of loyalty includes the Duty of Impartiality, which requires fiduciaries to balance the conflicting interests of different beneficiary groups in good faith. For instance, 25-year-old and 75-year-old beneficiaries have inherently different risk tolerances and investment time horizons, and fiduciaries cannot prioritize one group's interests over the other. This duty has significant implications for long-term climate-related risks and their related performance considerations that fiduciaries must address. The U.S. Supreme Court affirmed this principle in the 1996 case Varity v. Howe, stating that the common law of trusts mandates preserving assets for both present and future claims while impartially considering the interests of all beneficiaries.[vii]

Similarly, California's Uniform Prudent Investor Act explicitly requires trustees to act impartially when investing and managing trust property, ensuring that the differing interests of multiple beneficiaries are fairly considered.[viii]

Nonprofit institutional investors and trust fiduciaries–like foundations and endowments—also have what is called a Duty of Obedience to their charitable purpose. For these entities with a perpetual or long-term horizon, climate change impacts are likely to be very relevant to their long- and short-term mission goals. For example, California's Uniform Prudent Management of Institutional Funds Act (section 18503) requires that "an institution, in managing and investing an institutional fund, shall consider the charitable purposes of the institution and the purposes of the institutional fund."[ix] For many foundations and endowments with inter-generational or perpetual existence goals, climate change will present material considerations for management of long-term risks to achieve those goals.

In Delaware, where 66% of Fortune 500 companies are incorporated, corporate law requires boards to manage companies with a long-term perspective. The Delaware courts reinforce this obligation, as seen in the 2024 McRitchie v. Zuckerberg opinion. On page 73, the ruling states, "The fiduciary duties owed by directors of a Delaware corporation require the directors to seek to maximize the value of the corporation over the long term for the benefit of the stockholders as residual claimants to the value created by the specific firm that the directors serve."[x]

Conclusion

052.5 When developing California's climate risk disclosure rules, CARB should consider both the physical risks associated with climate change and the fiduciary duties that investors have to long-term savers.

Thank you for considering our comments. Do not hesitate to let us know if we can be of further assistance. Our Managing Director, Bryan McGannon (bmcgannon@ussif.org), would be happy to answer any questions.

Sincerely,

Maria Lettini
CEO, US SIF

[i] US SIF Foundation, *US Sustainable Investing Trends 2025/2026 Report,* December 9, 2025, https://www.ussif.org/research/trends-reports/us-sustainable-investing-trends-2025-2026-executive-summary.
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[v] Gallagher Re, "H1 2025: Natural Catastophe and Climate Report Preliminary Overview," https://www.ajg.com/gallagherre/-/media/files/gallagher/gallagherre/news-and-insights/2025/july/h1-2025-natural-catastrophe-and-climate-report.pdf.
[vi] Dominic Barton, James Manyika, Tim Koller, Robert Palter, Jonathan Godsall, and Josh Zoffer, "Where companies with a long-term view outperform their peers," *McKinsey Global Institute,* February, 8, 2017, https://www.mckinsey.com/featured-insights/long-term-capitalism/where-companies-with-a-long-term-view-outperform-their-peers.
[vii] *Varity Corp v. Howe* (1996), United States Court of Appeals for the Eight Circuit, https://supreme.justia.com/cases/federal/us/516/489/.
[viii] 2007 California Probate Code Article 2.5. Uniform Prudent Investor Act, *Justia, https://law.justia.com/codes/california/2007/prob/16045-16054.html.*
[ix] 2009 California Probate Code – Section 18501-18510: Part 7. Uniform Prudent Management of Institutional Funds Act, *Justia, https://law.justia.com/codes/california/2009/prob/18501-18510.html.*
[x] *James McRitchie v. Mark Zuckerberg et al.* (2024), Court of Chancery of the States of Delaware, *https://cases.justia.com/delaware/court-of-chancery/2024-c-a-no-2022-0890-jtl.pdf?ts=1714494707*.

Lawrence Livermore National Security (Nick Graves)

Please see the attached file.

February 9, 2026

California Air Resources Board

Subject: *LLNL Comments on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation*

CARB:

Lawrence Livermore National Laboratory (LLNL) is a federally funded research and development center (FFRDC) owned by the United States Department of Energy, National Nuclear Security Administration (DOE/NNSA) and operated by Lawrence Livermore National Security, LLC (LLNS). LLNL's mission is to strengthen national security through development and application of world-class science and technology to enhance the nation's defense and to reduce the global threat from terrorism and weapons of mass destruction. All real assets at LLNL are the property of the federal government. LLNS operates LLNL under a Management and Operating (M&O) contract with extensive federal oversight for the benefit of the nation and to meet national security requirements.

California's Climate Corporate Data Accountability Act (SB 253) and Climate-Related Financial Risk Act (SB 261) require covered entities to report and disclose greenhouse gas emissions and climate-related financial risks. CARB's proposed regulations implementing SB 253 and SB 261 apply to entities with revenues over $1 billion and $500 million, respectively. "Revenue" is based on the definition of "gross receipts" pursuant to California Revenue and Taxation Code §23120(f)(2). The proposed regulations also exempt government entities and companies that are majority-owned by government entities.

First, clarification is needed regarding whether the entirety of LLNS's federally funded budget is considered "revenue" within the scope of the proposed regulation. LLNS is subject to extensive federal oversight and scrutiny in how it spends this budget. While LLNS is a limited-liability company doing business in California as a partnership, the entity's actual revenue, from a tax perspective, is the management fee from which taxable income is calculated. As an M&O contractor, LLNS's zero net reimbursables and costs from its federally funded budget are rolled up into the financial statement (for the purpose of apportionment) to allocate the taxable fee that the partnership receives for management of LLNL. Within the context of the proposed regulation, LLNS's contract fee is more appropriate to consider as the total revenue amount within the context of the proposed regulations. Therefore, LLNS recommends that CARB exclude, from the calculation of revenues, the federal funds used solely for the operation of a federal facility and assets, as proposed in the Enclosure below. 053.1

Second, LLNS' unique position as an M&O contractor to the federal government presents additional challenges to the execution of the proposed disclosures required by SB 253 and 261. All real assets from which greenhouse gas emissions originate at LLNL come from the operation 053.2

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of a federal facility and related assets. Any climate-related financial risks LLNS identifies as part of its disclosure obligation would be directly associated with the operation of a federally-owned national laboratory site such as LLNL. As currently written, LLNS would be required to disclose such information on behalf of an otherwise exempt federal entity; yet if the federal government operated LLNL directly, they would be exempt from reporting requirements. For these reasons, LLNS recommends that CARB extend the exemption currently proposed for Section 96201 and 96071(b)(3) to apply to DOE M&O contractors exclusively managing a federal facility, as proposed in the Enclosure below.

In conclusion, LLNS recommends that CARB clarify certain elements defining applicability of its greenhouse gas and climate-related financial risk disclosure regulations to DOE M&O contractors such as LLNS. Specifically, CARB should either exclude from the calculation of revenue federal funding provided solely to operate federal facilities, or CARB should expressly exempt M&O contracting contractors that exclusively manage federal facilities from the reporting requirements. 053.3 053.4 053.5

Sincerely,

SCOTT WILSON (Affiliate)
Digitally signed by SCOTT WILSON (Affiliate)
Date: 2026.02.09 14:08:55 -08'00'

Scott Wilson
Office of Government and External Affairs
Lawrence Livermore National Laboratory

Enclosure: Proposed Regulatory Language

ESH-EFA-AQ-26-23581 SW/NG:ek

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Enclosure

Proposed Regulatory Language

Article 6: California Climate Disclosures

Subarticle 1: General Requirements for California Climate Disclosures Reporting

§ 96070. Purpose

The purpose of this article is to establish certain requirements pursuant to sections 38532 and 38533 of the Health and Safety Code. The climate change disclosure reporting programs set forth in this article are also colloquially referred to by the legislative bill numbers that originally enacted them: Senate Bill (S.B.) 253 (2023), the Climate Corporate Data Accountability Act, codified at Health & Safety Code Section 38532; and SB 261 (2023), the Climate-Related Financial Risk Act, codified at Health & Safety Code Section 38533.

NOTE: Authority cited: Sections 38532, 38533, 39600 and 39601, Health and Safety Code.

Reference: Sections 38532 and 38533, Health and Safety Code.

§ 96071. Applicability.

(a) This article applies to reporting entities and covered entities, as defined in section 96072.

(b) This article does not apply to the following entities:

(1) Non-profit or charitable organizations that are tax-exempt under the Internal Revenue Code;

(2) A business entity that is subject to regulation by the Department of Insurance in this state, or that is in the business of insurance in any other state.

053.2 (3) Federal, State and local government entities, and companies that are majority-owned by government entities (>50.00%); and companies

whose primary purpose is to operate federally funded research and development centers (FFRDCs) including national laboratories on behalf of a federal government agency such as the United States Department of Energy.

(4) A business entity whose only activity within California consists of wholesale electricity transactions; and

(5) A business entity whose only business in California is employee compensation or payroll expenses, including teleworking employees.

NOTE: Authority cited: Sections 38532, 38533, 39600 and 39601, Health and Safety Code.

Reference: Sections 38532 and 38533, Health and Safety Code.

§ 96072. Definitions.

(a) For the purposes of this article, the following definitions apply:

(1) "Business entity" means a corporation, partnership, limited liability company, or other business entity formed under the laws of the state, the laws of any other state of the United States or the District of Columbia, or under an act of the Congress of the United States.

(2) "CARB" means the California Air Resources Board.

(3) "Climate Accountability and Emissions Disclosure Fund" means the account where proceeds of the Health and Safety Code section 38532 implementation fee are deposited, and from which moneys are continuously appropriated for use by the state board for purposes of administering the Climate Corporate Data Accountability Act established by Health and Safety Code section 38532.

(4) "Climate-Related Financial Risk Disclosure Fund" means the account where the proceeds of the Health and Safety Code section 38533 implementation fees are deposited, and from which moneys are continuously appropriated for use by the state board for purposes of administering the Climate-Related Financial Risk program established by Health and Safety Code section 38533.

(5) "Covered entity" means a corporation, partnership, limited liability company, or other business entity formed under the laws of the state, the laws of any other state of the United States or the District of Columbia, or under an act of the Congress of the United States with total annual revenues in excess of five hundred million United States dollars ($500,000,000) and that does business in California. The entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue. "Covered entity" does not include a business entity that is subject to regulation by the Department of Insurance in this state, or that is in the business of insurance in any other state.

(6) "Debt" means those loans obtained by CARB, and required by the Legislature to be repaid, to carry out sections 38532 and 38533 of the Health and Safety Code.

(7) "Doing business" shall have the same definition as set forth in section 23101(a) of the California Revenue and Taxation Code.

(8) "Doing business in California" means doing business and meeting either of the criteria set forth in subsections 23101(b)(1) or 23101(b)(2) of the California Revenue and Taxation Code. Wholesale sales of electricity do not count for purposes of determining an entity's sales in California under Revenue and Taxation Code section 23101(b)(2).

(9) "Implementation Fee" means the fee set by the state board and assessed annually on a reporting entity or covered entity.

(10) "Parent" means a business entity that has ownership interest in or control of another business entity by direct corporate association as specified in section 95833 of Title 17 of the California Code of Regulations. The indicia determining ownership or control are set forth in section 96072(a)(6).

(11) "Reporting entity" means a partnership, corporation, limited liability company, or other business entity formed under the laws of this state, the laws of any other state of the United States or the District of Columbia, or under an act of the Congress of the United States with total annual revenues in excess of one billion United States dollars ($1,000,000,000) and that does business in California. The entity's revenue amount shall be

determined by the lesser of the entity's two previous fiscal years of revenue.

(12) "Required Revenue" (RR) means the total amount of funds necessary to recover the costs of implementation of expenditures under the programs established by Health and Safety Code sections 38532 or 38533, respectively, for each fiscal year, based on the number of personnel positions, including salaries and benefits, contracting costs, and all other costs, including legal defense of this article, as approved in the California Budget Act for that fiscal year.

(13) "Revenue" has the same meaning as "gross receipts" under section 25120(f)(2) of the California Revenue and Taxation Code, excluding gross receipts of federal funds solely used for the management and operation of federal facilities.

053.1

(14) "Scope 1 Emissions" means, as defined in Health & Safety Code Section 38532(b)(3), all direct greenhouse gas emissions that stem from sources that a reporting entity owns or directly controls, regardless of location, including, but not limited to, fuel combustion activities.

(15) "Scope 2 Emissions" means, as defined in Health & Safety Code Section 38532(b)(4), indirect greenhouse gas emissions from consumed electricity, steam, heating, or cooling purchased or acquired by a reporting entity, regardless of location.

(16) "Subsidiary" means a business entity that another business entity has ownership interest in or control of by direct corporate association as set forth in section 95833 of Title 17 of the California Code of Regulations. A subsidiary may operate as a separate legal entity but is under the control of the parent entity due to this direct corporate association which can influence the subsidiary's operations, management, or financial decisions. The following indicia of control determine ownership or control:

(A) Greater than 50 percent of ownership of any class of listed shares, the right to acquire such shares, or any option to purchase such shares of the other entity;

(B) Greater than 50 percent of common owners, directors, or officers of the other entity;

(C) Greater than 50 percent of the voting power of the other entity;

(D) In the case of a partnership other than a limited partnership, greater than 50 percent of the interests of the partnership;

(E) In the case of a limited partnership, greater than 50 percent of control over the general partner or greater than 50 percent of the voting rights to select the general partner; and

(F) In the case of a limited liability corporation, greater than 50 percent of ownership in the other entity regardless of how the interest is held.

(17) "Total Required Revenue" (TRR) means Required Revenue with a 10% contingency adjustment to cover unforeseen costs or reductions in revenue, plus the Debt.

NOTE: Authority cited: Sections 38532, 38533, 39600 and 39601, Health and Safety Code.

Reference: Sections 38532 and 38533, Health and Safety Code.

ACORE (Jeffrey Gorham)

Please see attached for ACORE's comments. Thank you very much for your consideration.

February 9, 2026

Rajinder Sahota, Deputy Executive Officer
California Air Resources Board
1001 I Street
Sacramento, California 95814

Re: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Deputy Executive Officer Sahota,

ACORE respectfully submits these comments to the California Air Resources Board ("CARB") in response to CARB's December 9, 2025 notice of public hearing soliciting public comment on proposed regulations implementing Senate Bill 253 ("SB 253," or the "Climate Corporate Data Accountability Act") and Senate Bill 261 ("SB 261," or the "Climate Related Financial Risk Act").[1]

ACORE is a 501(c)(3) national nonprofit organization that works to accelerate the transition to a clean energy economy. ACORE's membership spans the energy value chain, including project developers, institutional investors, corporate buyers of clean energy, manufacturers, electric power generators, retail energy providers, and other stakeholders.[2] Given the many ACORE member companies that are likely covered under SB 253, ACORE respectfully submits these comments to inform CARB's efforts to finalize effective and workable rules.

ACORE appreciates that the December 2025 CARB draft regulations focus on fee issues, reporting deadlines, and key definitions. We understand that future draft regulations will address additional program details.[3] With this in mind, ACORE writes to provide high-level recommendations for CARB to consider in drafting future regulations. Specifically, ACORE encourages CARB to clarify that companies can continue reporting under the current GHG Protocol Scope 2 Guidance, which was in place when SB 253 was enacted,[4] at least until 2033. In addition, CARB should specify that any updated GHG Protocol standards would not be automatically required of reporting entities. Further, any potential mandatory adoption of updated standards after 2033 should be subject to notice-and-comment rulemaking to promote transparency and consistency.

054.1

ACORE provides these important recommendations now because there are only months until the proposed Scope 1 and 2 reporting deadline of August 10, 2026. The GHG Protocol is in the midst of

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[1] *See* CARB, Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation (Dec. 9, 2025), https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/notice1.pdf.

[2] The views expressed here are those of ACORE and do not necessarily reflect the views of any individual ACORE member company.

[3] *See, e.g.*, CARB, Staff Report: Initial Statement of Reasons: Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation at 2 (Dec. 9, 2025), https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/isor.pdf.

[4] *See generally* WORLD RES. INST. & WORLD BUS. COUNCIL FOR SUSTAINABLE DEV., THE GREENHOUSE GAS PROTOCOL: SCOPE 2 GUIDANCE (2015) ("GHG Protocol Scope 2 Guidance"), https://ghgprotocol.org/sites/default/files/2023-03/Scope%202%20Guidance.pdf.

updating its Scope 2 Guidance, with final publication of updated Scope 2 Guidance is expected in 2027.[5] As a result, there is present uncertainty as to whether and when SB 253 reporting entities will need to adapt their reporting to align with the forthcoming revised Scope 2 Guidance.

054.2 There are two primary reasons that CARB should clarify that reporting entities can continue to rely on the current GHG Protocol Scope 2 Guidance at least through 2033. First, the existing Scope 2 Guidance is widely in use today; continuing to allow it will minimize reporting entities' compliance burdens and provide reporting entities with needed flexibility in the early years of California's new regulatory scheme. Second, the existing Scope 2 Guidance has a demonstrated track record of promoting investment in clean energy, whereas some of the updates under consideration could undermine existing incentives to invest in clean energy sources.

I. CARB Should Clarify that Entities May Continue to Report Under the Current GHG Protocol Scope 2 Guidance in Order to Promote Flexibility and Ease Compliance Burdens.

CARB should make clear in its regulations that companies can follow the GHG Protocol framework that was in place in January 2024 when SB 253 went into effect at least through 2033, or any successor GHG Protocol framework. This would advance the goal of allowing for flexibility and easing the compliance burden, while still providing California with high quality GHG emissions information.

054.3 Allowing entities to report under the current GHG Protocol Scope 2 Guidance for the foreseeable future would promote flexibility and ease the compliance burden on reporting entities. Companies are already comfortable and familiar with the effective Scope 2 Guidance that exists today.[6] In fact, 97 percent of S&P 500 companies that voluntarily reported their emissions to the Carbon Disclosure Project ("CDP") followed the GHG Protocol framework in 2023.[7] The current version of the GHG Protocol was in place when legislators enacted SB 253 and pointed to the GHG Protocol as the framework to follow. In addition, some ACORE members have expressed concern about increased reporting costs associated with certain proposed requirements under proposed updates to the GHG Protocol, underscoring the benefits of regulatory flexibility to continue using the existing framework.[8]

Moreover, the statute specifically affords a mechanism for CARB beginning in 2033 and every five years thereafter to "survey and assess currently available greenhouse gas accounting and reporting standards" and determine whether an "alternative accounting and reporting standard. . . would more effectively further the goals of this section."[9] At least until that time, CARB should clarify through its regulations that companies can use the GHG Protocol framework that was in place when the law was passed or any successor GHG Protocol framework if a company so chooses.

ACORE also requests that CARB not *require* reporting entities to adhere to any forthcoming GHG Protocol updates, particularly not until CARB has a chance to hear from reporting entities in a dedicated notice-and-comment rulemaking. To provide certainty and flexibility, ACORE encourages CARB to confirm that the existing GHG Protocol Scope 2 Guidance (or any successor GHG Protocol framework) is

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[5] Sarah Huckins, GHG Protocol Public Consultations Now Open: Scope 2 and Electricity Sector Consequential Accounting, WRI Blog (Oct. 20, 2025), https://ghgprotocol.org/blog/ghg-protocol-public-consultations-now-open-scope-2-and-electricity-sector-consequential.

[6] That is, the GHG Protocol Scope 2 Guidance published in 2015. *See* note 4.

[7] GHG Protocol, About Us, https://ghgprotocol.org/about-us (accessed Jan. 20, 2026).

[8] Reporting entities have raised concerns about hourly matching and deliverability requirements significantly raising reporting costs.

[9] *See* Cal. Health & Safety Code § 38532(c)(2)(A)(iv)(I).

an acceptable framework at least through 2033, when CARB will assess whether an alternate accounting and reporting standard would more effectively further the goals of the law.[10]

II. Allowing Continued Use of the Current GHG Protocol Scope 2 Guidance Will Encourage Clean-Energy Development.

Clarifying in CARB's forthcoming regulations that reporting companies can continue to use the existing GHG Protocol Scope 2 Guidance at least through 2033 would also promote clean energy investment and development. ACORE cautions against requiring strict adherence to the GHG Protocol updates currently under consideration which could discourage certain clean energy investments and have a chilling effect on the clean energy market.

Voluntary agreements to procure clean energy play a vital role in driving greater levels of clean energy deployment because such agreements de-risk projects and enable financing. However, the proposed hourly matching and deliverability requirements under consideration in the GHG Protocol Scope 2 update process threaten to undermine these incentives, which could result in less clean-energy capacity additions in the real world. Companies would have a more difficult time promoting renewable energy via purchases of Renewable Energy Certificates ("RECs") and Virtual Power Purchase Agreements ("VPPAs"). Indeed, a poll released in 2025 found that 78 percent of respondents involved in sourcing clean electricity and related instruments were not confident that they could continue such sourcing under an hourly matched and deliverable framework.[11] Today, many companies need to aggregate their load across regions to have enough demand for a long-term power purchase agreement. The new requirements proposed would therefore weaken a pivotal lever for companies to drive clean energy development.

054.4

By affording companies the flexibility to continue using the longstanding GHG Protocol framework in place when SB 253 was signed into law, CARB's forthcoming regulations can avoid any potential complications related to the GHG Protocol revision process.

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In short, ACORE encourages CARB to draft regulations that clarify that the existing version of the GHG Protocol framework will be an acceptable framework for Scope 2 emissions reporting at least until 2033, when the statute provides for reassessment. Although this letter does not address the relevant issue of the fee structure in the ongoing consultation, that should not be interpreted as a tacit endorsement of the language as proposed by ACORE or its members. ACORE greatly appreciates the opportunity to provide comments to assist in effective implementation of California's climate disclosure laws.

054.5

Respectfully submitted,

/s/ Lesley Hunter
Senior Vice President, Policy and Engagement
ACORE
1150 Connecticut Ave NW #401

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[10] *See* Cal. Health & Safety Code § 38532(c)(2)(A)(iv)(I).
[11] Green Strategies, Inc., Report: How Scope 2 Revisions May Change Clean Electricity Procurement Strategies at 15, Figure 9. Respondent's Confidence Level on Sourcing Clean Electricity Under Scenario at 2 (May 6, 2025) https://www.greenstrategies.com/report-release-scope-2-accounting-revisions-practitioners-perspectives/.

Washington, DC 20036
hunter@acore.org

/s/ Jeffrey Gorham
Director, Policy & Engagement
ACORE
gorham@acore.org

Association of Independent California Colleges and Universities (AICCU) (Nick Romo)

Dear Chair Sanchez,

On behalf of the Association of Independent California Colleges and Universities (AICCU), which represents more than 80 non-profit colleges and universities, I am submitting comments in support of the staff recommendation to exempt non-profit entities, as proposed on page 5 of the staff report.

In our prior submitted comments, we sought an exemption for California's independent, non-profit colleges and universities. Among other items, we underscored that application of the new reporting requirements to independent, non-profit colleges and universities would (i) be inconsistent with the intent of the bills and their legislative histories, which showed they were designed to focus on large, for-profit corporations, (ii) create unique challenges to universities, resulting in substantial new costs that would divert critical funds from academic and student programs and institutional financial aid, and (iii), given the statutory exemption already in place for University of California entities, bring about an inequitable inconsistency in treatment of higher education institutions within the State. Staff's recommendation for exemption remediates these issues and remains consistent with the state and federal tax exempt status of non-profit institutions of higher education. 055.1

This request remains consistent with the state and federal tax-exempt statuses of non-profit institutions of higher education and the legislative intent to apply the new disclosure laws to large corporations that profit from the sale of goods.

Staff's recommendation to exempt non-profit organizations would effectively satisfy our request in recognition of our educational mission.

Please extend our appreciation to your staff for engaging our universities on this matter and for the opportunity to provide feedback in support of their recommendation. We stand ready to share research and expertise in this important endeavor. 055.2

Sincerely,
Alex Graves

California Council for Environmental and Economic Balance
369 Pine Street, Suite 720, San Francisco, CA 94104
1201 J Street, Suite 222-223, Sacramento, CA 95814
(415) 512-7890 | cceeb.org

February 9, 2026

Rajinder Sahota
Deputy Executive Officer
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Comments regarding the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Ms. Sahota,

The California Council for Environmental and Economic Balance (CCEEB) appreciates the opportunity to provide comments to the California Air Resources Board (CARB) regarding the proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure initial regulation. CCEEB is a coalition of business, labor, and public leaders that works together to advance strategies to achieve a sound economy and a healthy environment. Founded in 1973, CCEEB is a non-profit and non-partisan organization that strives to provide pragmatic pathways - balancing the need to reduce emissions while keeping businesses competitive in California.

056.1 First, we would like to recognize CARB's work on this herculean effort to advance regulations on California's Climate Disclosure Laws: SB 253, SB 261 and SB 219 (also referred to as the 200s). CARB has conducted numerous workshops and provided resources, such as the December 2024- Enforcement Notice, December 2025- Enforcement Advisory, FAQs, and Checklists.

The primary focus of this initial phase of the regulation is for CARB to administer the fee program. The initial regulation also specifies key definitions and establishes a first-year reporting deadline for SB 253. Future reports, assurance, and enforcement provisions are to be determined in subsequent regulations. There are multiple aspects of the proposed regulation that CCEEB
056.2 supports, such as Enforcement Discretion, the Flat Fee, and No Assurances Required for 2026.

Enforcement Discretion. In the Staff Report: Initial Statement of Reasons (ISOR), CARB reiterates, consistent with its December 2024 Enforcement Notice, it will exercise enforcement discretion for the first report due in 2026 and allow "reporting entities to submit Scope 1 and Scope 2 emissions for their prior fiscal year based on information they already have or were collecting when that Notice was issued. Entities that were not collecting data or were not planning to collect data, at the time of the Enforcement Notice was issued, are not expected to submit Scope 1 and Scope 2 reporting data for this first reporting cycle." CARB recognizes, and
056.3 CCEEB concurs, that some reporting entities may require lead time to collect the data necessary in order to ensure complete and accurate reporting of Scope 1 and Scope 2 data.

Flat Fee. CCEEB also agrees with CARB that a flat fee is more equitable and less burdensome to calculate than a variable fee tied to emissions or financial metrics. A flat fee reduces CARB's
056.4 administrative burden – and cost of program implementation - when compared to verifying and managing a variable fee. The flat fee streamlines implementation and provides higher predictability for the program, covered and reporting entities, and CARB.

No Assurances Required for 2026. CCEEB also appreciates CARB's statement in the
056.5 November 18, 2025, Workshop Presentation Slides (slide 12) that limited assurance will not be required for 2026 SB 253 reporting for data submission. This provision supports reporting entities as they transition into compliance.

While CCEEB appreciates CARB's efforts to reduce confusion, simplify compliance, and
056.6 streamline reporting requirements, there are multiple parts of the proposed regulation that do not reflect operational realities, are not practical, or do not advance climate goals in a cost-effective manner, such as Calculation of Fees, Applicability, the Definition of "doing business in California," Payment and Collection, Fee Enforcement, and Deadline for Reporting.

Calculation of Fees-§ 96083. The calculation of the fees is of great concern to CCEEB's members that are covered and reporting entities. CARB estimates a $20.7 million cost to set up this program which is to be paid for out of the coveted Greenhouse Gas Reduction Fund as a loan that requires repayment. Subsequently, the cost is anticipated to be $13.9 million a year in 2026-27 and ongoing. When broken down, CARB estimates the need for 42 permanent positions by 2026-27, representing $8.586 million by fiscal year 2026-27 for salaries and benefits. Operating costs are estimated to be $5.266 million a year in 2026-27. CARB has also indicated that the fee is expected to cover $500,000 in legal expenses, a Consumer Price Index increase annually, a 10% contingency adjustment for unforeseen costs or revenue shortfalls, and the loan to get the program started that must be repaid.

CARB's August Workshop provided an estimate of the fees as well as an estimate of the number of covered and reporting entities under each bill. CARB estimates that the number of reporting

entities for SB 253 is approximately 2,600, with fees estimated at $3,100 per entity, regardless of whether a reporting entity consolidates and submits a single report. For SB 261, CARB estimates that the number of covered reporters is 4,150 with a fee of $1,400. For covered entities that are required to report under SB 261, they must pay both fees annually (even though SB 261 is a biennial report). CARB's November Workshop points out the challenges and limitations with regards to estimating the fees. The Workshop Slides indicate that there are major holes in the data, imprecise revenue estimates, and outdated information. These issues create very significant concerns about the accuracy and reasonableness of the fee estimates.

056.7

Because of the high level of uncertainty in CARB's costs, the irresolution as to what full regulatory compliance will require, legal precariousness, and the unknown universe of who is actually reporting, CCEEB recommends that CARB not collect fees in 2026. CARB should collect data in 2026 on the universe of covered and reporting entities before collecting fees and finalize the universe of regulatory costs, resulting in a more accurate estimate. This approach will better ensure that CARB maintains a clear nexus between the costs of administering the program and regulated entities. CCEEB additionally recommends smoothing costs over a period of years to reduce the volatility of the fees.

The statute authorizes a parent company to consolidate any reporting from subsidiaries into one, single report. Despite the consolidation, CARB is proposing requiring a fee from every single covered and reporting entity. CCEEB recommends that CARB establish a one-report = one-fee regulation to incentivize the consolidation of reports and further streamline the regulation. It is unclear how the consolidation of a report would result in additional costs to CARB in order to justify multiple fees. CCEEB recommends that if CARB chooses to pursue a fee for each subsidiary, regardless of a consolidated report, that CARB include the rationale for such fees. In addition to the one-report = one-fee concept, CCEEB recommends a cap on the total fees that a single parent entity would pay ($50,000), regardless of the number of covered and reporting entities within the same parent company.

056.8

056.9

The proposed regulation provides that in the event of an excess or shortfall of fees, the balance is carried over to the following year. However, there may be instances where a covered or reporting entity reports in one year and does not meet the threshold to report in the following year. In the case where CARB determines that covered or reporting entities paid too much, the regulations should include both a requirement to refund the fees and a process for covered and reporting entities to request a refund. In order to comply with Proposition 26, CARB must demonstrate by a preponderance of the evidence that the charge is no more than necessary to cover the reasonable costs of the government activity and bears a reasonable relationship to the payer's burden or benefits received from the governmental activity. Without this assurance, this fee becomes a tax.

056.10

056.11

056.12 While CARB's ISOR indicates that the fee is expected to be negligible for "most" companies, this is not the only expense companies will incur in complying with the statutes and regulations. Companies will need to hire experts, third-party assurance providers, and incur millions of dollars in costs collecting, measuring, and reporting the most accurate data. CCEEB appreciates the language that was incorporated into SB 219 that encourages minimizing duplication of effort and allows reports prepared to meet other national and international reporting requirements as well as the language that encourages alignment with existing, widely recognized reporting

056.13 frameworks. However, the language also specifies "as long as those reports satisfy all of the requirements in this section," which ultimately reduces the simplification and streamlining of reporting requirements. CARB should identify existing protocols that satisfy the reporting requirements for SB 253 and SB 261 and allow companies the flexibility to choose which protocol they want to use to demonstrate full compliance. The inclusion of this provision would again streamline reporting, allow for timely implementation, provide accurate, comparable information, and reduce the administrative burden on CARB.

056.14 Going forward, CCEEB recommends CARB be fully transparent about any future changes in program funding needs and staffing levels, including proposed fee increases. CARB should bring any proposed changes to the Board as informational items and provide covered and reporting entities the opportunity for public input.

Applicability-§ 96071. CCEEB recommends that CARB establish a mechanism to challenge CARB's determination that an entity is a "reporting entity" or "covered entity" subject to the

056.15 requirements and fees of SB 253 or SB 261 prior to the imposition of fees, reporting obligations, or penalties. CCEEB also proposes a procedure by which entities can seek confirmation that they are "reporting entities" or "covered entities," as applicable, before being subject to fees, reporting obligations, and penalties.

Definitions-§ 96072. While we acknowledge and appreciate the amount of work CARB put into

056.16 the definition of "doing business in California," the proposed definition may bring in entities without a meaningful connection to California. Entities may exceed the applicable sales thresholds despite not having employees, facilities, or physical operations in California. CCEEB recommends that CARB consider a definition tied to operational presence.

Payment and Collection-§ 96074. The proposed regulation requires entities to pay the fee within 60 days. Given the magnitude of the fees and the complex and time-consuming exercise

056.17 for applicability determinations, CCEEB recommends extending the period to pay the fees to 90 days. This timeframe is also consistent with the amount of time CARB has to make the reporting disclosures available on the digital platform.

056.18

Fee Enforcement-§ 96075. CCEEB disagrees that the failure to pay the full amount of any required fee should constitute a single, separate violation for each day that the fee has not been paid after the date the fee is due given that harm would not accrue with each passing day. CCEEB instead recommends a cap on penalties arising due to the nonpayment of program fees. Health and Safety Code section 38532 and 38533 each contain annual caps for administrative penalties. Fees arising due to the nonpayment of program fees should be subject to a further, smaller annual cap. In addition, CCEEB recommends adding a safe harbor from penalties for the nonpayment of program fees while an entity is performing a good-faith applicability analysis.

056.24

056.19

Deadline for Reporting Under Health and Safety Code § 38532- § 96076. The proposed regulation sets August 10, 2026, as the deadline for the first year of reporting for SB 253. CCEEB recommends extending this date until December 31, 2026, which would still comply with the 200s, establish a clear deadline, and provide the extra time that is needed to account for gathering and verifying data, the administrative strain imposed by this reporting requirement, and reflect the length of time needed for applicability determinations. Providing additional lead time will also lead to more accurate data and reduce uncertainty, ultimately benefitting consumers of the information, CARB, and the reporting entity.

056.20

Companies whose fiscal year ends on or before February 1, 2026, would report data based on the fiscal year ending in the current calendar year (FY 2025-26 data). Companies whose fiscal year ends after February 1, 2026, will report data based on the fiscal year ending in the previous calendar year (FY 2024-25 data), while also having the option to report data based on the more recent fiscal year where available. This approach guarantees at least six months of time between fiscal year end and the proposed reporting deadline. CCEEB recommends as an alternative that CARB allow companies a rolling deadline of no less than 12 months after the end of each company's fiscal year to report. This additional flexibility allows for the accommodation of a wide array of fiscal year deadlines, results in reports being submitted in a steadier, more consistent fashion, avoids potential bottleneck from limited assurance provider capacity, and allows CARB to receive manageable amounts of data submitted at any one time.

Other Comments- While the vast majority of CCEEB's comments focus directly on the narrow scope of this phase of the proposed regulation, CCEEB members have numerous concerns as the development of these regulations move forward.

056.21

Scope 1 and Scope 2 Template. To further support compliance and exercise enforcement discretion, CARB's November 18, 2025, Workshop Presentation Slides (slide 12) indicate that the use of the Scope 1 and Scope 2 Template is optional for 2026 reporting. Since the inclusion of a template is beyond the scope of requirements in the 200s, CCEEB recommends that CARB revoke the template altogether.

Use of Existing Standards and Methodologies. CCEEB proposes CARB provide a safe harbor for entities that calculate and disclosure climate-related financial risk and emissions using existing standards and methodologies identified by CARB, including how divestments, mergers, and acquisitions are addressed under such standards and methodologies. Moreover, future regulations should not deviate from existing standards or methodologies or standard reporting practices. To do so would only add to the burden of CARB staff as well as covered and reporting entities, without any tangible benefits. Adding reporting complexity would take away resources from companies that could better be put to use in programs that actually reduce emissions. In particular, the Greenhouse Gas Protocol (GHGP) provides guidance on how entities should account for acquisitions, divestments, mergers, and other structural changes. CARB should not require anything different from the GHGP's guidance on how companies should account for structural changes.

056.22

According to CARB's ISOR, the proposed regulation is expected to provide no negligible benefits, no cost savings, no direct impacts on emissions of criteria pollutants, no direct impacts on toxic air contaminants, no direct reductions of greenhouse gas emissions, no strong implications for environmental justice, no creation of jobs, and no expectation that it will result in an expansion of any existing businesses or the creation of new businesses. The sole benefit is information for investors and consumers at a cost of $14 million annually for CARB, in addition to the millions for each covered and reporting company to comply. Given this reality, CCEEB recommends CARB continue to search for additional ways to streamline the proposed regulation and upcoming regulations to reduce costs and simplify the process for covered and reporting entities.

056.23

CCEEB appreciates the opportunity to comment on the proposed regulations. Should you wish to discuss CCEEB's comments and feedback further, please do not hesitate to reach out to me to discuss.

Sincerely,

Tim Carmichael
President and CEO
California Council for Environmental and Economic Balance (CCEEB)

cc: Sydney Vergis
Assistant Deputy Executive, Industrial Strategies Division

ARIZONA CHAMBER
OF COMMERCE & INDUSTRY

February 9, 2026 *Electronically submitted*

Clerks' Office
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Comments Regarding the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Chair Sanchez:

The Arizona Chamber of Commerce and Industry (the "Chamber") and Arizona Manufacturer's Council ("AMC") appreciate the opportunity to provide comments on the California Air Resources Board's ("CARB") California Corporate Greenhouse Gas ("GHG") Reporting Program. The Chamber and AMC are committed to ensuring economic growth and prosperity for all Arizonans. Our mission is to advocate for free-market policies and work to advance Arizona as a leading player in the global economy. We work to relieve unnecessary and cumbersome regulatory burdens placed on Arizona businesses and support policies that improve Arizona's economic vitality, retain existing business, and spur new business growth and job creation. Our members consist of businesses across a wide range of industries that may be subject to CARB's proposed regulations, which threaten to impose substantial burdens on companies premised on ambiguous foundational questions.

We write to urge CARB to reconsider aspects of the proposed regulations implementing Senate Bills ("SB") 253 and 261, as modified by SB 219 (collectively, the "200s"). Both SB 253 and SB 261 offer little clarity with respect to their scope, applicability, and the requirements to be met to achieve compliance with the laws, and the proposed regulations are no different. Specifically, the proposed frameworks for submitting disclosures under the 200s do not align with the realities of complex corporate structures. This threatens to force out-of-state companies not otherwise within the scope of the laws to potentially make disclosures to the State of California they are not legally required to make—and potentially subjecting them to specific requirements that are inconsistent with accepted reporting frameworks or regulatory requirements in other jurisdictions—or to impose a substantial burden for subsidiary companies to supplement established parent-level consolidation of climate-related information by preparing redundant, potentially inconsistent GHG reports and/or climate risk reports. 057.1

The proposed regulations also present constitutional concerns. The proposed definition of "doing business" in California raises due process concerns and violates notions of federalism by attempting to subject out-of-state entities to these laws based on the existence of a subsidiary or actions that have only a limited nexus to the State of California. CARB must adopt a reasonable and clear definition of "doing business" in California that makes explicit that a subsidiary alone, even one that normally utilizes intercompany shared services or consolidates financial or other data within its broader enterprise, cannot subject a parent entity to reporting obligations. 057.2

CARB's proposed requirements for reports to be submitted under the 200s create Due Process concerns for entities, even if they are able to determine whether they are covered by the laws. CARB's unclear proposal for implementing SB 261 leaves entities unsure of how to submit a compliant report. CARB should revise its guidelines to outline the precise requirements for a compliant report under SB 261 so companies are fairly put on notice of their obligations. 057.3

CARB's proposed template for reports submitted under SB 253 likewise conflicts with the existing inventories of regulated entities, resulting in companies incurring significant costs to try to produce compliant data and leaving companies vulnerable if CARB later determines that existing practices are insufficient. CARB should allow reporting entities to rely on recognized, reasonably equivalent reporting frameworks without potential enforcement risk. 057.4

Finally, companies are set to incur substantial costs in assessing their requirements under the regulations and preparing compliant reports, all the while litigation concerning the validity of the laws is ongoing. It would be fundamentally unfair to require prompt compliance once the enforcement advisory CARB issued on December 1, 2025, is lifted or the pending litigation in the U.S. Court of Appeals for the Ninth Circuit surrounding the 200s is resolved. If and when the Ninth Circuit case is resolved and there is a final promulgation of regulations, CARB should continue to delay enforcement for a reasonable period of at least 1 year for initial reporting obligations. 057.5

I. Reporting obligations place undue burdens on businesses because they do not align with corporate organizational structures. 057.6

CARB's proposed framework for reporting obligations under the 200s does not align with how corporations and other climate-focused organizations assess climate risks. As is common for consolidated financial reporting, corporate policies and frameworks for GHG emissions reporting tend to focus on consolidated emissions reporting, in keeping with the global nature of climate issues. The same is true for identifying and assessing climate risk. Many publicly traded companies, for example, analyze emissions and climate-related risks across their entire group of corporate affiliates, as this approach can provide a more comprehensive understanding of the overall climate risk profile arising from business activities. This consolidated reporting approach is embedded within other climate reporting frameworks, like the Task Force on Climate-Related Financial Disclosure ("TCFD") recommendations.[1] The TCFD's framework is centered around reports prepared at the enterprise level, which the TCFD defines as the "group, company, or companies, and other entities for which consolidated financial statements are prepared, including subsidiaries."[2] This is because aligning climate disclosure practices with financial ones better allows companies to discern the "linkages and connections between climate-related issues and their governance, strategy, risk management, and metrics and targets" and produce "consistent, comparable, reliable, clear, and efficient" disclosures.[3]

[1] TCFD, *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures* (June 2017), https://perma.cc/X8FS-232D.
[2] *Id.* at 63.
[3] *Id.* at 51.

CARB's proposed regulations do not effectively implement this approach. While CARB's reporting framework under SB 261 claims to be "largely based on TCFD,"[4] the proposed regulations require reporting compliance at the entity level where a company actually "does business" in California,[5] mandating a reporting framework for subsidiary corporations that are already covered by consolidated-level reporting. Many of these individual subsidiaries do not currently have the capability to generate granular, subsidiary-level reports because accepted GHG reporting practices currently focus on consolidated reporting among corporate affiliates and companies have made substantial investments in providing reporting of that nature. This creates a host of problems: disaggregation and verification of subsidiary-level data from consolidated reporting will be challenging and burdensome, if it is even possible at all; potential inconsistencies among reporting across various jurisdictions will create potential legal risk, including for non-California entities regulated in other jurisdictions; and such a granular requirement would add little value in the context of corporate entities already covered by established consolidated reporting.

Further, the question of whether or not a specific corporate entity "does business" in California is more complex than contemplated by the proposed regulations. Many large organizations make use of complex shared services and intercompany arrangements among various subsidiary corporate entities, making it extremely unclear what it means for a given company to "do business" in California. And though CARB would *allow* companies to submit consolidated reports at the parent level, not all parent entities independently do business in California, and requiring out-of-state businesses to restructure consolidated GHG reporting to be consistent with California-specific requirements would be burdensome, impose on the regulatory prerogatives of other jurisdictions, and have little benefit, as least as to those entities currently reporting under accepted alternative frameworks. CARB's proposal thus ignores the foundational concept of corporate separateness and risks drawing in entities who themselves might not be subject to disclosure requirements at all. CARB's published guidance on this topic likewise lacks clarity and leaves many unanswered questions as to whether a given entity is or is not in scope, as we discuss further in Section II below. 057.7

The same is true of emissions reporting under SB 253. Like with financial reporting and climate risk management, many companies report emissions on a consolidated basis. Instead of making use of these established practices, the proposed regulations would require time-consuming, burdensome, and speculative guesswork and projecting, which constituent companies must assemble (or disaggregate) for the first time and present for public scrutiny. Many multi-entity organizations that do collect GHG data do not do so on an entity-by-entity basis, and forcing complex organizations to do so places an unreasonable burden on these companies. CARB's proposed framework thus creates an unnecessary, arbitrary burden—either requiring subsidiaries with California operations to prepare a separate, potentially inconsistent set of emissions reports, a significant burden with no real benefit, or compelling larger entities with a minimal-at-best connection to California to comply with California regulations at the parent level, despite intentional and well-recognized legally foundational corporate separations amongst related entities. 057.8

[4] Cal. Air Resources Bd., *Climate Related Financial Risk Disclosures: Checklist* 3 (updated Nov. 17, 2025), https://perma.cc/BLV4-YM49 [hereinafter "*Checklist*"].
[5] Proposed Regulations § 96071 (stating that regulations apply to business entities).

Recognizing that many companies have long abided by established international frameworks like TCFD or the International Sustainability Standards Board, CARB should incorporate these established practices into its rulemaking efforts. We request that CARB set clear standards for reporting obligations under the 200s so regulated entities can produce compliant reports without unnecessary burdens.

II. The proposed scope of CARB's regulations is vague and places an undue burden on out-of-state businesses.

057.9

A. Without additional guardrails, CARB's implementation of the reporting triggers raises Due Process concerns.

CARB must provide further clarity and limits on the three reporting criteria to ensure that the 200s do not run afoul of the U.S. Constitution in their implementation. First, a clear and unambiguous definition of "doing business in California" is crucial for ensuring that CARB's final regulations avoid creating due process concerns. Due Process "requires the invalidation of laws that are impermissibly vague," meaning that they "fail[] to provide a person of ordinary intelligence fair notice of what is prohibited, or [are] so standardless that [they] authorize[] or encourage[] seriously discriminatory enforcement. *FCC v. Fox Television Stations, Inc.*, 567 U.S. 239, 253 (2012) (citation omitted). In evaluating whether a vague law gives fair notice such that a regulated entity "know[s] what is required of them," the law's requirements must be clear from the common understanding of the terms used. *See Butcher v. Knudsen*, 38 F.4th 1163, 1168, 1173 (9th Cir. 2022) (quoting *Fox*, 567 U.S. at 253). The proposed definition does not rise to this standard. CARB's regulations contemplate a three-part test for determining whether an entity is subject to reporting obligations under the 200s. First, the entity must be based in the United States.[6] Next, the entity must meet the revenue threshold—$500 million for SB 261, and $1 billion for SB 253.[7] Finally, the entity must "do[] business in California."[8] The proposal defines "doing business in California" to include "engaging in any transaction for the purpose of financial . . . gain" in California, which includes being organized or domiciled within California, or doing business that exceeds certain sales amounts.[9]

Yet, as with the proposed reporting frameworks under the 200s, this three-part test is not sufficient to provide notice to a parent entity that it is subject to reporting obligations. The phrase "within California" implies that an entity must transact within California's borders to be subject to reporting requirements, but the definition as proposed could draw in parent entities wholly outside California. For example, our members include large corporations whose operations may reach several states by virtue of subsidiaries or other affiliated entities. Without greater clarity, a large parent company could trigger the requirements even if the parent itself only has *de minimis* operations within the State if it exceeds the revenue thresholds based entirely on sales *outside* of California and has a wholly owned subsidiary domiciled in California. Or a parent may own a more limited interest in a subsidiary that has greater operations in the State. It is not clear from the face of the rule whether these parent entities would themselves be subject to reporting obligations

[6] Proposed Regulations § 96072(a)(5), (11).
[7] *Id.*
[8] *Id.*
[9] *Id.* § 96072(a)(7), (8); Cal. Code Regs. tit. 18 § 23101(a), (b)(1), (b)(2).

through their subsidiaries. The proposed definition thus fails to give notice to parent entities domiciled and operating outside California as to whether they must comply with the burdensome reporting obligations under SB 253 and SB 261.

To make this clearer, consider a specific (but highly likely) example: Imagine an entity, Acme Parent Inc., a Delaware corporation that is publicly listed, has global operations, and collects and reports GHG emissions for its constituent entities to the Environmental Protection Agency and pursuant to various international reporting laws. Acme Parent Inc. generates tens of billions of dollars annually across its organization, but does not directly generate *any* revenue in California, thus it does not apparently independently fall under the remit of any of the 200s. On the other hand, it has a subsidiary, Acme Western Inc., that generates $100 million in revenue from operations in the western United States, including Arizona, Nevada, Washington, Oregon and California. The revenue generated in California totals $15 million. Under the test for aggregate revenue, Acme Western Inc. does not meet the aggregate revenue thresholds of $500 million or $1 billion, although it clearly generates more than $735,000 of revenue in California. However, it has intercompany shared services with Acme Parent Inc. (consisting of payroll services, financial reporting consolidation, a public company board of directors with responsibilities overseeing the entirety of Acme Parent Inc., including Acme Western Inc.). Under CARB's guidance directing companies to assess obligations on an "individual company basis,"[10] it appears that Acme Parent Inc. would not be "doing business in California," and Acme Western Inc. would not be deemed to meet the aggregate revenue thresholds of $500 million and $1 billion, respectively—seemingly resulting in no reporting requirement for either entity. But it is unclear whether California would share this view and respect the corporate separateness of the organizational structures, particularly in light of the shared services and consolidated reporting (financial and for GHG emissions) that Acme Parent Inc. has long employed. This foundational vagueness makes it risky for companies to confidently determine that they are—*or are not*—subject to these laws.

CARB's vague regulations and guidance do little to explain how a subsidiary's in-state operations impact a parent's reporting obligations. The need for explicit line drawing is all the more important given the grave penalties levied under SB 253 and SB 261. Companies who do not report because they are unable to determine their obligations could be subject to over half a million dollars in penalties—thus leaving businesses compelled to undertake costly, unnecessary reporting efforts for fear of enforcement. Further, given the highly charged issues surrounding climate change, failure to report (whether or not a company's decision to do so was reasonable) could expose a company to other risks such as reputational harm from concerned parties or criticism from non-governmental organizations, which could have a real tangible or intangible impact on a company's brand or operations. In addition to vagueness, these triggering criteria potentially raise a second Due Process concern: it is a fundamental principle that individuals or entities should only be held liable for their own actions and inaction. Unless CARB places proper guardrails on these criteria, they can create situations where one corporate affiliate is held responsible for those of a separate entity. 057.10

[10] *See* Cal. Air Resources Bd., *California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs: Frequently Asked Questions About Regulatory Development and Initial Reports* at 8 (Nov. 17, 2025), https://perma.cc/2YQC-58A2. [hereinafter "FAQ"].

CARB should resolve these constitutional concerns and provide an unambiguous definition of "doing business in California." CARB should revise the proposed definition to clarify that if only a subsidiary of an entity is subject to the 200s, the laws' reach does not extend to the parent, and such determination is not undermined by shared services or intercompany arrangements between parents and subsidiaries. CARB's regulations must be clear and provide fair notice to those it seeks to regulate to avoid being deemed unconstitutional on Due Process grounds. If necessary, CARB should include examples in the preamble to any final rule that demonstrate that actions of one subsidiary or corporate affiliate cannot be attributed to the parent or other affiliated entities when determining whether an entity meets the reporting thresholds. 057.11

B. The proposed regulations impermissibly regulate out-of-state conduct.

Due Process is not the only constitutional concern within CARB's proposal. The Constitution affords Congress the exclusive power to "regulate Commerce . . . among the several States." U.S. Const. art. I, § 8, cl. 3. Implicit in this power is the prohibition against States "impos[ing] undue burdens on interstate commerce." *Nat'l Pork Producers Council v. Ross*, 6 F.4th 1021, 1026 (9th Cir. 2021) (quoting *South Dakota v. Wayfair*, 585 U.S. 162, 173 (2018)), *aff'd*, 598 U.S. 356 (2023). This limitation is designed to prevent "purposeful discrimination against out-of-state economic interests," and extends to the regulation of commerce taking place "wholly outside of [a] State's borders, whether or not the commerce has effects within the State." *Nat'l Pork Producers Council v. Ross*, 598 U.S. at 371–72; *Daniels Sharpsmart, Inc. v. Smith*, 889 F.3d 608, 614 (9th Cir. 2018) (quoting *Healy v. Beer Inst.*, 491 U.S. 324, 336 (1989)). The critical inquiry in assessing a law's validity on these grounds is whether the regulation, in effect, "control[s] conduct beyond the boundaries of the State." *Smith*, 889 F.3d at 614 (quoting *Healy*, 491 U.S. at 336).

CARB's proposed regulations fail that test. Though CARB has attempted to tie the regulated conduct to California, the regulations still impose an impermissible extraterritorial reach and require reporting for emissions and climate risks that may occur well outside California's borders. Under CARB's definition, the mere existence of a subsidiary might compel conduct by parent companies transacting entirely outside of the state. Not only would that parent have to disclose emissions and other climate-related information related to the California subsidiary, but it might also be required to disclose such information related to its own nationwide or even international operations. It would violate basic notions of federalism to attempt to apply these disclosure requirements to out-of-state parent companies based on what can be a tenable nexus to California through a subsidiary. CARB should therefore clarify the definition of "doing business in California" to ensure it does not reach out-of-state businesses solely on the basis of a subsidiary that has operations in-state. CARB should provide additional guardrails in any final rule to address this issue. 057.12

III. The proposed regulations and guidance to implement SB 261 are insufficient to inform regulated entities how to comply with the rule 057.13

The constitutional concerns do not end with assessing whether a company must comply in the first place. Even assuming a company can navigate that first hurdle, CARB's proposed framework for submitting reports under SB 261 lacks both the clarity and specificity to provide

companies with sufficient direction to allow them to submit compliant reports. CARB's guidance provides superficial guidelines for filing compliant reports, stating that its framework for SB 261 reports is "largely based on TCFD."[11] And the items that CARB lists as minimum requirements for disclosure generally align with TCFD's broad recommendations for climate-related risk disclosure. CARB further states that, at least for the first-year reports are due, reports that are "compliant with TCFD 2017" are also compliant with obligations under SB 261 with respect to content of the reports, initially appearing to offer comfort to regulated entities.[12]

However, the authors of SB 261 appear to have forgotten a key point—that the TCFD is a *voluntary* reporting regime, and not a regulatory regime. In other words, the TCFD provides considerable room for individual company discretion in determining what to report. The TCFD, on its own, does not impose any enforceable requirements and outlines only disclosures or analyses an entity might "consider" including in its reports. Importantly, there is no body charged with authoritatively interpreting TCFD and scrutinizing individual TCFD reports, companies' approaches and therefore no authoritative voice indicating just what is and is not "compliant" with the TCFD.

As a result, "compliant" TCFD reports differ significantly across the board. Consider, for example, TCFD's recommendation with respect to scenario analyses to evaluate the impacts of climate change on a business. TCFD recommends that entities evaluate a "2° C or lower scenario in addition to two or three other scenarios" relevant to their circumstances.[13] . Bayer's 2024 TCFD Report, for example, evaluated only two climate scenarios.[14] Liberty Mutual's 2023 TCFD Report, by contrast, assessed four.[15] Banner Bank's considered only one.[16] Some entities may submit reports without any scenario analysis at all, and some undertake a more comprehensive and detailed analysis than others. TCFD reports vary in other ways, too. Some, like Bank of America's, carefully walk through every metric that TCFD advises giving consideration to, while AT&T's is much more succinct.[17]

But which, if any, of these TCFD reports would comply with SB 261? Will CARB accept all of these approaches, or only a more limited subset? And, more importantly, how would a regulated entity *know* if it complies, and how would a company know whether it was likely to see an enforcement action against it for inadequate disclosure? CARB's proposal, which directs entities to take into account "various climate scenarios,"[18] is unclear. This broad wording, along with the rest of CARB's superficial guidance, thus leaves companies in an inappropriate

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[11] *Checklist*, *supra* note 5, at 3.
[12] FAQ, *supra* note 11, at 12.
[13] TCFD, *supra* note 2, at 27–28.
[14] Bayer Group, *Task Force on Climate-Related Financial Disclosures (TCFD) Report 2024* at 5 (Mar. 5, 2025), https://www.bayer.com/sites/default/files/2025-03/bayer-tcfd-report-2024.pdf.
[15] Liberty Mutual Insurance, *2023 Task Force on Climate-Related Financial Disclosures Report* at 21, https://www.libertymutualgroup.com/documents/tcfd-2023-report.pdf.
[16] Banner Bank, *TCFD Report 2024*, at 7, https://www.bannerbank.com/-/media/project/banner-bank/dotcom/pdfs/tcfd_ada.pdf?.
[17] *See* Bank of America, *Managing our Transition to a Sustainable Future* (Nov. 16, 2023), https://about.bankofamerica.com/content/dam/about/report-center/esg/2023/2023_TCFD_Report.pdf; AT&T, *Task Force on Climate-related Financial Disclosures (TCFD) Index* (last updated Aug. 9, 2023), https://sustainability.att.com/reports/reporting-frameworks/tcfd.
[18] *Checklist*, *supra* note 5, at 6.

conundrum – how to discern the adequacy of *voluntary* subjective requirements for a legally compulsory disclosure? CARB is thus empowered with inappropriate discretion to determine whether a TCFD report complies with SB 261, and companies have no way of knowing whether their reporting is likely to be deemed sufficient. SB 261 does not clearly describe what kind of (or whether a) scenario analysis is required; it does not specify which considerations and recommendations from TCFD an entity must implement. Against this backdrop, SB 261 fails to offer entities a way to know with certainty whether their reports will ultimately be deemed compliant. This creates fundamental Due Process problems for a law that includes enforcement discretion and provides for the imposition of penalties, making it likely that enforcement will be inconsistently applied and thus would be arbitrary and capricious.

It would seem (although again, it is far from clear) that CARB views minimum alignment with TCFD's four pillars as a practical floor, but without defined and comprehensive parameters, it remains unclear to entities how to build out their disclosures in a manner that CARB will consider compliant. For example, after the first year of reporting, where entities initially indicated gap disclosures in their reports, does CARB expect those gaps to be filled in? And by when? If a company has not conducted scenario analysis, are they expected to do so? What constitutes full alignment with the TCFD? CARB's lack of guidance fails to provide entities with any reasonable opportunity to know and understand what compliance looks like and will, therefore, result in continued increased costs for entities and fear of selective or arbitrary enforcement. If CARB determines that a report is insufficient, a company seemingly would have little success in challenging that determination owing to the significant discretion CARB has bestowed upon itself. Companies might be then forced to incur significant funds trying to remedy their reports (to meet an unknown standard) or pay heavy penalties—costs that could have been avoided were reporting requirements clear to begin with.

CARB should thus revise its regulations and guidance to clearly and unambiguously outline the precise requirements and minimum standards for a compliant report under SB 261, including specifying which TCFD recommendations an entity must implement, if any, so companies are fairly put on notice of their reporting obligations.

IV. Reporting frameworks proposed to implement SB 253 diverge from established practices and thus with the intent of the law.

057.14

CARB should decline to impose a standardized approach to GHG reporting or require reporting through a mandated template. As discussed above, many public companies that could be subject to SB 253 have long made efforts to measure and inventory their GHG emissions data, often on a consolidated basis at the parent level of an organization. Requiring companies to diverge from their well-established practices thus threatens to impose substantial—and unnecessary—compliance costs on regulated entities with no clear benefits.

The Chamber objects to the submission of SB 253 reports under a mandatory template, which would create unnecessary burdens for companies already complying with the spirit of the law. CARB's own guidance recognizes the uncertainty and implementation difficulties inherent in complying with SB 253.[19] The guidance allows companies to submit emissions reports already

[19] FAQ, *supra* note 11, at 9–10.

prepared through another voluntary or regulatory program or pursuant to its own annual reporting methods for the first reporting period to "reduce uncertainty." CARB should maintain this approach as it finalizes its regulations. Many companies that would be subject to reporting obligations under SB 253 already maintain established inventories, participate in voluntary reporting programs, and have invested significant resources into calculating emissions data based on those protocols.

Adopting this approach would align with the intent of the law as well. Legislators recognize that many businesses already invest significant resources into inventorying and calculating their emissions. SB 253 thus requires CARB to structure emissions reporting "in a way that minimizes duplication of effort and allows a reporting entity to submit to the emissions reporting organization reports prepared to meet other national and international reporting requirements."[20] Allowing companies to submit reports based on existing inventories and frameworks would ensure consistency and reduce compliance burdens of the law.

V. CARB should implement its proposed exemptions, some of which in an expanded form.

057.15

We support CARB's proposed exemption for government entities and companies that are majority-owned by government entities. CARB should clarify that this proposed exemption includes subdivisions of governments—such as a political subdivision of a state. Each such entity is not a "business entity" under the plain meaning of that phrase.

Additionally, we support CARB's proposed exemption for a business entity whose only activity within California consists of wholesale electricity transactions. As acknowledged by CARB, this exemption is consistent with the letter of intent from the lead sponsors of SB 253 and SB 261. CARB should clarify that this proposed exemption includes bilateral sales or purchases of electric power or other energy commodities or energy services (such as transmission) that occur in interstate commerce. Such sales or purchases are a type of wholesale electricity transaction. CARB should also include renewable energy certificates transactions (as such transactions support renewable energy projects and, consequently, should not be discouraged in any manner) and carbon offset transactions (as AB 1305 already accounts for disclosures about these transactions) within this proposed exemption. CARB should also expand the "do not count for purposes of determining an entity's sales in California" language at § 96072(a)(8) of the proposed regulations in order to account for these concepts.

057.16

057.17

Also, we support CARB's proposed exemption for non-profits and charitable organizations that are tax-exempt under the Internal Revenue Code. As correctly stated by CARB, such organizations "do not fall within the legislative intent of corporate disclosures and would not have reportable revenue according to section 96072(a)(13)."[21] The same rationale applies for not-for-profit organizations that are tax-exempt under the Internal Revenue Code. Therefore, such not-for-profit organizations should also be included within this proposed exemption.

057.18

057.19

[20] Cal. Health & Safety Code § 38532(c)(1)(D)(i).
[21] California Air Resources Board, Staff Report: Initial Statement of Reasons, Dec. 9, 2025, pg. 6.

Further, we support CARB's proposed exemption for business entities whose only business in California is employee compensation or payroll expenses, including teleworking employees. These out-of-state business entities have a minimal and tenuous connection with—and environmental impact within—California.[22] 057.20

VI. CARB should ensure regulated entities have sufficient time to comply with climate-related disclosure requirements.

Lastly, should the 200s survive judicial scrutiny, CARB should provide regulated entities with a grace period to come into compliance with reporting requirements. While compliance with SB 261 reports (initially due January 1, 2026) have been temporarily stayed and the regulations propose a deadline of August 10, 2026, for initial reporting under SB 253, requiring fully compliant reports by this deadline is unreasonable given ongoing challenges to the validity of the laws and the compliance costs entities must incur. Both SB 253 and SB 261 continue to be embroiled in litigation over constitutional concerns, and on November 18, 2025, the U.S. Court of Appeals for the Ninth Circuit enjoined enforcement of SB 261.[23] Importantly, the litigation centers around the validity of the laws. Companies cannot reasonably know whether the laws will be upheld nor, as discussed above, what their obligations under these laws would be. To make disclosures on time, companies must necessarily build out staff and infrastructure, engage advisors, and develop protocols months in advance to collect and process information. It would be fundamentally unfair to require companies to continue to incur substantial costs in trying to determine their compliance obligations and prepare reports based on vague regulations arising out of statutes that may ultimately be found to be unconstitutional. 057.21

CARB should thus continue to delay enforcement for a period of at least one year for any required submission under or enforcement of the 200s following the final promulgation of the regulations or final court adjudication. During this period, CARB should exercise its discretion to not take enforcement actions against companies who are unable to submit reports or who submit reports perceived to be noncompliant. Companies must be afforded sufficient time to review the final rule and accurately assess their disclosure obligations and determine how to comply.

The Chamber and AMC appreciate your time in considering these comments.

Sincerely,

Danny Seiden
President and CEO
Arizona Chamber of Commerce & Industry

[22] We also support CARB's proposed exemption for a business entity that is subject to regulation by the Department of Insurance in California, or that is in the business of insurance in any other state, but do not have further comments on this proposed exemption.

[23] Order, *U.S. Chamber of Commerce v. Randolph*, No. 25-5327 (9th Cir. Nov. 18, 2025), Dkt. No. 44.

7724 E. Panama Lane
Bakersfield, CA 93307–9210
www.kernenergy.com
661–845–0761

VIA ELECTRONIC POSTING
https://carb.commentinput.com/?id=ekNF7gTx2h

February 9, 2026

Clerk of the Board
California Air Resources Board
1001 I Street
Sacramento CA, 95814

Dear Sir or Madam:

Kern Energy (Kern) is providing comments on the California Air Resources Board's (CARB) proposed regulations implementing the Corporate Climate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Act (SB 261). While this regulatory package is positioned as establishing the fee programs for these two programs, it further establishes key foundational components critically related to the broader implementation of these laws. Kern is specifically commenting on the following aspects: (1) Reporting Deadline for Emissions Data Under SB 253 is Untimely and (2) Definitions of Covered Entity and Reporting Entity Do Not Adequately Account for Volatile Business Sectors.

Kern operates a 27,000 barrel per day refinery located in California's San Joaquin Valley that has been in continuous operation for more than 90 years. A family-owned and operated company with 200 employees, Kern plays an important role in leveling the supply and price playing field for petroleum products in the San Joaquin Valley, supplying critical transportation fuels to agricultural operations, major transportation corridors, local industry, and the public - all while facing stiff competition from much larger refiners in Los Angeles and San Francisco . Kern fills a critical space as the last small refinery producing CARB's unique reformulated gasoline (CaRFG) and diesel which underscores the significant challenge of operating a small refinery in California.

1. **Reporting Deadline for Emissions Data Under SB 253 is Untimely**

058.1 The proposed regulation establishes August 10, 2026, as the first deadline for all reporting entities to submit the emissions data required under SB 253, which Staff indicates should streamline reporting responsibilities by aligning with the existing verification deadline under the existing Mandatory Reporting Regulation (MRR). Kern respectfully requests the reporting deadline instead be no earlier than September 10.

Kern appreciates Staff's goal of streamlining reporting responsibilities and timing for entities subject to MRR and corporate climate emissions reporting, however establishing August 10 as the reporting deadline will have the opposite effect. SB253 requires entities to report emissions data based on the fiscal year, while MRR and required verification use data based on the calendar year. This collection and verification of compliance data for a single report requires immense working hours across multiple departments within an organization. Aligning these due dates will actually create the additional burden of meeting two separate and equally intensive regulatory deadlines simultaneously. For a small refinery with a relatively limited support staff and resources, the duplicity of MRR verification and reporting SB 253 emissions data will fall on the shoulders of the same personnel. Pushing the corporate climate emissions reporting deadline back to September or later will allow Kern's staff to attentively work through the MRR verification process and adequately transition to SB 253 emissions reporting, resulting in a more timely and accurate completion of both.

2. **Definitions of Covered Entity and Reporting Entity Do Not Adequately Account for Volatile Business Sectors**

Kern encourages Staff to reexamine the proposed definitions for "Covered Entity" and "Reporting Entity," as proposed in Section 96202(a), and provide for the most recent three fiscal years of an entity's revenue for determining applicability under these new regulations. As these definitions are proposed, two fiscal years is simply inadequate for determining whether an entity's revenue exceeds the applicable threshold. Kern recognizes Staff's intent to mitigate the potential for entities to cycle in and out of the programs due to unforeseeable or one-off type scenarios, and cautions Staff that two years is too narrow to achieve this objective.

058.2

In both the Initial Statement of Reasons and the Informative Digest of Proposed Action, Staff note these programs are targeted at large entities; however, revenue is only one of many metrics that can assess the size of an entity. Revenue alone serves as a poor proxy for the size of an organization, its emissions profile, or its ability to absorb new compliance costs. In the example of the high-volume/low-margin nature of the refining industry, and the volatile nature of two independent commodity markets, make gross revenue inaccurate in depicting the size of the business entity. Kern understands CARB must account for revenue because this metric is prescribed in the law, and believes this requirement further underscores the need to allow for no less than a three-year review of fiscal year revenue to determine program applicability.

Kern appreciates CARB's consideration of Kern's comments. As always, Kern is committed to working with Staff throughout this regulatory process. Please do not hesitate to reach out to me or Brooke Holland at (661) 845-0761 with any questions.

Sincerely,

Melinda Palmer
VP – Regulatory & Public Affairs
Kern Energy

Carbon Accountable (Michael Schmitz)

Carbon Accountable has been deeply involved in providing legal and technical support for this legislation since its inception in 2021. We strongly believe these landmark laws will help usher in a new era of corporate transparency and provide critical decision-useful climate information to investors, consumers, and the public. We want to thank CARB for its diligent work on
059.1 implementation and for the robust opportunities provided for stakeholder engagement, including numerous workshops and information solicitations.

Attached are Carbon Accountable's comments on the proposed regulation.

February 9, 2026

Chair Lauren Sanchez
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Comments on Initial Proposed Regulation for SB 253 and SB 261

Submitted via CARB public docket

Dear Chair Sanchez and Members of the Board,

Carbon Accountable appreciates the opportunity to provide comments on the California Air Resources Board's (CARB) initial proposed regulation for the Climate Corporate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Act (SB 261). As an original co-sponsor of SB 253, Carbon Accountable has been deeply involved in providing legal and technical support for this legislation since its inception in 2021. We strongly believe these landmark laws will help usher in a new era of corporate transparency and provide critical decision-useful climate information to investors, consumers, and the public. We want to thank CARB for its diligent work on implementation and for the robust opportunities provided for stakeholder engagement, including numerous workshops and information solicitations.

The following are our comments on the proposed regulation.

1. Definitions: "Doing Business in California"

Carbon Accountable strongly supports the definition of "doing business" and "doing business in California" set forth in proposed § 96072 which incorporates by reference California Revenue and Taxation Code (RTC) § 23101. By using the definition provided by established state tax law, CARB provides a clear, objective, and verifiable standard. This approach avoids ambiguity and ensures that the regulation properly applies to entities with a meaningful economic nexus to the state and minimizes administrative burden. 059.2

2. Definitions: "Parent" and "Subsidiary"

We also support the inclusion and definition of the terms "Parent" and "Subsidiary" in § 96072(a)(10) and § 96072(a)(16) respectively. It makes sense for CARB to align these definitions with Title 17, California Code of Regulations, § 95833, ensuring consistency with the Cap-and-Invest program. Establishing a clear scope of corporate relationships is necessary to accurately identify entities within complex corporate structures and appropriately determine reporting obligations. This alignment promotes regulatory consistency and closes potential loopholes that could otherwise allow entities to obscure their control over subsidiaries to evade compliance. 059.3

3. Applicability and Exemptions

Carbon Accountable has reviewed the applicability provisions in § 96071 and supports the proposed exemptions for tax-exempt non-profit organizations, government entities, and business entities whose only California activity consists of wholesale electricity transactions or teleworking employees. These exclusions are entirely consistent with the legislative intent of SB 253, which was designed to capture the emissions of major commercial enterprises rather than governmental or charitable bodies. However, given that insurance companies are clearly within scope based on the definition of reporting entities, the proposed insurance company exemption is not in conformance with the statutory language and the intent of the law as enacted. Throughout the legislative process supporters of SB 253 made clear the importance of ensuring a level playing field, where all commercial entities that meet the definition of reporting entity would be treated the same. We urge the CARB to reconsider its approach with respect to the application of the law to insurance companies to ensure even-handed application of this important statute.

059.4

059.5

4. Fee Enforcement

Finally, we express our support for the robust fee enforcement mechanisms outlined in § 96075. The inclusion of late fees, the treatment of each day of non-payment as a separate violation, and the authority to seek injunctions are essential tools for maintaining the integrity of the program. Additionally, we support the provision allowing the Executive Officer to contract with external entities, such as the Franchise Tax Board, for auditing purposes. These measures ensure that the costs of implementation are borne fairly by all covered entities and that non-compliance does not result in a financial advantage.

059.6

Thank you for your consideration of these comments. Carbon Accountable remains committed to supporting CARB in the successful implementation of these world-leading disclosure programs.

Sincerely,

Carbon Accountable

Community Health Group

February 3, 2026

Submitted electronically via the Public Comment Form

Jordan Ramalingam, Chief
Climate Data and Risk Reporting Branch
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulations – Comment from Community Health Group

Dear Chief Ramalingam:

Community Health Group (CHG) appreciates the opportunity to comment on the California Air Resources Board's proposed rule. CHG supports the Board and the Legislature's exclusion of nonprofit entities from SB 253 and SB 261 reporting to minimize administrative burdens.

CHG is an independent, not-for-profit Medi-Cal and Medicare managed care health plan serving nearly 354,000 members in San Diego County since 1982.

060.1 CHG supports the Board's efforts to establish consistent greenhouse gas reporting and climate-related financial risk disclosures for covered for-profit entities and appreciates that both the Board and the Legislature have excluded nonprofit entities to minimize their administrative burdens.

As the Board continues refining the regulation and preparing for program implementation, CHG respectfully requests consideration of a simple process that entities may use to confirm or document their exempt status under the program (e.g., through a reporting portal or a brief attestation). 060.2

CHG appreciates your consideration of these comments and looks forward to continuing to work with the Board on this important issue.

Sincerely,

Ann Warren
Associate CEO
Community Health Group

CALIFORNIA MANUFACTURERS & TECHNOLOGY ASSOCIATION

Submitted electronically via CARB Comment Portal

February 9, 2026

Lauren Sanchez, Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: CMTA Feedback on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Chair Sanchez:

On behalf of the California Manufacturers & Technology Association (CMTA), which represents small, medium, and large manufacturers operating across California, we appreciate the opportunity to comment on CARB's draft regulations to implement Senate Bill 253 (Climate Corporate Data Accountability Act) and Senate Bill 261 (Climate-Related Financial Risk Act).

CMTA believes it is essential that the implementing regulations for SB 253 and SB 261 be clear, workable, cost-effective, and legally durable, particularly given the scale, complexity, and cumulative compliance obligations already facing California manufacturers.

1. Regulatory Timing and Legal Uncertainty

CMTA acknowledges CARB's decision not to enforce the first reporting deadline under SB 261 in light of the Ninth Circuit's November 18, 2025, order enjoining enforcement of that statute. We appreciate CARB's recognition of the legal uncertainty surrounding SB 261. However, we are concerned about the continued development of compliance tools, voluntary reporting dockets, and fee structures. At the same time, the statute remains enjoined, which may create confusion and de facto pressure on regulated entities to prepare for obligations that may ultimately be modified or invalidated. Manufacturers depend on regulatory certainty to make long-term operational and investment decisions. 061.1

We urge CARB to clearly distinguish between voluntary and mandatory actions under SB 261 and to avoid regulatory approaches that effectively assume the law's enforcement prior to resolution of the litigation.

2. First-Year Scope 1 and Scope 2 Reporting Deadline 061.2

CARB's proposal to require Scope 1 and Scope 2 emissions reporting by August 10, 2026, raises significant implementation concerns. While SB 253 requires reporting in calendar year 2026, it does not specify a deadline. Manufacturers, particularly those with complex operations, multiple facilities, or limited internal data systems, will need sufficient time to collect, validate, and harmonize emissions data across business units.

Furthermore, the technical and administrative burden of these disclosures continues to increase as the underlying standards (such as Greenhouse Gas Protocol (GHGP)) evolve. Revisions to the GHGP currently under consideration would make Scope 2 reporting increasingly complex. This burden, compounded significantly by the addition of Scope 3 reporting requirements to the mandate, requires more time to gather, verify, and assure the emissions data.

CMTA recommends that CARB:

- Provide additional flexibility for first-year reporting, including an extended or phased deadline, such as December 31, 2026, for the initial 2026 report; and 061.4
- Clearly articulate enforcement discretion and safe harbors for entities that make good-faith efforts using the best available data. 061.5
- Establish a clear regulatory framework for how emissions information must be reported.

Specifically, CARB should develop standardized reporting templates or forms to promote consistency, reduce administrative burden, and minimize the risk of inconsistent submissions across entities. In addition, CARB should specify the accepted emissions accounting methodologies and emission factor sources that regulated entities must use, including whether CARB will rely on established standards such as IPCC, U.S. EPA, IEA, or another defined framework. Clear direction on reporting format and technical standards will be essential for accurate, comparable, and verifiable disclosures. 061.6

3. SB 261 Reporting Framework and Standards

With respect to SB 261 climate-related financial risk disclosures, CMTA similarly urges CARB to provide a defined regulatory framework for how manufacturers should report required information. CARB should develop standardized templates or structured reporting formats to ensure clarity and comparability across submissions while reducing unnecessary compliance complexity. 061.7

CMTA also requests that CARB clearly identify the accepted disclosure standard entities are expected to follow. This disclosure should specify whether CARB intends to align with established national or international frameworks—such as the Task Force on Climate-related Financial Disclosures (TCFD)—or with another clearly defined reporting standard.

Early clarity on the governing framework will allow companies to design internal processes, avoid duplicative reporting, and ensure disclosures are decision-useful for regulators and stakeholders.

4. Program Scope and Exemptions

CMTA supports CARB's proposed exemptions for government entities, nonprofit organizations, telework-only entities, and wholesale electricity transactions. These exemptions appropriately limit the programs' scope to entities with a meaningful operational presence in California. 061.8

However, CMTA requests additional clarification regarding:

- How "doing business in California" will be applied to manufacturers with limited sales or distribution activity in the state; and
- How parent-subsidiary relationships will be treated where emissions data and financial risk management are decentralized. 061.9
- Whether, and to what extent, manufacturers with facilities located entirely outside of California would be subject to program requirements based solely on downstream sales or market participation.

Clear, objective guidance is essential to ensure the program remains focused on in-state environmental concerns, avoids extraterritorial regulation of out-of-state manufacturing activities, and prevents inconsistent interpretations or duplicative reporting obligations.

5. Fee Calculation

CMTA requests clarification on how CARB intends to determine the number of entities subject to SB 253 and SB 261 for purposes of calculating the proposed fee. CARB staff acknowledged during the November 2024 public workshop that its preliminary effort to determine the number of covered entities was significantly flawed and that CARB was unable to accurately determine the number of entities that fall within the scope of either law. Staff also emphasized that it "must accurately identify all entities subject to the 200s on an annual basis for fee purposes, including revenue and doing business," and indicated that it may rely on a subset of Franchise Tax Board data. (See SB 253 261 Nov Workshop Slides (Updated).) 061.10

However, CARB staff had previously advised that the Franchise Tax Board may be legally precluded from sharing the necessary data with CARB. (See Virtual Public Workshop on SB 253, SB 261, and SB 219 - August 21, 2025 recording at 1:15; SB 253/261/219 Public Workshop: Regulation Development and Additional Guidance.) Has CARB resolved this legal issue? If not, how will CARB ensure that its determination of the number of covered entities and reporting entities is accurate?

6. Per Entity Fee Assessment

CMTA requests that CARB revise its proposal to assess fees against each reporting entity and each covered entity to incentivize reporting at the parent company level and to reflect CARB's program implementation costs more accurately. By encouraging subsidiary entities to report at the parent company level, CARB would reduce its own administrative burden by reducing the number of reports it must review and evaluate and would more equitably distribute program implementation costs across reporting and covered entities. 061.11

CARB can achieve this by assessing fees based on the number of reports it expects to receive: a single fee for any entity submitting a report for itself only, and a single fee for groups of entities reporting under a single, parent-level report.

7. Cumulative Regulatory Burden on Manufacturers

California manufacturers are already subject to extensive climate, energy, and reporting requirements, including Cap-and-Invest compliance, air district permitting, energy efficiency mandates, and supply chain disclosures. SB 253 and SB 261 add substantial new layers of cost and administrative burden without clear alignment to existing programs. Manufacturers also face risks due to the requirement to incorporate data from third-party organizations into an entity's value chain to report under SB 253. 061.12

To alleviate the burdens associated with these risks, CMTA strongly encourages CARB to:

- Include a safe harbor for reasonable estimates of emissions where an entity makes reasonable efforts to obtain accurate data, uses appropriate estimation techniques where direct data is not obtainable, and transparently discloses the use of estimates and associated uncertainty. 061.13
- Align definitions, methodologies, and reporting structures with existing state and federal programs wherever possible; and 061.14
- Minimize duplicative or conflicting requirements that do not directly advance emissions reductions. 061.17

CMTA appreciates CARB's engagement with stakeholders and its efforts to provide early guidance. We suggest that CARB continue to engage regularly with stakeholders throughout the program's implementation to help identify and resolve problems that arise and to make program implementation more efficient. We respectfully request that CARB refine the proposed regulations to provide greater clarity, flexibility, and proportionality, particularly for manufacturers that form the backbone of California's economy and clean energy supply chains. We look forward to continued engagement as this rulemaking and program implementation move forward. 061.15 061.16

Sequent Energy Management (Erin Sullenger)

Please see attached comments from Sequent Energy Management. Thank you.

February 9, 2025

California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Comments on Proposed Regulations for California Climate Disclosures Reporting under SB 253 and SB 261

Dear California Air Resources Board,

Sequent Energy Management, LLC ("Sequent"), a subsidiary of The Williams Companies, appreciates the opportunity to provide comments on the regulations proposed by the California Air Resources Board ("CARB") on December 9, 2025, to implement Senate Bill 253 (Climate Corporate Data Accountability Act) and Senate Bill 261 (Climate-Related Financial Risk Disclosure Program), as amended by Senate Bill 219.

Sequent is a marketer of natural gas that serves customers across the United States, including customers in California. Our business model is centered on the wholesale marketing of energy commodities, and our operations are conducted entirely outside California's borders. Importantly, Sequent has no physical presence in the state as it does not own or operate infrastructure or physical assets within the state, nor does it have any personnel in California. It transacts only at wholesale market delivery points associated with interstate commerce (i.e. citygate hubs) and not with end users in the state.

Since the passage of SB 253 and SB 261, Sequent has tracked CARB's regulatory activity related to implementing reporting programs for these disclosure requirements and participated in the pre-rulemaking comments and attended the webinars. Sequent is concerned that CARB is not accounting for companies like Sequent that have only minimal connections to the state. Accordingly, Sequent submits the following comments urging CARB to ensure its regulations focus only on entities with a genuine California operational nexus, while minimizing unintended burdens on non-resident wholesale market participants.

1. CARB Must Provide Parity for Non-Resident Natural Gas Marketers Without a Physical Presence in California by Adopting an Exemption for Wholesale Natural Gas Transactions.

062.1 As currently proposed, CARB's draft regulations exempt business entities whose only activity within California consists of wholesale electricity transactions. CARB should expand this exemption to include wholesale natural gas transactions. California's climate disclosure laws—SB 253 and SB 261—were enacted to enhance transparency around corporate greenhouse gas emissions and climate-related financial risks. The stated intent is to provide California

consumers, investors, and regulators with consistent, reliable data to assess the environmental impact and economic resilience of companies operating within the state. These laws are designed to target entities with a meaningful presence in California whose activities directly contribute to the state's emissions profile or financial exposure to climate risks. However, this legislative purpose does not support application of disclosure requirements to companies like Sequent, who do not sell directly to individual customers and have no physical assets, infrastructure, or personnel in the state. The only contact that natural gas marketers such as Sequent have with California is indirectly through the sale of bulk quantities of gas in interstate commerce at market delivery or entry points for further distribution. The two main natural gas market delivery points in California are PG&E Citygate (serving Northern and Central California) and SoCal Citygate (serving Southern California).

The proposed regulations already contemplate and particularly account for the fact that the wholesale energy market does not have a sufficient nexus with California to justify disclosure requirements by exempting wholesale electricity transactions. Article 6, Subarticle 1, Section 96071. Applicability, Subparagraph b, includes an exemption for any "business entity whose only activity within California consists of wholesale electricity transactions." The proposed regulations also specifically exclude wholesale sales of electricity from a company's sales for purposes of the definition of "doing business in California."

In CARB's "Staff Report: Initial Statement of Reasons," CARB explains that the exemption for wholesale electricity transactions was included based on Senator Scott Wiener's January 30, 2024 letter published in the Senate Daily Journal regarding the legislative intent to exclude such transactions.[1] Senator Wiener's letter states that wholesale electricity transactions "that occur through the Western Energy Imbalance Market and will occur through the Extended Day Ahead Market, operated by the California Independent System Operator" were not intended to "constitute 'doing business in California.'" While Senator Wiener's letter did not address wholesale energy transactions involving natural gas, the same economic and jurisdictional logic applicable to wholesale electricity transactions applies equally to wholesale natural gas transactions at California's citygate delivery points. These citygate delivery points function identically to the electricity delivery points referenced in Senator Wiener's letter.

The California Independent System Operator ("CAISO") manages a centralized, wholesale exchange where entities transact at the grid (not with end consumers). The Western Energy Imbalance Market ("WEIM") is a real-time market operated by CAISO. It resolves the minute-to-minute mismatch between scheduled and actual electricity supply/demand across a wide footprint. Participants in the WEIM transact only in wholesale electricity. The Extended Day Ahead Market ("EDAM") is a day-ahead market extending CAISO's footprint. Participants submit bids and schedules for the next day and economically commit generation on a

[1] Staff Report, pg. 6 (citing California Legislature. (2024, January 30.) Senate daily journal, one hundred forty-second legislative day, 2023–24 regular session (p. 3057). Available at https://leginfo.legislature.ca.gov/faces/pubSenDailyJrn2.xhtml?type=doc&sessionyear=20232024&pagenum=3057&sessionnum=0&fileid=996).

region-wide basis before real-time operations. For both WEIM and EDAM, no in-state physical presence or facility is required to participate.

Wholesale natural gas transactions at California citygates (e.g., PG&E Citygate, SoCal Citygate) are entirely analogous. Citygates are interstate pipeline delivery points that, like the CAISO markets, function as regional wholesale hubs; prices at these delivery points reflect the costs of transportation from upstream hubs, and marketers, like Sequent, deliver gas at these delivery points into California's pipeline distribution systems without owning or operating infrastructure in the state. Furthermore, the wholesale electricity and natural gas markets are inextricably tied to one another. Natural-gas-fired electric generation participates directly in CAISO's WEIM and EDAM. When these markets commit a gas-fired generator in the day-ahead schedule or dispatch it in real time, that generator must secure corresponding natural gas supply and transportation. This creates a direct operational link between CAISO's electricity market commitments and the natural gas that is delivered at interstate pipeline citygates. U.S. interstate natural gas pipeline operations rely on nominations, balancing, storage, compression dispatch, and linepack management, all of which are sensitive to hourly and daily swings in power-generation demand.

Therefore, WEIM's real-time dispatch and EDAM's day-ahead unit-commitment processes drive upstream gas nominations, intra-day balancing, and citygate flows. The natural gas market's hub-and-citygate structure where gas is delivered from interstate pipelines into local networks functions as the fuel-supply analogue to CAISO's market dispatch: both are wholesale, interstate transactions that support power-sector operations with no in-state physical presence.

Wholesale gas marketers such as Sequent, just like entities whose only business in California consists of wholesale electricity transactions, operate entirely outside California's borders and do not engage in activities that generate emissions or economic activity within the state beyond a financial transaction. Including such entities within the scope of these laws and proposed regulations would dilute the focus of the regulations and impose burdens on companies whose connection to California is not only minimal, but purely transactional. Furthermore, including wholesale natural gas transactions within the scope of the law while exempting wholesale electricity transactions would burden one segment of the wholesale energy market while benefitting another. CARB should therefore ensure parity between wholesale electricity transactions and wholesale natural gas citygate transactions by including wholesale natural gas transactions within the existing proposed exemption for wholesale electricity transactions to remain consistent with the Legislature's stated intent.

2. CARB Should Establish a De Minimis Exemption Based on the Portion of a Company's Total Revenue Generated in California.

062.2 To ensure proportionality, CARB should establish an exemption for companies with minimal financial contacts with California. In its September 2025 pre-rulemaking comments, Sequent urged CARB to consider a de minimis threshold of 5%, meaning a minimum of 5% of a company's total revenue must be generated within California, below which entities would be

exempt from reporting requirements. To put this in perspective, Sequent's California-related revenue represented less than 0.07% of its total gross revenue in 2024 (and an even smaller percentage in 2025). And yet, Sequent's de minimis financial relationship with California could subject it to an undue burden of complying with these climate disclosure regulations. This is contradictory to the intent of the laws and contrary to CARB's stated intent for excluding other minimal relationships with the state. Establishing a de minimis threshold would allow CARB to focus its regulatory efforts on entities with meaningful in-state operations or business relationships while avoiding undue burdens on out-of-state businesses with minimal California activity, minimizing risk of regulatory overreach and associated litigation.

Sequent again urges California to adopt a de minimis threshold when defining "revenue." When discussing the definition of revenue in the Staff Report, CARB focused on a definition to "identify[] companies that may potentially have large operations and associated carbon footprints." Further, CARB has already recognized that there are de minimis contacts with California that should be exempt from disclosures; CARB excluded thresholds for real property and tangible personal property and compensation in the state tax code when defining "doing business in California" because including those thresholds "would bring companies into the regulation's scope with marginal operations in California that are beyond the intent of the legislation." These statements acknowledge that California is sensitive to the impact on businesses that have a de minimus relationship with the state. Yet, the proposed regulation fails to include a de minimis financial exemption. This oversight must be corrected.

3. A Tax Nexus is not the Correct Proxy for an Environmental Regulatory Program.

CARB's December 2025 proposed regulations align the applicability definitions with California tax-code concepts. While Sequent appreciates CARB's effort to provide clarity, relying on tax-filing constructs that were designed for fiscal purposes risks sweeping in entities that have no physical, operational, or emissions-related nexus to the State. Using the tax filing constructs that CARB has proposed, Sequent would trigger disclosure requirements because its wholesale transactions of natural gas to the citygates exceeds the "sales" thresholds set forth in California Revenue and Taxation Code section 231010(b)(2). Yet, Sequent is not 'at home' in California, has no facilities, assets, or personnel in California, sells only at wholesale market delivery points, and derives a de minimis share of its total revenue from California. Regulating entities like Sequent that operate exclusively outside of California, based solely on incidental wholesale transactions completed in interstate commerce, risks creating extraterritorial effects that are excessive in relation to the local benefits, raising dormant commerce clause and personal jurisdiction concerns.

062.3

California's Revenue & Taxation Code definition of "doing business" was developed to allocate tax liability, not to identify which entities have a meaningful environmental or operational nexus with the state. This tax nexus is poorly calibrated with the purpose of California's climate disclosure laws and is legally fragile under due-process minimum contacts principles. Both the climate disclosure laws and CARB's proposed regulations improperly seek

to regulate behavior that occurs beyond the state's borders by relying on two variables: a revenue threshold determined by total revenue (within and without of California's borders) and a tax filing nexus rather than an operational nexus to the state. Essentially, absent a de minimis exemption or exemption for wholesale natural gas transactions, and based upon CARB's minimal tax nexus definition of "doing business in California," CARB's regulations would force Sequent to make climate disclosures and file climate related financial reports, not an insignificant burden, based almost entirely on commercial activity that occurs outside of the state of California. In sum, this regulation places an undue burden on Sequent's commercial activity occurring outside of California's boundaries. This is a precarious legal position for CARB. Program applicability and enforcement should rely on in-state operational nexus, not on tax principles or other standards unrelated to an operational or environmental nexus.

Sequent respectfully requests CARB not to finalize the tax code definition of "doing business in California." Instead, CARB should craft its own definition, tailored by its role as an environmental regulator and for a program that is focused on environmental disclosures. A CARB-developed definition would provide the agency the ability to adapt the regulation to the unique and likely evolving needs of the climate disclosure program instead of being bound by lists or thresholds developed by other government agencies that are focused on fiscal, revenue, and tax-related priorities. Further, if the tax code or definition changes, that could significantly disrupt how CARB conducts this program. In short, for environmental disclosure programs, applicability must hinge on an entity's in-state operational footprint and environmental relevance, not on tax-apportionment mechanics unrelated to climate risk or jurisdictional fairness.

4. The Definition of "Doing Business in California" Should Include a Two-Year "Look Back" Period and Exclude Wholesale Sales of Natural Gas.

In the proposed rule, CARB added flexibility to the definition of "Covered entity" and "Reporting entity," key applicability-related terms for the climate disclosure laws and regulations. The proposed regulations allow for entities to evaluate the two most recent fiscal years when considering the revenue thresholds that determine applicability. Specifically, CARB states that entities "must meet the revenue threshold for two consecutive years," providing flexibility for entities that can have potentially large revenue changes that can occur from selling property or corporate assets. Sequent supports the two year "look back" period for the applicability thresholds but urges CARB to extend this to the definition of "Doing business in California."

062.4

CARB is planning to adopt part of the definition of "Doing business in California" from the California Revenue and Tax Code Section 23101(b)(2), which includes a minimum sales threshold of $735,019.[2] Just as CARB has provided flexibility for calculating revenue, CARB

[2] Sequent understands this to be the 2024 inflation adjusted sales threshold for Section 23101(b)(2), as shared by CARB in the Climate Disclosure regulation workshops.

should extend that same flexibility to calculating sales since sales generated in California, like revenues in general, can also experience large changes from year to year. Just as it has proposed for calculating revenue, CARB should also include a provision that entities must exceed the minimum sales threshold for two consecutive years in order to qualify for "doing business in California."

Additionally, the proposed definition of "doing business in California" provides that "wholesale sales of electricity do not count for purposes of determining an entity's sales in California." For the reasons set forth in Section 1 above, this definition should be revised to extend that exclusion to wholesale sales of natural gas.

062.5

5. Clear, Unambiguous Regulations are Essential.

To ensure legal clarity and enforceability, CARB must establish precise and transparent rules, particularly since CARB has indicated its desire to promote consistency across California's climate-disclosure programs. Clear rules will not only support consistent and meaningful disclosures but also ensure that enforcement actions are grounded in objective, legally defensible criteria. To the extent CARB ultimately provides materiality, documentation, or assurance guidance for SB 253, we urge that such guidance be aligned with established investor-grade standards and with existing annual financial reporting cycles to avoid duplicative workstreams. This comment is offered solely to support efficient implementation of SB 253 and does not address any requirements currently stayed under SB 261.

062.6

Conclusion

Sequent supports transparency and disclosures of material risks and information. However, CARB's proposed regulations must include a reasonable definition of "doing business in California," along with specific exemptions as outlined above, to avoid unintended reporting burdens on entities that do not operate or have a physical activity within California's jurisdiction. We appreciate CARB's efforts to engage stakeholders and the opportunity to participate in the rulemaking process.

062.7

Sincerely,

Sequent Energy Management, LLC

February 9, 2026

Lauren Sanchez, Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Subject: California Water Association Comments on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Chair Sanchez,

On behalf of the California Water Association (CWA) and its 84 member utilities, thank you for the opportunity to provide input on the California Air Resources Board's (CARB) proposed regulations on SB 253 and 261. CWA represents investor-owned drinking water utilities regulated by the California Public Utilities Commission (CPUC), serving more than 6 million Californians. Our members are committed to environmental stewardship and support the State's broader climate goals.

We urge the Board to consider the following comments during their deliberation of the proposed regulations. The implementation of SB 253 and SB 261 creates new compliance obligations for water utilities that have not historically been subject to climate reporting mandates.

CWA submits the following comments to identify areas where revisions to the regulatory proposal can help provide further clarity.

Defining "Doing Business in California" and Covered Entities

Reliance on California Revenue and Taxation Code section 23101 creates ambiguity, particularly for entities not incorporated or headquartered in California, which entities have significant operations outside of California, especially in the case of entities with some

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California Water Service

Treasurer
Jon Pierotti
Golden State Water Company

063.1

California operations whose parent companies have limited or no independent tax nexus to California. CWA would suggest that the definition of “doing business in California” be aligned so that only entities that do business in California under the California Corporations Code and that appear in the California Secretary of State’s Business Entities database would be subject to SB 253 and/or SB 261.

The regulations and definitions should offer all entities operating within California, regardless of their ownership form or structure, reasonable clarity as to whether their operations would fall within or outside the scope of the California Climate Laws.

063.2 We recommend that the “doing business in California” test be determined on an entity-by-entity basis, not including parents, subsidiaries or affiliates, rather than on a consolidated basis, which is consistent with the text of the California Climate Laws. Additionally, we would recommend that the Board clarify that, consistent with the text of the California Climate Laws, companies who may be doing business in California may elect to compute their “total annual revenues” on a standalone basis without regard to their parents, subsidiaries or affiliates. 063.14

The proposed regulations do not provide a clear mechanism for companies to challenge CARB’s determination that they are “covered entities” subject to the requirements and fees of SB 253 and SB 261. Given the significant compliance obligations, ongoing fee liability, and potential penalties associated with covered-entity status, the absence of a defined process to contest applicability raises serious due process and fairness concerns. 063.3

Reporting Timelines

The proposed regulation establishes an August 10th reporting deadline for all reporting entities to submit the emissions data required under SB 253.

CARB should adopt a “rolling” submission schedule where reports are due exactly twelve months following the close of an entity’s individual
063.4 fiscal year. This model provides the greatest degree of equity, ensuring that every reporting entity has an identical window of time to finalize and assure its data regardless of its accounting cycle. This "rolling" approach would distribute the demand for specialized technical and

assurance services throughout the calendar year, lowering costs and ensuring that each report reflects the most recent and accurate data available for that specific enterprise. Given the impending complexity of Scope 2 updates and the addition of Scope 3, providing deadline flexibility is essential for a workable regulatory framework.

Timing flexibility will also address the concern related to the limited availability of qualified third-party assurance providers. Timing constraints will further be amplified as assurance requirements transition from "limited" to "reasonable" assurance, which is a much more time-consuming process. This type of reporting presents a technical and administrative burden, which will be further exacerbated when Scope 3 reporting requirements join the mandate. At that point, the time required to gather, verify, and assure this data will necessarily and significantly increase. A rigid "one size fits all" August deadline fails to account for the prolonged data-collection cycles required for these expansive indirect emission reporting requirements and the fact that companies may operate on different fiscal year-end dates.

063.5

Additionally, CWA recommends CARB consider how reporting timelines are applied in the event of a merger or acquisition. In the event of a merger or acquisition, reporting should be limited to forward looking data only; in other words, a company should not be responsible for collecting and reporting data for a predecessor company or for a period of time prior to an acquisition. Reporting timelines should consider when a company has merged, allowing for a grace period to collect and report pertinent and relevant data.

063.6

Data collected

Certain climate-related disclosure requirements could inadvertently require reporting of various types of sensitive information, and CARB should look to restrict the risk of such disclosures. The Board should provide an exemption from supplying data if it would be confidential, proprietary or otherwise sensitive information, or if a company is prevented by applicable law from doing so, including in the case of information that may be classified or restricted due to national security concerns.

063.7

CWA recognizes that CARB does not have the same flexibility in setting the general substance of the disclosure requirements, as this was defined by the authorizing legislation; however, these standards should recognize the need for nuance and flexibility in how organizations prepare relevant disclosures.

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Fee Structure and Customer Affordability

063.8 Health and Safety Code sections 38532 and 38533 authorize CARB to assess fees solely for the purpose of recovering the reasonable costs of implementing and administering the statutory greenhouse gas reporting and disclosure programs. Nothing in these provisions authorizes CARB to recover the costs of defending regulations against judicial challenge

The methodology for calculating and assessing implementation fees in Sub article 2 of the proposed regulations raises substantial legal concerns. As designed, the fee framework exceeds CARB's fee authority under Health and Safety Code sections 38532 and 38533, and independently exhibits the characteristics of an unauthorized tax under Article XIII A of the California Constitution and a compelled subsidy of government advocacy in violation of the First Amendment. 063.9

The proposed fee framework also includes an automatic annual adjustment tied to the Consumer Price Index (CPI). While inflation indexing can be appropriate in limited circumstances, the CPI mechanism proposed here operates independently of actual program costs and therefore risks systematic overcollection in violation of both statutory fee authority and the constitutional limits on regulatory fees. 063.10 This also raises concerns with how these types of costs would be represented in the three-year cycle of general rate cases at the California Public Utilities Commission (CPUC). The potential for over collection presents an added concern for utilities, including water utilities, regulated by the PUC, which may result in utilities incurring costs that cannot be passed through or back to customers.

In addition, these regulations represent a substantial shift for regulated water utilities. Full compliance with SB 253 and SB 261 will be a significant operational and financial undertaking. For many utilities, the infrastructure, tools and expertise needed to comply are not currently in place. Data collection, internal hiring and system upgrades along with legal consultation and third-party assurance are expected to reach hundreds of thousands of dollars annually. 063.11

CWA underscores the financial burden these regulations place on California's regulated water utility customers. Many will need to augment processes and procedures to comply at the national-parent utility level. These efforts could strain budgets and often will be born by California customers and ratepayers.

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Enforcement and Penalty Provisions

The proposed enforcement and penalty framework raises serious concerns regarding proportionality, due process, and consistency with CARB's delegated authority. As drafted, the provisions expose regulated entities to excessive and unpredictable liability for technical or administrative violations, even in the absence of harm, intent, or repeated noncompliance.

The proposed enforcement provisions do not meaningfully distinguish between: willful misconduct and good-faith error, material violations and minor technical deficiencies, or first-time and repeat violations. 063.12

Absent clear mitigation standards, regulated entities face the same penalty exposure whether a violation results from intentional noncompliance or from reasonable disagreement, evolving guidance, or administrative oversight. This lack of differentiation discourages cooperative engagement with CARB, particularly during the early years of a complex, first-of-its-kind reporting regime.

Effective enforcement frameworks typically incorporate graduated penalties, safe harbors, cure periods, and explicit mitigation factors. The absence of these features here increases the risk of arbitrary outcomes and inconsistent enforcement.

CWA recommends that CARB establish a right to cure period for first-time or non-material violations. Given the complexity of the disclosure obligations under SB 253 and SB 261, the proposed regulations should include clear and enforceable safe harbors to protect good-faith actors and to avoid penalizing entities for circumstances beyond their reasonable control. Safe harbors are particularly appropriate where compliance depends on third-party data, evolving methodologies, and professional judgment rather than bright-line conduct. 063.13

Conclusion

CWA and its member utilities are committed to supporting California's climate goals especially as they relate to our water resources. For all of the reasons listed above, we respectfully request CARB to revise the proposal before proceeding.

We appreciate the Board's attention to these concerns and stand ready to support your efforts to develop equitable, effective, and administratively feasible regulations. Please do not hesitate to contact us for further discussion or clarification.

Thank you for your consideration of these comments. If you have any questions or would like to discuss further, please feel free to reach out to me at jcapitolo@calwaterassn.com.

CALIFORNIA WATER ASSOCIATION

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Sincerely,

Jennifer Capitolo
Executive Director
California Water Association

Environmental Defense Fund (Stephanie Jones)

Please see attached.

February 9, 2026

Submitted via CARB Public Comment Web Portal

Lauren Sanchez, Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814
climatedisclosure@arb.ca.gov

Re: Proposed California Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Chair Sanchez:

Environmental Defense Fund ("EDF") respectfully submits the following comments to the California Air Resources Board ("CARB") in response to its request for public input on the Proposed California Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation ("Proposal")[1] for implementation of Senate Bill ("SB") 253 and SB 261. Founded in 1967, EDF is a nonprofit organization with more than 2.5 million members nationwide, including approximately half a million in California. EDF has offices across the country, including in California, and a staff of scientists, economists, policy experts, and other professionals. EDF works to strengthen people's ability to thrive in a changing climate and has long sought to improve disclosure and understanding of climate-related risks.

064.1 EDF supports this Proposal overall as a key step in CARB's implementation of programs that will increase consistency and reliability of public reporting of corporate greenhouse gas ("GHG") emissions and climate-related financial risks. Improved reporting will benefit investors, consumers, and the broader public. Below, EDF provides comments on several aspects of the Proposal's regulatory provisions and the Initial Statement of Reasons staff report.

I. Comments on Proposed Regulatory Provisions

Applicability (§ 96201)

EDF supports the Proposal's exclusions of nonprofit (§ 96201(b)(1)) and governmental entities (§ 96201(b)(3)), and of entities with business in California consisting only of wholesale

[1] CARB, Notice of Public Hearing to Consider the Proposed California Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation (Dec. 9, 2025), https://ww2.arb.ca.gov/sites/default/files/2025-12/200s%20initial%20regulation_notice_final.pdf.

electricity transactions (§ 96201(b)(4)) or employee payments (§ 96201(b)(5)). Each of these
064.2 exclusions aligns with legislative text and intent that focused on entities conducting activities for financial gain in the state.[2]

EDF does not oppose the Proposal's exclusion of insurance companies (§§ 96201(b)(2), 96202(a)(5)) from SB 261 reporting requirements, given explicit direction to that effect in that statute, but the text of SB 253 contains no analogous exclusion.[3] Insurers' GHG emissions can
064.3 be significant – in particular, scope 3 emissions associated with both investing and underwriting activities – and can serve as an indicator of financial risk, so emissions reporting from these entities would be of high value to the investors, consumers, and public that SB 253 is intended to benefit.[4] Methodologies for calculating and reporting these emissions have advanced markedly over the last several years.[5] Accordingly, EDF asks that CARB reconsider its proposed exclusion of insurers from SB 253 reporting requirements, if not in this initial rulemaking then in subsequent amendments.

Definitions (§ 96202)

EDF supports the Proposal's incorporation of Revenue and Taxation Code ("tax code")
064.4 definitions. As EDF has explained in prior comments to CARB,[6] grounding the revenue and "doing business in California" parameters of these disclosure programs in that well-established and widely familiar framework provides reliability, clarity, and efficiency for regulated entities, regulators, and end users of information alike.

Deadline for Reporting Under Health and Safety Code Section 38532 (§ 96206)

064.5 EDF supports CARB's proposed initial reporting deadline of August 10, 2026 for scope 1 and 2 reporting under SB 253. The alignment with the verification deadline for CARB's Mandatory Reporting Regulation comports with SB 253's direction that "the emissions reporting

---

[2] *See* Cal. Rev. & Tax. Code § 23101 (defining "doing business" as "actively engaging in any transaction for the purpose of financial or pecuniary gain or profit"); *see also* Letter from EDF to CARB 2-5 (Mar. 21, 2025), https://ww2.arb.ca.gov/form/public-comments/submissions/22566 (explaining rationales for excluding nonprofit and government entities, wholesale electricity transactions, and *de minimis* business activities from applicability determinations).

[3] *Compare* Cal. Health & Safety Code § 38533(a)(4) (codifying the SB 261 definition of "covered entity" with its exclusion of insurance companies) *with* Cal. Health & Safety Code § 38532(b)(2) (codifying the SB 253 definition of "reporting entity").

[4] *See* Silvia Bressan, *Greenhouse Gas Emissions and the Financial Stability of Insurance Companies*, 18 J. of Risk & Fin. Mgmt. 411 (2025), https://www.mdpi.com/1911-8074/18/8/411.

[5] *See* The Global GHG Accounting and Reporting Standard for the Financial Industry, Partnership for Carbon Accounting Financials, https://carbonaccountingfinancials.com/standard (last visited Feb. 2, 2026) (setting forth guidelines conforming with the GHG Protocol for calculation of financed, facilitated, and insurance-associated GHG emissions).

[6] *See* Letter from EDF to CARB at 2-6 (Mar. 21, 2025), https://ww2.arb.ca.gov/form/public-comments/submissions/22566 (recommending alignment with tax code definitions and Franchise Tax Board data); Letter from EDF to CARB at 1 (Sept. 11, 2025), https://ww2.arb.ca.gov/form/public-comments/submissions/52356 (further recommending use of tax code definitions and data for reliability and efficiency).

[be] structured in a way that minimizes duplication of effort."[7] The proposed timing and fiscal year cutoff appear reasonable and feasible based on EDF's knowledge of current corporate emissions reporting practices.

II. Comments on Initial Statement of Reasons

064.6 EDF agrees that the programs the Proposal helps to implement will "provide accurate, comparable, and decision-useful climate information to investors, lenders, insurers, and the public in California" and "ultimately result in beneficial reductions in GHG emissions."[8] For a detailed presentation of evidence establishing these benefits, please see the amicus brief that EDF submitted in the Ninth Circuit Court of Appeals on October 23, 2025,[9] which is attached to this submission.

* * *

EDF thanks CARB for its efforts to implement these vital disclosure programs and its consideration of public input. Please do not hesitate to contact us to discuss further.

Respectfully submitted,

Stephanie Jones
Katelyn Roedner Sutter
Peter Zalzal
Environmental Defense Fund
sjones@edf.org

[7] Cal. Health & Safety Code § 38532(c)(2)(D)(i).
[8] CARB, Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation, Staff Report: Initial Statement of Reasons at 16 (Dec. 9, 2025), https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/isor.pdf.
[9] Br. of Amicus Curiae Env't Def. Fund in Support of Defendants-Appellees, *Chamber of Commerce of the United States v. Sanchez*, No. 25-5327 (9th Cir. Oct. 23, 2025).

Jeremy Weinstein

Please see attached letter.

THE LAW OFFICES OF
JEREMY D. WEINSTEIN
A PROFESSIONAL CORPORATION

February 9, 2026

California Air Resources Board
1001 I Street
Sacramento, CA 95814
Electronic Submission: https://carb.commentinput.com/?id=ekNF7gTx2h

Re: Comments on Proposed Climate Data and Financial Risk Reporting Regulation

To Whom It May Concern:

Thank you for the opportunity to comment on the proposed regulations under Health and Safety Code sections 38532 and 38533. I very much appreciate staff's consideration of the comments I and others previously submitted. My comment is to bring the regulations into conformance with federal law by changing § 96071(b)(1), § 96071(b)(4), and § 96072(a)(8) as follows:

> [§ 96071(b)(1)] Non-profit, charitable, or other organizations that are not profit-seeking and are tax-exempt under the Internal Revenue Code; 065.1
>
> [§ 96071(b)(4)] A business entity whose only activity within California consists of wholesale electricity transactions, wholesale natural gas transactions, or other transactions that occur in interstate commerce; and
>
> [§ 96072(a)(8)] "Doing business in California" means doing business and meeting either of the criteria set forth in subsections 23101(b)(1) or 23101(b)(2) of the California Revenue and Taxation Code. Wholesale sales of electricity, wholesale sales of natural gas, and other sales that occur in interstate commerce do not count for purposes of determining an entity's sales in California under Revenue and Taxation Code section 23101(b)(2). 065.4

With regard to § 96071(b)(1), in addition to non-profit and charitable organizations, there are other organizations (such as not-for-profit organizations) that are not profit-seeking and are tax-exempt under the Internal Revenue Code. All such organizations "do not fall within the legislative intent of corporate disclosures, and would not have reportable revenue according to section 96072(a)(13)."[1] Therefore, all such organizations should be exempted from § 38532 and 065.2

[1] California Air Resources Board, Staff Report: Initial Statement of Reasons, Dec. 9, 2025, pg. 6.

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§ 38533.

With regard to § 96071(b)(4) and § 96072(a)(8), the US Constitution's Commerce Clause gives Congress exclusive power to "regulate commerce among the several states."[2] Under the "dormant" Commerce Clause, states may not pass laws or regulations that place an "undue burden" on interstate commerce.[3] "Interstate Commerce" is defined in the Code of Federal Regulations:

> Interstate commerce means trade, traffic, or transportation in the United States— (1) Between a place in a State and a place outside of such State (including a place outside of the United States); (2) Between two places in a State through another State or a place outside of the United States; or (3) Between two places in a State as part of trade, traffic, or transportation originating or terminating outside the State or the United States.[4]

A transaction that involves more than one state in its performance is in interstate commerce. A foreign corporation must pay California income taxes if it is "doing business" in California. The taxes are on amounts earned that are allocated to California activities. Activities a foreign corporation undertakes in interstate commerce are exempt from California taxation.

065.3

Wholesale electricity transactions are always in interstate commerce.[5] So are wholesale natural gas transactions that involve, or commingle with, any gas that flows across state lines.[6] Half-million dollar annual fines (§ 38532(e)(2)(A)) seem an "undue burden."

CARB could consider being even more explicit, consistent with the intent of the Wiener and Stern letter,[7] for example by specifying that injections into, transportation in, and withdrawals from, interstate natural gas pipelines, even if only between injection and withdrawal points wholly within California, are exempt. This is because CARB rulemaking with perceived extraterritorial effects, or that interfere with energy markets, especially fossil fuel energy markets, would likely be met with furious counteractions by the Trump Administration and Republican-dominated states. The US Department of Justice has already sued four U.S. states in response to Executive Order 14260. The threat in the federal enforcement action of the Federal Trade Commission against CARB regarding vehicle emissions could not be more explicit.[8]

These comments are solely my own and are not necessarily the opinions of any client I

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[2] U.S. Constitution Article 1, Clause 8, § 3.
[3] United States v. Lopez, 514 U.S. 549, 579 (1995) "One element of our dormant Commerce Clause jurisprudence has been the principle that the States may not impose regulations that place an undue burden on interstate commerce, even where those regulations do not discriminate between in-state and out-of-state businesses."
[4] 49 C.F.R. § 390.5
[5] *New York vs. FERC*, 535 U.S. 1 (2002).
[6] E.g., *Interstate Nat. Gas Co., Inc. v. FPC*, 331 U.S. 682 (1947).
[7] Wiener, Stern, *re Legislative Intent- SB 253 and SB 251*, Jan. 29, 2024.
[8] "We are confident that today's outcome ensures the continued free functioning of competition, including by ensuring that consumers are not harmed by California's attempts to coopt private businesses to enforce preempted regulations in large swaths of the nation. Going forward, the [FTC] will intervene where, as here, private parties coordinate with a state actor to execute a sub-regulatory scheme to reduce competition, especially where the legal authority to do so is in grave doubt." Statement of the Federal Trade Commission Regarding The Clean Truck Partnership Investigation (Aug. 12, 2025).

represent or industry group in which I participate.

Yours truly,

Jeremy D. Weinstein

Supply Chain Federation (Sarah Wiltfong)

Please see the attachment.

February 09, 2026

California Air Resources Board
1001 I St.
Sacramento, CA 95814

Submitted electronically

RE: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

The undersigned organizations represent covered and reporting employers in the goods movement, logistics, retail, and maritime industries. Thank you for the opportunity to comment on California Air Resources Board's (CARB) Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation.

Covered Entities Need Flexibility for Reporting Deadlines

We appreciate CARB proposing an initial reporting deadline of August 10th and further strongly recommend CARB consider the following:

- **Create an extension request process**

066.1 Data availability will vary greatly depending on the reporting entity, the complexity of their operations and value chain, and the level to which data is available internally or must be obtained from a third-party, such as utility providers. Reporting entities are reliant upon the speed at which these third-parties process and provide the data necessary to calculate emissions. CARB must take into consideration not only when

data is available to support reporting, but the variable time entities need to process data, calculate emissions, and undergo verification.

A broad array of reasons outside of a covered entity's control could delay this process. For instance, the regulations will likely increase the demand for verification services, which will create bottlenecks in what is already a months-long process.

If there is an anomaly during data review, this could also add an unexpected delay to a covered entity's verification timeline. Entities should be granted the necessary time to appropriately validate all data.

Accordingly, we strongly recommend CARB create a process to allow covered entities to request an extension of their reporting deadline if an entity can demonstrate that assurance or data collection is still ongoing.

- **Provide all covered entities a minimum 12 months to report**

Allowing up to 12 months after the close of a fiscal year provides needed flexibility to covered entities if they are not calculating their emissions inventory under optimal conditions , which will not be the case for every entity every year. Optimal conditions include that the entity has an experienced reporting team, data was readily available and received in a timely manner from internal teams and third parties, their operations were similar to the prior year, data availability and recommended calculation methodologies did not change, and prior years did not require restatements.

066.2

Additionally, providing companies with 12 months to submit emissions data under the rules would prevent entities that already voluntarily report emissions data from having to produce a second, duplicative report for CARB or dramatically accelerate their reporting timeline, which could negatively impact the quality of data and a report.

Proactively moving the initial reporting deadline to December 31st will further deter the need to request an extension in the deadline unless unprecedented circumstances occur. Moving the reporting deadline further reduces the administrative burden on CARB to review and process such requests, and minimize entities' reporting incomplete, rushed data. Though we strongly encourage CARB to issue both an extension process for unforeseen circumstances and move the initial deadline to December 31st to submit data for fiscal year periods ending in 2025.

Creating a rolling 12 month submission deadline for future reporting years would also reduce anticipated bottlenecks in assurance providers which most observers believe will be induced by adhering to a single reporting deadline.

Transparency and Fairness in Fee Setting

We appreciate CARB including forecasted program costs and approved positions in the Initial Statement of Reasons.

The proposed fee framework would divide total required revenue in a given fiscal year by the number of reporting entities. Given the uncertainty around the number of covered entities under each program and who will report, we are concerned that reporting entities will be held accountable for paying fees for entities that are covered by the regulations but have not reported. CARB should establish a clear process for ensuring that regulated entities are not unfairly held accountable for shortfalls due to noncompliance.

066.3

The proposed fee framework also allows for 60 days to pay fees after receipt of notice from CARB. Because the fees are variable and are not finalized at this time, we are concerned that entities cannot budget fully for these unknown fees and may need additional time to allocate funding beyond the proposed 60-day time period. Also, processing fees through corporate accounting systems can take significant time, especially when paying a fee for the first time. Extending the payment period to a period of no less than 90 days would better allow corporations to perform the necessary accounting processes needed.

066.4

Furthermore, CARB should be fully transparent about any future changes in program funding needs and staffing levels, especially any proposed increases, by bringing proposed changes to the Board as informational items and providing reporting entities the opportunity for public comment and review.

066.5

Thank you for the opportunity to submit these comments. If you have any questions, please contact Sarah Wiltfong at sarah@supplychainfederation.com

American Trucking Associations
California Business Roundtable
California Retailers Association
California Trucking Association
NAIOP SoCal Chapter
Pacific Maritime Shipping Association
Supply Chain Federation

NIXON PEABODY

February 9, 2026

By electronic submittal

California Air Resource Board
1001 I St.
Sacramento, CA 95814

RE: Comments on the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear CARB Staff:

I am providing comments on California Air Resource Board's ("CARB") proposed regulation implementing California's Climate Corporate Data Accountability Act ("SB 253") and Climate-Related Financial Risk Act ("SB 261") ("Proposed Regulation") on behalf of out-of-state holding companies that have one or more subsidiaries that "do business in California" when those subsidiaries, individually, are under the $500 million/$1 billion annual revenue thresholds.

We appreciate and support the State's commitment to corporate climate accountability and the important policy goals underlying these disclosure requirements. We are, however, concerned that certain definitions in the Proposed Regulations and related guidance create significant ambiguity regarding the requirements, particularly as applied to out-of-state holding and out-of-state indirect parent companies with no California sales, that indirectly wholly own one or more smaller California-based subsidiaries. As discussed below, we respectfully request that CARB clarify these definitions to ensure that only those entities that truly "do business in California" are covered or reporting entities.

I. CARB Should Clarify That Out-Of-State Parent Companies That File Unitary Taxes with Total Annual Revenues in Excess of $500 Million or $1 Billion Are Not Covered or Reporting Entities Solely Due to Indirect Control of California Subsidiaries

067.1

A. The Doing Business in California Threshold

The Proposed Regulation defines two key entity types:

1. An SB 261 "covered entity" is a U.S.-based entity with (1) total annual revenues in excess of $500 million that (2) does business in California. § 96072(5).

2. An SB 253 "reporting entity" is a U.S.-based entity with (1) total annual revenues in excess of $1 billion that (2) does business in California. § 96072(11).

The Proposed Regulation provides that "'doing business in California' means doing business and meeting either of the criteria set forth in subsections 23101(b)(1) or 23101(b)(2) of the California Revenue and Taxation Code" and that "'doing business' shall have the same definition as set forth in section 23101(a) of the California Revenue and Taxation Code." § 96072 (7)-(8). Under these provisions, an entity is "doing business in California" if the entity is: (1) actively engaging in any transaction for the purpose of financial gain or profit in California *and* (2) either: (a) is organized or commercially domiciled in California, or (b) has California-based sales that exceed approximately $735,019 (adjusted for inflation).

Many out-of-state holding and indirect parent companies do *not* meet this threshold as they are *not* organized or commercially domiciled in California *and* do not have any California-based sales.

B. FAQ Adds Ambiguity and Unreasonably Extends Proposed Regulation Applicability to Indirect Parent Companies

In CARB's *California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs: Frequently Asked Questions About Regulatory Development and Initial Reports*, last updated November 17, 2025 (the "FAQ"), CARB addressed Question 15, which asked: "When calculating a parent company's total revenue for the purposes of determining compliance obligations under HSC §§ 38532 and/or 38533, must the revenue from the parent company's subsidiaries be included in the calculation?" CARB responded that "if a parent company and its subsidiaries file California taxes as a unitary business, then the revenue of the subsidiaries counts towards the revenue of the parent company as part of its gross receipts." 067.5

This is the first time CARB has ever taken such a position. Indeed, prior guidance has outlined that each entity was to be evaluated for applicability *individually*. Evaluating entities individually is most appropriate, as consolidating subsidiary revenues with those of a parent company for compliance purposes disregards the separate legal existence of each corporate entity—a fundamental principle of the corporate form.

It is also unclear whether this exception to the prior guidance extends to including a subsidiary's California-based sales to determine whether the parent is doing business in California. For example, suppose an out-of-state parent company has a subsidiary with California-based sales exceeding $735,019, but the subsidiary has annual revenue under $500 million and therefore is not a "covered entity." The parent company, meanwhile, has no California-based sales but has annual revenue exceeding $500 million. In that situation, does the parent company do business in California and become a "covered entity" solely because it files California taxes as a unitary business with a subsidiary that is doing business in California? 067.2

C. An Out-Of-State Parent Should Not be a "Covered Entity" or a "Reporting Entity" Solely Because it is Required to File California Taxes on a Unitary Basis

An out-of-state parent company should not be deemed a "covered entity" or a "reporting entity" solely because it is required to file California taxes on a unitary basis with subsidiaries that do

business in California. Such an expansion was not intended by the legislature and is not anticipated by non-California parent and holding companies. This is especially unreasonable and not anticipated when those subsidiaries are small, with annual revenues well under the $500 million and/or $1 billion annual revenue threshold, but the parent company collectively generates $500 million and/or $1 billion in annual revenue.

Moreover, treating an out-of-state parent company as a "covered entity" under these circumstances would effectively purport to regulate entities that do not do business in California, raising significant jurisdictional and constitutional concerns. These legal issues would likely invite protracted litigation and could materially delay the implementation of the regulations. 067.3

Accordingly, we request that CARB confirm that a parent company is **not** a "covered entity" or a "reporting entity" under the Proposed Regulations where:

(1) the parent company is organized and commercially domiciled outside of California,
(2) the parent company does not have direct California-based sales meeting the $735,019 threshold (adjusted for inflation), and
(3) none of the parent company's subsidiaries that do business in California individually meet the $500 million and/or the $1 billion annual revenue threshold.

This should hold true even if the parent company files California taxes as a unitary business and when, *collectively*, the parent company has total annual revenues in excess of $500 million or $1 billion United States dollars.

Stated differently, we seek confirmation that the $500 million and $1 billion annual revenue thresholds are evaluated at the individual entity level, and that the aggregation of subsidiary revenues on a unitary tax filing does not, by itself, cause an out-of-state parent company with no direct California sales to become a "covered entity" or a "reporting entity."

Absent clear guidance that out-of-state parent companies with no California-based sales are not "doing business in California" simply due to their subsidiaries' actions, especially when those subsidiaries actions in California are de minimis with less than $500,000 and/or $1 billion annual revenue for any one subsidiary, large international parent companies are being swept into mandatory reporting to their surprise and contrary to legislative intent and reason.

II. Conclusion and Recommendations

We appreciate CARB's efforts to implement SB 253 and SB 261 and share the State's commitment to corporate climate accountability and transparency for large companies *that do business in California*. The FAQ No. 15 created significant ambiguity regarding the application of the Proposed Regulation to out-of-state parent companies with California-based subsidiaries, and we appreciate CARB's efforts in clarifying that these companies with de minimis ties to California do not get swept in. An alternate conclusion risks unintended compliance burdens, regulatory uncertainty, increased risk of litigation due to jurisdictional limits, and further delays in implementing the regulations. 067.4

We welcome continued engagement on these matters through public workshops or direct dialogue with CARB.

Sincerely,

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Partner

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February 9, 2026

Clerk of the Board
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

Submitted electronically via: https://carb.commentinput.com/?id=ekNF7gTx2h

RE: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear CARB:

POET appreciates the opportunity to comment on the California Air Resources Board's ("CARB") Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation implementing California's Health and Safety Code ("HSC") §§ 38532 (SB 253) and 38533 (SB 261) (the "Climate Disclosure Rules"). POET provides the below comments on CARB's proposed regulation.

I. APPLICABILITY OF § 35833

068.1

POET urges CARB to revise proposed § 96071(b) to exclude companies that already publicly disclose lifecycle emissions of their products under existing California regulatory programs from the applicability of § 35833. According to CARB, the goal of the Climate Disclosure Rules is to "help ensure that accurate, comparable, and decision-useful climate information is made available to inform investors, lenders, insurers, consumers and other stakeholders in the state."[1] Imposing these disclosures upon companies like POET that are already subject to emissions-related reporting requirements under the California Low Carbon Fuel Standard ("LCFS") program would not ensure that additional "decision-useful climate information" is made available to relevant California stakeholders. That is because CARB's LCFS reporting requirements already capture significant climate-related information regarding POET's products. As required under the LCFS program, POET's bioethanol lifecycle emissions are publicly available on the CARB LCFS Pathway Certified Carbon Intensities website. The publicly available Current Fuel Pathways spreadsheet lists the certified carbon intensity of POET's fuel pathways. [2] Additionally, biomass feedstocks are subject to new stringent sustainability requirements and reporting obligations pursuant to the

[1] CARB, *Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Regulations—Staff Report: Initial Statement of Reasons*, at 3 (Dec. 9, 2025).
[2] *See* CARB, *LCFS Pathway Certified Carbon Intensities*, https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities.

2025 LCFS rulemaking.[3] Climate-related risk information relating to POET's facilities, all of which are located outside of California, is unlikely to be useful to relevant California stakeholders — *i.e.*, consumers of POET's bioethanol and co-products. For example, the estimated flood risk of a POET transloading facility located in Georgia is not meaningful information for a California consumer deciding whether to purchase E85. Because emissions information for POET's products sold in California is already publicly available and POET's facilities are not located in California, disclosing climate-related risks affecting POET facilities would not provide California stakeholders with decision-useful climate information.

068.2 Furthermore, requiring private companies to disclose climate-related financial risks accomplishes none of the California legislature's stated goals, which are focused primarily upon empowering investors to make well-informed decisions. As a privately held company, POET's equity shares are not publicly traded, and the investing public has no discernible interest in the information subject to disclosure. Furthermore, neither § 35833 nor the Final Report of Recommendation of the Task Force on Climate-related Financial Disclosures ("TCFD") allows companies to withhold or redact information that is confidential, meaning that § 35833 could require companies to disclose confidential business information as part of their climate-risk disclosure.[4] Requiring private companies to disclose confidential business information, especially when the investing public holds no financial interest in such disclosures, is unreasonably burdensome and supports no appropriate state regulatory goals.

068.3 In conclusion, CARB should narrowly tailor § 35833 to achieve its objectives by excluding private companies and those which already report emissions under California regulatory programs from § 35833 applicability. At minimum, CARB should provide a mechanism for private companies to safeguard and redact from public disclosure confidential business information that would otherwise be subject to disclosure under the TCFD.

II. CALCULATION OF FEES

068.4 CARB should clarify that fees levied under the Climate Disclosure Rules will be assessed against only the corporate entity submitting required disclosure reports. The Climate Disclosure Rules provide that required reports may be consolidated and submitted at the parent company level.[5] CARB issued guidance on July 9, 2025, as updated on November 17, 2025, in which CARB proposed assessing fees at the level of individual corporate subsidiaries even if a parent company submits a consolidated report.[6] The proposed regulation follows CARB's guidance, stating that "annual fees are assessed for reporting entities and covered entities."[7] Allowing parent companies

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[3] California Code of Regulations, Title 17, § 95488.9(g).
[4] *See* TCFD, *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures* (June 2017), https://assets.bbhub.io/company/sites/60/2021/10/FINAL-2017-TCFD-Report.pdf; *see* TCFD, *Task Force on Climate-related Financial Disclosures: Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures* (Oct. 2021), https://assets.bbhub.io/company/sites/60/2021/07/2021-TCFD-Implementing_Guidance.pdf.
[5] California HSC §§ 38532(c)(2)(A)(iii), 38533(b)(2).
[6] CARB, *California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs: Frequently Asked Questions about Regulatory Development and Initial Reports*, at pg. 9, posted July 9, 2025, and updated November 17, 2025.
[7] Proposed § 96074(a).

to submit the required reports will reduce CARB's administrative burden. To incentivize reporting at the parent level and minimize CARB's administrative costs, CARB should levy program fees against only the parent entity submitting the reports rather than individual subsidiary entities.

III. CONCLUSION

POET appreciates the opportunity to comment on this proposed regulation and looks forward to working with CARB to make its Climate Disclosure Rules fair and successful for both California and companies doing business in California. If you have any questions, please contact me at Josh.Wilson@POET.com or (202) 756-5612.

Sincerely,

Joshua P. Wilson
Senior Regulatory Counsel

California Chamber of Commerce (Jonathan Kendrick)

Attached please find the comments of the California Chamber of Commerce and others on the SB 261 and BS 253 ISOR and proposed regulatory package

February 9, 2026

Lauren Sanchez
Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Comments on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Ms. Sanchez:

The California Chamber of Commerce (CalChamber),[1] and the undersigned, appreciate the opportunity to comment on the California Air Resources Board's (CARB) proposed regulations implementing the Climate Corporate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Act (SB 261).

We submit the following comments[2] to identify areas where revisions to the regulatory package can help to at least reduce compliance burden and provide needed clarity.

I. This Regulatory Package Triggers SRIA Requirements Under the APA

069.1

The current regulatory proposal is procedurally deficient because CARB has improperly bypassed the requirement to conduct a Standardized Regulatory Impact Assessment (SRIA). Under the Administrative Procedure Act and Government Code Section 11346.3(c), any "major regulation" must be preceded by a SRIA submitted to the Department of Finance.[3] A "major regulation" is defined as having an economic impact on California business enterprises and individuals exceeding $50 million in any 12-month period.[4] The ISOR incorrectly characterizes this rulemaking as "not major," claiming the highest annual cost is approximately $20.8 million.[5] This figure is fundamentally flawed because it primarily accounts only for the administrative fees expected to be collected under the regulation. **It entirely ignores the substantial and unavoidable direct compliance costs that will be borne by the entities this rulemaking determines must comply with SB 253 and SB 261**.

[1] CalChamber represents a broad and diverse cross-section of California employers, including manufacturers, retailers, logistics providers, technology companies, energy producers, and service providers, many of whom would be directly affected by the proposed rule package.

[2] CalChamber is currently a party to a lawsuit filed in federal court challenging the constitutionality of SB 253 and SB 261. As we explain in *Chamber of Commerce of the United States of America et al. v. Randolph, No. 2:24-cv-00801- ODW-PVC (C.D. Cal.)*, SB 253 and SB 261 unconstitutionally compel companies to speak on a controversial topic, in clear violation of their First Amendment rights, impermissibly burden interstate commerce, and further violate constitutional and statutory limitations on California's ability to regulate beyond its borders. While these comments do not cure any of the defects at issue in the CalChamber lawsuit, they are provided by the undersigned in the hopes of reducing the burden on reporting entities in the event CARB implements these laws.

[3] See Government Code § 11346.3(c).

[4] See Government Code §11346.3(c) and Cal. Code Regs. Tit. 1, § 2000.

[5] Initial Statement of Reasons (ISOR) at pp. 19-20.

As the ISOR repeatedly notes, defining terms such as "doing business in California," "revenue," "parent," and "subsidiary" establishes the universe of who must comply with SB 253 and SB 261 and who is excluded.[6] Such determinations control the scale and economic impact of these disclosure programs.

The economic reality of the proposed regulation far exceeds the $50 million threshold of a "major regulation." CARB has acknowledged that thousands of entities will be subject to SB 253 and SB 261.[7] For individual entities, these costs are expected to reach hundreds of thousands of dollars per year.[8] Across the thousands of reporting and covered entities, the cumulative impact of data collection, internal hiring and systems upgrades, external consultants and legal review, and the procurement of third-party assurance will reach hundreds of millions of dollars annually. By failing to quantify these direct costs to the California economy, CARB has not performed the rigorous macroeconomic analysis required by law, including the impact on job creation, business elimination, and the state's overall competitive disadvantage.

It is therefore concerning that CARB has advanced this rulemaking without preparation of a SRIA. As the Legislative Analyst's Office and Cal/OSHA have both observed, the SRIA process improves the quality of regulatory analysis and helps surface implementation challenges early.[9] Given the significant economic impacts associated with the proposal, this rule should not be finalized without a SRIA.

To remedy this procedural error, CARB should suspend the current rulemaking and conduct a formal SRIA, as mandated by Government Code Section 11346.3, that reflects the actual compliance burden and economic impact of the proposed rulemaking and evaluates cost-effective alternatives. Proceeding without this data denies the public and the regulated community a meaningful opportunity to comment on the true economic consequences of the proposal and leaves the regulation vulnerable to challenge.

II. Need for SB 253 Reporting Flexibility and Recognition of Increasing Data Complexity 069.2

The proposed regulation establishes an initial August 10th reporting deadline for all reporting entities to submit the emissions data required under SB 253. CARB proposed this deadline for consistency with the verification deadline under CARB's Mandatory Reporting Regulation (MRR).[10] The ISOR justifies the August 10th deadline by claiming that aligning with the MRR will streamline greenhouse gas reporting for

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[6] See, e.g., ISOR at p. 5 ("This section's purpose is to define the scope of applicability for the Proposed Regulation by identifying which business entities are subject to the regulation and to establish which entities are exempted, even if they may otherwise meet the applicability criteria"); See also, ISOR at p. 7 ("Health and Safety Code sections 38532 and 38533 do not provide a definition for 'doing business in California', which is needed to establish which entities are subject to the fee"), ISOR at p. 8 ("Health and Safety Code sections 38532 and 38533 do not provide a definition for 'revenue', which is also needed to establish which entities are subject to this fee regulation"), ISOR at p. 9 ("A clear definition of 'doing business in California' is necessary to determine which entities fall within the scope of the fee regulation authorized by Health and Safety Code sections 38532 and 38533"), and ISOR at p. 11 ("The inclusion of the terms 'Parent' and 'Subsidiary' is necessary to establish the scope of corporate relationships relevant to reporting obligations under the regulation and ensures consistent identification of entities within corporate structures.")

[7] See, e.g., "SB 253/261/219 Public Workshop: Regulation Development and Additional Guidance," August 21, 2025, at slide 19 (providing initial estimates of over 4,000 covered entities under SB 261 and over 2,000 covered entities under SB 253).

[8] See, e.g., SEC File No S7-10-22, "The Enhancement and Standardization of Climate-Related Disclosures for Investors" (estimating ranges of hundreds of thousands of dollars of compliance costs for each reporting entity for a rule that did not even include the notoriously difficult reporting required for Scope 3).

[9] See Legislative Analyst's Office, "Improving California's Regulatory Analysis," at p. 12 (February 3, 2017) and Cal/OSHA "Initial Statement of Reasons, Public Hearing," at p. 56 (September 15, 2016).

[10] ISOR, at p. 15.

entities that must comply with both.[11] However, the deadline provides very little in the way of streamlining. SB 253 requires reporting for the ***prior fiscal year*** of entity-level global emissions. In contrast, MRR requires reporting for the ***prior calendar year*** and is focused on facility-specific emissions, emissions associated with imported electricity, and emissions associated with the combustion of fuels sold in California. SB 253 and MRR collect very different data sets measured over different periods of time.

Alignment in name only does not constitute streamlining and the effect of an August 10th reporting deadline creates an artificial compliance bottleneck. Forcing thousands of companies to compete for the currently limited pool of compliance service providers simultaneously will lead to severe capacity constraints and inflated costs without improving data quality. ***CARB should give the maximum amount of time in the calendar year for entities to perform their 2026 reporting by setting an initial reporting deadline of December 31, 2026, while preserving the February 1st cutoff date proposed in the regulatory package for determining which fiscal year to apply.***

After 2026, an August 10th reporting deadline will become a greater problem as assurance requirements transition from "limited" to "reasonable" assurance, a much more rigorous and time-consuming process. Furthermore, the technical and administrative burden of these disclosures is expected to grow as reporting and assurance standards evolve. Revisions to the GHG Protocol's treatment of Scope 2 emissions reporting are currently under consideration and may make Scope 2 reporting increasingly complex. This burden will be compounded significantly when Scope 3 reporting requirements join the mandate. Scope 3 disclosure requires the collection and verification of data from an entity's entire upstream and downstream value chain which is information often outside the reporting entity's direct control and notoriously difficult to quantify. As these even more complex reporting layers are phased in, the time required to gather, verify, and assure this data will necessarily increase. In future years, a rigid August deadline fails to account for the prolonged data-collection cycles required for these expansive indirect emission reporting requirements. 069.3

We recommend that CARB adopt one of the following two alternative reporting structures after 2026:

Alternative 1: Rolling Deadline Based on Fiscal Year End

Under this approach, CARB adopts a "rolling" submission schedule where reports are due exactly twelve months following the close of an entity's individual fiscal year. This model provides the greatest degree of equity, ensuring that every reporting entity has an identical window of time to finalize and assure its data regardless of its accounting cycle. This "rolling" approach would distribute the demand for specialized technical and assurance services throughout the calendar year, lowering costs and ensuring that each report reflects the most recent and accurate data available for that specific enterprise. Given the impending complexity of Scope 2 updates and the addition of Scope 3, providing deadline flexibility is essential.

Alternative 2: Unified December 31 Deadline with Fiscal Year Cutoff

This approach preserves the existing framework in Section 96076(b), which uses a February 1st cutoff to determine the applicable reporting year, but replaces the August 10th submission date with a uniform December 31st deadline. Under this method, companies with fiscal years ending on or before February 1st would report data from that most recently completed fiscal year, while those ending after February 1st would report from the fiscal year ending in the prior calendar year. Using a December 31st deadline is more consistent with how emissions data are typically reviewed and assured in practice and gives reporting entities more time to report as the requirements become more onerous. Increasing the time period between the February 1st cutoff and the reporting deadline also helps space out demand for technical and assurance services.

[11] *Ibid*.

III. The Proposed Fee Structure Exceeds CARB's Statutory Authority Under Health and Safety Code Sections 38532 and 38533 and Raises Serious Constitutional Concerns

The methodology for calculating and assessing implementation fees in Subarticle 2 of the proposed regulations raises substantial legal concerns. As designed, the fee framework exceeds CARB's fee authority under Health and Safety Code sections 38532 and 38533 and exhibits the characteristics of an unauthorized tax under Article XIII A of the California Constitution and a compelled subsidy of government advocacy and restraint on petition, in violation of the First Amendment to the United States Constitution. 069.4

A. Inclusion of Legal Defense Costs Exceeds CARB's Fee Authority Under Health and Safety Code Sections 38532 and 38533

Health and Safety Code sections 38532 and 38533 authorize CARB to assess fees solely for the purpose of recovering the reasonable costs of implementing and administering the statutory greenhouse gas reporting and disclosure programs. Nothing in these provisions authorizes CARB to recover the costs of defending regulations against judicial challenge.

The statutory scheme is narrowly focused on program implementation, such as establishing reporting requirements, collecting and reviewing disclosures, and administering compliance mechanisms. By contrast, defending the validity of a regulation in court is a general governmental function that serves the interests of the State as sovereign, not a cost of administering a reporting program attributable to regulated entities. 069.5

By defining "Required Revenue" to include the "legal defense of this article," CARB exceeds the fee authority delegated to it by the Legislature. Agencies may not expand their fee authority by regulation beyond the limits established in statute.[12] Where a statute authorizes fees to recover implementation and administration costs, the agency may not use that authority to shift unrelated governmental expenses, such as litigation defense, onto regulated parties.[13]

B. The Fee Structure Also Likely Constitutes an Unauthorized Tax Under Proposition 26

The proposed implementation fee exceeds the constitutional limits on regulatory fees and likely constitutes an unauthorized tax under Article XIII A, section 3(b) of the California Constitution, as amended by Proposition 26.

1. Proposition 26 Presumes State-Imposed Charges Are Taxes Unless a Narrow Exception Is Satisfied 069.6

Proposition 26 establishes a broad constitutional presumption: ***any levy, charge, or exaction imposed by the State is a "tax" unless the government affirmatively demonstrates that the charge falls within a narrow exception***. One such exception allows charges imposed solely to recover the reasonable costs of regulation, including costs incident to issuing permits, conducting inspections and audits, and administrative enforcement and adjudication.[14] An agency has the burden of demonstrating that the costs are administrative in nature and the charge recovers no more than the reasonable costs of regulatory activity.[15] Failure to meet this condition means a charge is a tax regardless of how an agency labels it.

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[12] See Government Code Sections 11342.1 and 11342.2.
[13] See, e.g., *Sinclair Paint Co. v. State Bd. of Equalization* (1997) (*Sinclair Paint*), 15 Cal.4th 866, 875–876.
[14] Cal. Const., art. XIII A, § 3(b)(3).
[15] Cal. Const., art. XIII A, § 3(d).

The proposed regulation defines "Required Revenue" to include the "legal defense of this article." Legal defense of a regulation is not an administrative regulatory activity; it is adversarial litigation undertaken on behalf of the State as sovereign. Proposition 26's exception for administrative adjudication does not extend to defending regulations in court.

California courts have held that a regulatory fee is valid only if it is imposed to mitigate or defray the costs of the regulatory program itself, not to fund general governmental functions.[16] Defending the legality of a regulation is a general governmental responsibility that benefits the State broadly and cannot be attributed to the specific costs of administering the regulatory program itself. By incorporating litigation defense of the regulatory package into the fee base, the proposed regulation severs the required reasonable nexus between the charge and permissible regulatory costs, effectively rendering the charge a tax.

2. The Fee Is Not "No More Than Necessary" to Cover Regulatory Costs

Even apart from litigation defense, the structure of the fee fails Proposition 26's requirement that charges be no more than necessary to recover reasonable regulatory costs.[17] 069.7

First, the regulation imposes a mandatory 10 percent contingency adjustment to Total Required Revenue to account for speculative "unforeseen costs."[18] This preemptive surcharge is not tied to documented expenses and is imposed regardless of whether such costs materialize and effectively builds a surplus into the fee structure. "Fee" structures that include speculative buffers or built-in surpluses untethered to actual costs run the risk of becoming a tax.[19]

Second, Section 96073(b) requires that any excess revenue be rolled forward indefinitely, with no mechanism for refunding overcollections to the entities that paid them. Sustained overcollection without refunds is a hallmark of a tax, not a fee. Where revenues materially exceed actual regulatory costs, the charge loses its "fee" character.[20]

Together, the contingency surcharge and mandatory roll-over are likely to ensure that the program will routinely collect more than its actual costs and retain those funds permanently. That outcome is incompatible with Proposition 26's requirement that regulatory fees be limited to actual and reasonable costs.

Because the proposed charge exceeds the regulatory-cost exception, it is a tax under Article XIII A. CARB, as an administrative agency, lacks authority to impose a tax by regulation. Taxes may be imposed only by the Legislature (or the electorate), subject to constitutional voting requirements.[21] An agency cannot cure this defect by characterizing a tax as a "fee." Nor can the agency rely on its general regulatory authority to expand fee recovery beyond what the Constitution and enabling statutes permit. Where a charge functions as a tax, it is invalid regardless of policy justification.

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[16] See, e.g., *Sinclair Paint,* 15 Cal.4th at 874–878.
[17] Cal. Const., art. XIII A, § 3(d).
[18] ISOR, at p. 12.
[19] *California Farm Bureau Fed'n v. State Water Resources Control Bd.* (2011) 51 Cal.4th 421, 441; See also *Sinclair Paint*, 15 Cal. 4th at 878.
[20] *Ibid*.
[21] Cal. Const., art. XIII A, § 3(a); *Sinclair Paint*, 15 Cal. 4th at 872-873;

C. Compelled Funding of the State's Legal Defense of this Regulation Raises First Amendment Concerns

069.8

1. Compelled Subsidization of Government Advocacy

In addition to exceeding CARB's statutory fee authority and the constitutional limits on regulatory fees, the requirement that regulated entities fund the State's legal defense of this regulation raises serious and independent concerns under the First Amendment to the United States Constitution.

The First Amendment protects not only the right to speak, but also the right to refrain from speaking and from being compelled to subsidize speech with which one disagrees.[22] The Supreme Court has repeatedly held that compelled financial support for expressive activity, particularly advocacy on contested legal or policy issues, implicates core First Amendment interests.[23]

Defending a regulation in court is inherently expressive and adversarial. It involves advancing legal and policy arguments intended to persuade a judicial audience regarding the legality and constitutionality of the State's regulatory choices. When the State requires regulated entities to finance that advocacy through mandatory fees, it compels those entities to subsidize speech that may directly conflict with their own views, interests, and legal positions. This concern is particularly acute where the regulated entities funding the State's legal defense may themselves be challenging the regulation or supporting challenges brought by others. In such circumstances, entities are forced to bankroll arguments deployed against their own claims in court.

2. Burden on the Right to Petition

The First Amendment separately protects the right "to petition the Government for a redress of grievances," including through access to the courts. Government actions that impose financial burdens on the exercise of this right are subject to heightened constitutional scrutiny.[24]

The statutory overreach of the fee structure is compounded by serious First Amendment concerns. By requiring covered and reporting entities to fund the State's legal defense of this regulation, CARB compels regulated parties to subsidize governmental advocacy in proceedings where those same parties may be exercising their constitutional right to petition the courts for redress of grievances.

By embedding judicial defense costs of the regulation into the fee base, the proposed regulation effectively inhibits regulated entities from seeking judicial review. Regulated entities must challenge the regulation knowing that they are simultaneously funding the State's efforts to defeat those challenges. This structure creates a built-in disincentive to petition the courts and risks chilling meritorious claims. Courts have repeatedly held that government actions that penalize, retaliate against, or impose unjustified burdens on the exercise of the right to petition, whether directly or indirectly, raise serious First Amendment concerns and are subject to heightened constitutional scrutiny.[25]

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[22] See *Janus v. AFSCME* (2018) 585 U.S. 878, 892; see also *Knox v. SEIU* (2012) 567 U.S. 298, 309.
[23] *United States v. United Foods, Inc.* (2001) 533 U.S. 405, 410–414.
[24] *See BE&K Construction Co. v. NLRB* (2002) 536 U.S. 516, 524–525*; California Motor Transport Co. v. Trucking Unlimited (1972)* 404 U.S. 508, 510–511.
[25] *California Motor Transport Co. v. Trucking Unlimited* (1972) 404 U.S. 508, 510–511; *BE & K Construction Co. v. NLRB* (2002) 536 U.S. 516, 524-526, 530.

3. Lack of Germaneness to Permissible Regulatory Purposes

Even in contexts where compelled fees are permitted, the Supreme Court has required that funded activities be *germane* to the regulatory purpose that justifies the fee.[26]

Administrative implementation, compliance review, and agency-level enforcement may satisfy that germaneness requirement. Judicial defense of the regulation itself does not. Litigation defending the validity of a regulation does not advance day-to-day program administration. Instead, it serves the State's institutional interest in preserving its regulatory authority. That interest, however, should not be financed through compelled contributions from regulated entities who may oppose the regulation or seek judicial review of its legality.

Taken together, the fee structure risks creating a systemic chilling effect on judicial review. Judicial challenges play a critical role in testing the legality and constitutionality of administrative regulations. A regulatory scheme that requires challengers to fund the government's defense undermines that role and threatens to insulate agency action from meaningful scrutiny.[27] The words "including legal defense of this article" should be stricken from the proposed regulation.

D. The Fee Structure Creates a Substantial Risk of Overcollection

069.9

The proposed fee framework also includes an automatic annual adjustment tied to the Consumer Price Index (CPI). That inflation indexing, layered on top of a ten percent contingency adjustment, operates independently of actual program costs and therefore risks systematic overcollection in violation of both statutory fee authority and the constitutional limits on regulatory fees.

Regulatory fees must be calibrated to the agency's reasonable administrative costs. CARB's implementation costs for SB 253 and SB 261 are likely to be disproportionately high in the initial years as internal systems are developed, but those costs do not inherently track CPI over time. As systems mature and processes are standardized, many costs may remain flat or decline. An automatic CPI escalator applied to a prior year's revenue estimate, without reconciliation to actual cost experience, introduces a built-in upward ratchet disconnected from CARB's real expenditures.

That risk is magnified because CPI indexing is not the only upward pressure in the fee formula. When layered on top of mandatory contingency adjustments and a roll-forward mechanism that permanently retains excess revenue, the CPI adjustment functions as an automatic revenue escalator rather than a cost-recovery tool. The absence of any mandatory true-up or refund mechanism exacerbates this ratchet effect, effectively ensuring that overcollections are retained rather than corrected.

Article XIII A of the California Constitution, as amended by Proposition 26, requires that regulatory fees be no more than necessary to cover reasonable costs. An automatic CPI adjustment that is not reconciled to actual expenditures fails that standard. As the nexus between the charged fee and the agency's real regulatory costs erodes over time, the charge ceases to function as a lawful cost-recovery fee and instead takes on the characteristics of a revenue-raising tax.

The constitutional defect created by CPI indexing in this context is compounded by the absence of any mechanism to return excess collections to fee payors. Even where CPI-based increases result in revenues that materially exceed actual costs, the regulation provides no way to reconcile those overcollections. Instead, surplus funds are retained and carried forward, placing the entire risk of

[26] See *Keller v. State Bar of California* (1990) 496 U.S. 1, 13–14.

[27] See *City of Lakewood v. Plain Dealer Publishing Co.* (1988) 486 U.S. 750, 757–758 (laws that chill First Amendment activity are constitutionally suspect even absent proof of actual suppression).

forecasting errors on regulated entities, contrary to the settled principle that regulatory fees must reflect costs actually incurred by the agency.

To at least partially address the many statutory and constitutional requirements, CARB should:

- Limit any CPI adjustments to situations where CARB can demonstrate corresponding increases in actual program costs, rather than applying a generalized inflation index disconnected from the agency's actual reasonable costs;
- Pair any inflation adjustment with a mandatory reconciliation to actual expenditures, to ensure that fee levels remain calibrated to reasonable regulatory costs; and
- Provide for pro-rata refunds or credits where collections exceed costs, consistent with the requirement that fees recover no more than the reasonable costs of regulation.

As drafted, the CPI adjustment mechanism contributes to a fee structure that is not reliably tied to actual and reasonable regulatory costs and therefore further supports the conclusion that the proposed charge is likely to function as an unauthorized tax rather than a lawful regulatory fee.

IV. The Enforcement and Penalty Provisions Are Inconsistent With the Disclosure-Based Nature of SB 253 and SB 261

069.10

The proposed enforcement and penalty framework raises serious concerns regarding proportionality, due process, and consistency with CARB's delegated authority. As drafted, the provisions expose regulated entities to excessive and unpredictable liability for technical or administrative violations, even in the absence of harm, intent, or repeated noncompliance. These defects undermine fairness and unnecessarily increase compliance burden for reporting structures that even state agencies have struggled to implement.[28]

A. Compounding Daily Penalties Are Disproportionate to the Underlying Violations

The regulation provides that "each day during any portion of which a violation occurs is a separate offense," including for payment and reporting violations. Applied to fee payment obligations, this structure means that a single missed or disputed payment can result in daily, compounding penalties until the issue is resolved.

This approach is disproportionate to the nature of the underlying conduct. Late payment or administrative error do not cause incremental harm on a day-by-day basis. Treating each day of nonpayment as a separate violation converts a single administrative lapse into potentially massive liability that bears no reasonable relationship to the severity of the violation.

Administrative penalties must be reasonably related to the gravity of the offense, the regulated entity's culpability, and the harm addressed.[29] A penalty scheme that allows liability to grow exponentially based

[28] Even an agency as well-resourced as the California State Teachers' Retirement System (CalSTRS) has warned that its past efforts at reporting Scope 3 emissions were inaccurate after it discovered a colossal climate data error. If even CalSTRS struggles with Scope 3, we must expect covered entities to struggle as well. See, e.g., Politico, "Why CalSTRS can't count", May 7, 2024, available at https://www.politico.com/newsletters/the-long-game/2024/05/07/theres-a-climate-accounting-problem-00156501).

[29] See, e.g., *United States v. Bajakajian* (1998) 524 U.S. 321, 334 ("The touchstone of the constitutional inquiry under the Excessive Fines Clause is the principle of proportionality: The amount of the forfeiture must bear some relationship to the gravity of the offense that it is designed to punish.")

solely on the passage of time, without regard to intent, materiality, or actual harm, raises serious concerns under principles of proportionality and due process.

B. Penalties Are Not Meaningfully Tied to Intent, Materiality, or Good-Faith Compliance

The proposed enforcement provisions do not meaningfully distinguish between willful misconduct and good-faith error, material violations and minor technical deficiencies, or first-time and repeat violations.

Absent clear mitigation standards, regulated entities face the same penalty exposure whether a violation results from intentional noncompliance or from reasonable disagreement, evolving guidance, or administrative oversight. This lack of differentiation discourages cooperative engagement with CARB, particularly during the early years of a complex, first-of-its-kind reporting regime. CARB's focus should be on helping entities come into compliance. Effective enforcement frameworks typically incorporate graduated penalties, safe harbors, cure periods, and explicit mitigation factors. The absence of these features here increases the risk of arbitrary outcomes and inconsistent enforcement. 069.11

C. Broad Discretion Without Clear Standards Raises Due Process Concerns

Several enforcement provisions vest broad discretion in CARB, including authority to determine when violations occur, assess daily penalties, impose late fees "sufficient" to cover additional costs, and determine whether and how penalties are mitigated. 069.12

While agencies necessarily exercise discretion in enforcement, due process requires that regulated entities have clear notice of the conduct that triggers penalties and the magnitude of potential liability. Open-ended standards and undefined penalty ranges prevent businesses from assessing compliance risk and create the appearance, and risk, of arbitrary enforcement.

Clear standards are especially important where penalties can accumulate rapidly and where the underlying obligations involve complex reporting judgments rather than bright-line conduct.

D. Enforcement Provisions Are Inconsistent With the Nature of the Program

SB 253 and SB 261 establish a corporate disclosure regime, not an emissions control or environmental harm program. The Legislature recognized this distinction and therefore expressly excluded Health and Safety Code section 38580, CARB's general administrative penalty provision for AB 32, from applying to these statutes.[30] That exclusion reflects a deliberate legislative judgment that traditional environmental penalty structures are ill-suited to the nature of the obligations created by SB 253 and SB 261. 069.13

Notwithstanding this clear statutory direction, the proposed regulations adopt an enforcement framework that mirrors the penalty regimes used for environmental harm and emissions violations. Concepts such as treating "each day" of noncompliance as a separate violation, allowing penalties to accrue continuously over time, and imposing escalating liabilities untethered to materiality or harm are hallmarks of statutes designed to deter ongoing pollution or physical environmental impacts. In those contexts, daily penalties serve a clear purpose: they reflect the fact that each day of excess emissions causes incremental environmental harm.

By contrast, the obligations imposed by SB 253 and SB 261 involve the preparation and submission of disclosures. A failure to disclose information on a given date does not create new or compounding environmental harm with each passing day. Applying a per-day, compounding penalty structure to disclosure violations therefore bears no reasonable relationship to the nature of the underlying conduct. Instead, it transforms a technical or administrative lapse into an open-ended liability exposure that

[30] Health and Safety Code §§ 38532(f) and 38533(f).

escalates solely by operation of time. The Legislature's decision to make section 38580 inapplicable to SB 253 and SB 261 reflects an understanding that disclosure violations should be addressed through measured, compliance-oriented remedies rather than punitive, harm-based penalties. CARB should not override that legislative judgment by importing environmental enforcement concepts through regulation.

The proposed regulatory package, however, expressly relies upon Section 38580 for the assessment of penalties.[31] Where the Legislature has affirmatively excluded a penalty statute, CARB has no discretion to revive that authority through regulatory cross-references or generalized enforcement language. The proposed enforcement framework therefore exceeds CARB's delegated authority and is inconsistent with the express terms and structure of SB 253 and SB 261. The proposed penalty regime materially alters the balance struck by the Legislature by treating failures to disclose as if they were ongoing emissions violations. The proposed regulation should be revised to align penalties with the nature of the obligations imposed rather than relying on enforcement tools designed for environmental harm and expressly excluded by the Legislature.

We recommend that CARB revise the enforcement and penalty provisions to:

- Establish explicit cure periods for first-time or non-material violations;
- Incorporate mitigation factors that account for good-faith efforts, reliance on guidance, and prompt corrective action; 069.14
- Define clear limits or ranges for late fees and penalties to reduce uncertainty; and
- Align enforcement severity with actual harm, intent, and materiality.

These changes would reduce the risk of unintended or inequitable consequences.

V. The Proposed Auditing Provision Exceeds CARB's Statutory Authority and Raises Confidentiality and Due Process Concerns

The proposed auditing provision authorizes CARB's Executive Officer to contract with or consult outside entities, including the Franchise Tax Board (FTB) and the California Department of Tax and Fee Administration (formerly the Board of Equalization), to obtain data or services needed to audit fee remittances or unpaid fees, and to fund those auditing activities using fee revenues. As drafted, this provision exceeds CARB's delegated authority and lacks the necessary statutory and procedural guardrails. 069.15

First, while CARB may verify whether required fees have been accurately calculated and remitted, neither SB 253 nor SB 261 authorizes CARB to obtain or use confidential taxpayer information held by the Franchise Tax Board or the California Department of Tax and Fee Administration. Disclosure and use of tax return information are governed by strict confidentiality provisions in the Revenue and Taxation Code,[32] which permit interagency sharing only where the Legislature has expressly authorized it.[33] Nothing in SB 253 or SB 261 provides such authorization. An administrative regulation cannot create access to confidential tax data where the Legislature has not done so.

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[31] See § 96075(a) of the proposed regulation.

[32] See Rev. & Tax Code § 19542.

[33] In California, when the Legislature wants one agency to have access to another agency's tax data, it writes a specific "interagency sharing" provision (See Rev. & Tax. Code §§ 19551 – 19570). Here the statutes authorized CARB to collect "fees" and "reports," but they are silent on tax records. It is unclear what statutory authority exists, for CARB to collect tax records.

Second, the proposed language is overbroad in scope. It does not limit auditing activities to information reasonably necessary to verify fee applicability or fee amounts, nor does it define the permissible data sources, audit methods, or boundaries of inquiry. Absent clear limits, the provision could be read to authorize expansive financial audits or inquiries into unrelated business operations, which would exceed the narrow purpose of fee verification and raise due process concerns. Regulatory audits must be no more intrusive than necessary to administer the authorized program, and regulated entities are entitled to clear notice of the scope and basis of any audit.

For these reasons, the auditing provision should be revised to: (1) expressly limit audits to verification of fee remittances using information lawfully provided by the fee payer or otherwise publicly available; and (2) clarify that nothing in the regulation authorizes access to confidential tax information held by FTB or CDTFA absent express statutory authorization.

VI. The Regulations Should Provide a Clear and Fair Process for Entities to Challenge Covered-Entity Determinations

069.16

The proposed regulations do not provide a clear mechanism for companies to challenge CARB's determination that they are "covered entities" subject to the requirements and fees of SB 253 and SB 261. Given the significant compliance obligations, ongoing fee liability, and potential penalties associated with covered-entity status, the absence of a defined process to contest applicability raises serious due process and fairness concerns.

Determining whether an entity is covered under SB 253 or SB 261 involves complex legal and factual questions, including interpretation of "doing business in California," application of revenue thresholds, treatment of affiliated entities, application of exemptions under the proposed rule, and classification of parent–subsidiary relationships. Reasonable disputes are inevitable, particularly for companies with limited physical presence in California, unusual corporate structures, or non-recurring revenue events. Without a formal avenue to seek review or clarification, companies may be forced either to comply under protest, incurring substantial and potentially unrecoverable costs, or to risk enforcement actions and penalties while disputing their status.

Fundamental principles of administrative due process require that regulated entities have a meaningful opportunity to challenge threshold determinations that trigger regulatory obligations. Absent a review mechanism, CARB's initial applicability determinations function as unreviewable, de facto adjudications, despite the lack of any formal adjudicatory process. Providing a clear path to contest covered or reporting entity status would improve accuracy, reduce unnecessary compliance costs, and encourage cooperative engagement with CARB.

Accordingly, we recommend that CARB amend the regulations to establish a transparent, time-bound process allowing entities to challenge or seek confirmation of covered-entity determinations prior to the imposition of fees, reporting obligations, or penalties. At a minimum, the regulations should:

- Allow entities to submit a written challenge or request for determination regarding covered-entity status;
- Require CARB to provide a reasoned written response within a defined timeframe;
- Suspend fee and reporting obligations while a good-faith challenge is pending; and
- Provide clarity regarding whether and how determinations may be revisited in subsequent reporting years.

Incorporating such a process would enhance procedural fairness and reduce the risk of erroneous coverage determinations.

VII. Applicability Definitions Warrant Further Refinement to Avoid Overbreadth and Unintended Consequences

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The proposed regulations adopt definitions of "doing business in California" and "revenue" that will determine which entities are subject to the requirements of SB 253 and SB 261. These threshold determinations are among the most consequential aspects of the rule package, as they define the scope of the regulated universe and drive both compliance obligations and fee liability. We believe these definitions would benefit from further refinement.

With respect to the definition of "doing business in California," the proposed reliance on sales-based thresholds may sweep in entities with limited operational presence in the state. Companies that have no facilities, employees, or physical operations in California may nonetheless exceed sales thresholds based on national or global distribution patterns.

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The proposed approach to determining whether an entity meets the statutory revenue threshold also raises concerns. Reliance on gross receipts, without regard to margins or extraordinary, non-recurring transactions, may disproportionately affect high-volume, low-margin industries such as retail, logistics, and wholesale trade. In these sectors, revenue is often a poor proxy for emissions profile, climate risk, or capacity to absorb new regulatory costs. Clarifying how one-time transactions or anomalous revenue spikes are treated would improve predictability and fairness.

069.19

Finally, the proposed regulations currently define the terms "parent" and "subsidiary," but do not provide clear guidance on how reporting obligations are to be applied in practice across parent–subsidiary corporate structures. Absent such guidance, reporting entities lack a workable framework for determining whether and how disclosures should be made on a consolidated basis, at the subsidiary level, or both.

069.20

Without clear rules addressing how consolidated reporting is to be achieved, the proposed approach risks inconsistent interpretation, duplicative reporting, and unnecessary administrative burden. Clarifying parent–subsidiary applicability and reporting mechanics at the outset is essential to ensure consistent implementation and workable compliance as the program moves forward.

VIII. Implementation Would Benefit from Clear, Codified Safe Harbors

Given the novelty, scale, and complexity of the disclosure obligations under SB 253 and SB 261, the proposed regulations should include clear and enforceable safe harbors to protect good-faith actors and to avoid penalizing entities for circumstances beyond their reasonable control. Safe harbors are particularly appropriate where compliance depends on third-party data, evolving methodologies, and professional judgment rather than bright-line conduct.

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Well-designed safe harbors do not undermine the integrity of the program. To the contrary, they promote more accurate reporting and encourage early and transparent engagement with CARB. Without such protections, the program risks punishing good-faith actors with unnecessary enforcement actions.

A. Safe Harbor for Good-Faith Use of Accepted Methodologies and Standards

The regulations should provide a safe harbor for entities that calculate and disclose emissions and climate-related financial risk using recognized, widely accepted methodologies employed to satisfy other national and international reporting requirements, including accepted versions of the GHG Protocol and other referenced frameworks. To preserve flexibility and minimize unnecessary duplication, CARB should

069.22

avoid requiring the use of prescriptive reporting templates or mandating adherence to a single methodology where multiple credible standards are already in widespread use.

Where an entity can demonstrate that it relied in good faith on CARB-approved or widely accepted methodologies, applied those methodologies consistently, and documented its assumptions and calculation methods, the entity should not be subject to penalties solely because CARB later revises its interpretive guidance or adopts updated standards or reporting formats. This protection is particularly important given the accepted versions of the GHG protocol at the time the laws were passed, the likelihood of future changes to Scope 2 accounting rules, the anticipated expansion to Scope 3 disclosures, and the use of differing global warming potential values across regulatory regimes.

A safe harbor of this kind is also consistent with the statutory directive to minimize duplication of effort by allowing reporting and covered entities to rely on disclosures prepared for other jurisdictions. That objective would be undermined by rigid templates or inflexible standard-setting that forces entities to re-map, re-calculate, or re-format substantively equivalent information solely to satisfy California-specific presentation requirements.

B. Safe Harbor for Reasonable Estimates and Data Gaps Outside the Entity's Control

Especially for Scope 2 and Scope 3 emissions and climate-related financial risk disclosures, reporting entities will often be required to rely on estimates, proxy data, and information provided by third parties across complex value chains. The regulations should include a safe harbor for reasonable estimates where primary data are unavailable despite good-faith efforts to obtain them.

That safe harbor should apply where an entity makes reasonable efforts to obtain accurate data, uses appropriate estimation techniques where direct data are unavailable or difficult to obtain, and transparently discloses the use of estimates and associated uncertainty. The regulations should also exempt information that may be prohibited from disclosure under applicable law, due to external confidentiality restrictions or obligations, or on national security grounds.

Critically, reporting entities should not be subject to penalties for inaccuracies that are attributable to incomplete, inconsistent, or unreliable third-party data, or to reasonable estimates derived from such data, where the entity does not control the underlying information and has complied with the applicable disclosure and documentation requirements.

C. Safe Harbor for Reliance on Qualified Third-Party Assurance Providers

The regulations should include a safe harbor for entities that rely on qualified, independent third-party assurance providers to review disclosures. Where an entity engages an assurance provider that meets CARB's qualification requirements and follows the provider's professional recommendations in good faith, the entity should not be exposed to penalties based on later disagreements over methodological interpretation. 069.31

Absent such a safe harbor, entities are placed in the untenable position of being second-guessed for relying on professional experts whose services the regulations themselves effectively require.

D. Safe Harbor for Early-Year Reporting

The initial reporting years under SB 253 and SB 261 will involve significant learning curves for both reporting entities and regulators. The regulations should include an explicit safe harbor, beyond the one-year flexibility provided by guidance for 2026, for early-year reporting errors that are promptly corrected upon identification. A limited, time-bound safe harbor would recognize the complexity of initial implementation and encourage transparency rather than discouraging disclosure out of fear of penalties. 069.23

Additionally, CARB has provided several enforcement notices and guidance documents. CARB should expressly include a safe harbor that prevents reporting and covered entities from being penalized for following such enforcement notice and guidance documents.

E. Safe Harbor and Extended Timeframe for Fee Payment

Finally, the proposed regulations require reporting and covered entities to remit program fees within 60 days, after which daily penalties may begin to accrue. Given the complexity of the applicability determinations, the magnitude of the fees, and the absence of a clear process to challenge reporting or covered-entity status or fee calculations, a 60-day payment window is unreasonably short and creates unnecessary risk of penalties for good-faith entities. 069.24

Determining the correct fee amount may require internal review of revenue calculations, corporate structure, and parent–subsidiary relationships. In some cases, CARB may not deliver the fee notice to the proper channel to ensure timely payment. In many cases, companies must also coordinate with outside counsel, accountants, or assurance providers to confirm that the fee assessment is accurate and consistent with the regulations.

A rigid 60-day deadline, combined with compounding daily penalties, effectively forces companies to pay under protest to avoid enforcement exposure even where there are legitimate disputes regarding applicability or fee calculation. That outcome undermines due process and discourages the careful review necessary to ensure accurate fee remittance.

We therefore recommend that CARB establish a safe harbor for fee payment that allows additional time for good-faith review and dispute resolution. The regulations should: (1) extend the initial fee payment deadline to at least 120 days from the date of invoicing or notice of assessment; (2) provide an automatic safe harbor from penalties where a covered entity is engaged in a good-faith review or challenge of its covered-entity status or fee calculation; (3) suspend accrual of penalties during the pendency of a timely, good-faith dispute or clarification request; and (4) allow entities to remit payment without penalty upon resolution of the dispute within a reasonable period. 069.25

Extending the payment window and incorporating a safe harbor would not impede CARB's ability to administer the program or collect fees. Instead, it would reduce unnecessary disputes, prevent inadvertent noncompliance, and align the fee collection process with the disclosure-oriented nature of SB 253 and SB 261. A more flexible approach would also improve fairness and compliance outcomes while reducing the likelihood of avoidable enforcement actions.

IX. Conclusion

We appreciate the opportunity to comment on CARB's proposed regulations implementing SB 253 and SB 261.

We urge CARB to revise the proposal before proceeding. At a minimum, CARB should complete the SRIA required for major regulations using a realistic accounting of direct compliance costs, adopt reporting timelines that reflect fiscal-year variability and growing data complexity, and ensure fees remain strictly limited to actual and reasonable implementation and administration costs authorized by Health and Safety Code sections 38532 and 38533. CARB should also narrow and clarify the enforcement, penalty, and audit provisions to align with the disclosure-based nature of these statutes and applicable statutory limits. Finally, CARB should add codified safe harbors for good-faith compliance (including a longer fee-payment window and tolling during good-faith disputes). Thank you for your consideration of these comments. 069.26 069.27 069.28 069.29 069.30

If you have any questions or would like to discuss the above comments, please feel free to reach out to me at jonathan.kendrick@calchamber.com.

Sincerely,

Jon Kendrick
Policy Advocate
California Chamber of Commerce

And on Behalf of the Following Organizations

African American Farmers of California
Agricultural Council of California
American Chemistry Council
Dairy Institute of California
Energy Infrastructure Council
California Chamber of Commerce
California Construction and Industrial Materials Association
California Cotton Ginners and Growers Association
California Dates Commission
California Grocers Association
California Hospital Association
California Independent Petroleum Association
California League of Food Producers
California Retailers Association
California Strawberry Commission
California Tomato Growers Association
Nisei Farmers League
Plumbing Manufacturers International
Specialty Equipment Market Association
Western Growers Association
Western Plant Health Association
Western Tree Nut Association
Wine Institute

JK:nr

February 9, 2026

Lauren Sanchez
Chair
California Air Resources Board
1001 I St.
Sacramento, CA 95814

Submitted electronically

RE: CRA Response to Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation (Notice), Staff Report (Initial Statement of Reasons), and Proposed Regulatory Text

The California Retailers Association (CRA) appreciates the opportunity to continue to provide comments on the rulemaking for Senate Bills 253 and 261, as Amended by SB 219, California's Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs.

CRA is the only statewide trade association representing all segments of the retail industry including general merchandise, department stores, mass merchandisers, on-line marketplaces, restaurants, convenience stores, supermarkets and grocery stores, chain drug and specialty retail such as auto, vision, jewelry, hardware and home stores. The California Retailers Association works on behalf of California's retail industry, a driving force of California's economy, with over 400,000 retail establishments, an annual gross domestic product of $330 billion and one fourth of California's total employment.

The retail industry is committed to the goals of SBs 253 and 261 as amended by SB 219 and has made investments in sustainability practices and appreciates the opportunity to participate in the rulemaking process for California's Corporate Climate Reporting Regulations.

Below are CRA's comments and concerns that remain following CARB's Proposed California Corporate GHG Reporting and Climate-Related Financial Risk Disclosure Initial Regulation, Staff Report and proposed regulatory text, which were sent to the California Office of Administrative Law (OAL) on December 9, 2025 and following OAL's subsequent publishing of the Notice on December 26, 2025, which initiated the current 45-day public comment period that these comments apply to.

We look forward to ongoing dialogue and are happy to make our subject matter experts available to answer specific questions or provide additional information that may be useful as CARB moves forward with finalizing California's Corporate Climate Reporting regulations.

1121 L Street, Suite 607 Sacramento, CA 94814 • P:916/443-1975 • www.calretailers.com •
cra@calretailers.com

New and Remaining Concerns and Requested Changes to the Regulations

I. Gross Receipts Should Exclude Intercompany Transactions

§ 96072. (13) "Revenue" has the same meaning as "gross receipts" under section 25120(f)(2) of the California Revenue and Taxation Code. *Gross receipts should exclude any intercompany transactions as defined under Cal. Code Regs. 25106.5-1(b)(1).*

070.1 When intercompany sales are excluded, the scoping results will match the tax filing for taxpayers filing a California combined return (i.e. the entity and revenue total used for scoping would be the same as the revenue included in a company's tax filing), which is required pursuant to California tax law. If intercompany sales are included, there is a misalignment between which subsidiaries are doing business for California tax purposes.

For example, an entity may come into scope based on intercompany sales that is not listed in a company's tax filing or has a different revenue total on our tax filing where those sales are eliminated. If intercompany sales are included, CARB would not be able to verify reporting entity lists with the Franchise Tax Board records. Additionally, since partnerships are subject to the fee, any revenue flowing from the partnership to the partner/owners should be excluded to avoid double counting the revenue at entities that are subject to the fee.

II. Calculation of Fees

§ 96073. The current fee structure does not achieve the stated goal of the law because it assesses the fee
070.2 based on corporate structure (i.e., allocates a fee to each entity or subsidiary that meets the criteria for reporting), not at the level of the organization where financial/investment and pollution abatement decisions are made (i.e., parent level for companies that report at the parent level).

III. Use of Definitions

The California Retailers Association recommends aligning key definitions in the regulation with widely accepted international reporting standards, for example:

070.3
- Using the GHG Protocol definitions for Scope 1 and Scope 2 emissions

070.4
- Defining "subsidiary" in line with International Financial Reporting Standards (IFRS) or Generally Accepted Accounting Principles (US GAAP), rather than relying on the concept of "influence"

CRA's view is that closer alignment with global frameworks would reduce the risk of differing interpretations and support better comparability across companies.

If CARB's Climate Disclosure Team has questions or needs additional information on the issues raised in this letter, please do not hesitate to contact me directly either at 916/443-1975 or Sarah@calretailers.com

Sincerely,

Sarah Pollo Moo
Director, Public Affairs
California Retailers Association

CC: *cotb@arb.ca.gov*

Attachments: Previous Correspondence Sent to CARB for This Rulemaking

October 26, 2025

Submitted Electronically via CARB's Public Docket and via Climatedisclosure@arb.ca.gov.

Re: California Corporate Climate Regulations (Senate Bills 253 and 261 as Amended by SB 219) Draft Reporting Template for Scope 1 and Scope 2 GHG emissions and Other Comments

To CARB Climate Disclosure Team:

The California Retailers Association (CRA) appreciates the opportunity to continue to provide comments on the rulemaking for Senate Bills 253 and 261, as Amended by SB 219, California's Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs.

CRA is the only statewide trade association representing all segments of the retail industry including general merchandise, department stores, mass merchandisers, on-line marketplaces, restaurants, convenience stores, supermarkets and grocery stores, chain drug and specialty retail such as auto, vision, jewelry, hardware and home stores. The California Retailers Association works on behalf of California's retail industry, a driving force of California's economy, with over 400,000 retail establishments, an annual gross domestic product of $330 billion and one fourth of California's total employment.

The retail industry is committed to the goals of SBs 253 and 261 as amended by SB 219 and has made investments in sustainability practices and appreciates the opportunity to participate in the rulemaking process for California's Corporate Climate Reporting Regulations.

Below, CRA summarizes our members' questions, comments and concerns that remain during the rulemaking process as well as previous comments we submitted to CARB that we have has not received responses to. We also included CRA's original responses to CARB's set of questions released earlier this year.

We look forward to ongoing dialogue and are happy to make our subject matter experts available to answer specific questions or provide additional information that may be useful as CARB moves forward with finalizing California's Corporate Climate Reporting regulations.

Remaining Concerns, Questions and Comments on the Draft Corporate Climate Reporting Regulations

I. SB 253 Draft Template

070.5 The California Retailers Association requests confirmation from CARB, related to the draft template for SB 253 compliance CARB published on October 10, that if a company uses a more up-to-date GWP factor than what the template is keyed to (AR6 instead of AR4), would the company still be considered in compliance? We understand that the template is both draft and, for now, optional, but we do want to make sure companies are not being penalized for using more updated GWP factors. The CARB template

is using an outdated version of a standard and many, if not most, companies that fall under SB 253 are using the newer version.

II. "Climate-Related Financial Risk"

The California Retailers Association requests clarity from CARB on the following section regarding SB 261 and "Climate-Related Financial Risk" (see italics below). Following comments submitted on this issue, CARB's August 21, 2025 workshop and review of CARB's FAQs/resources, we still have
070.6 remaining concerns and unanswered questions on the issue of "Climate-Related Financial Risk".

The California Retailers Association is concerned that "Climate-Related Financial Risk" will ask organizations to submit hard numbers on climate disclosures. Many companies do not want to disclose exact numbers due to the costly and overly burdensome operational lift and confidentiality standards.

> *(2) "Climate-related financial risk" means material risk of harm to immediate and long-term financial outcomes due to physical and transition risks, including, but not limited to, risks to corporate operations, provision of goods and services, supply chains, employee health and safety, capital and financial investments, institutional investments, financial standing of loan recipients and borrowers, shareholder value, consumer demand, and financial markets and economic health.*

III. Disclosure Submission

The California Retailers Association requests that CARB provide clarity on the disclosure submission
070.7 timeline. Will disclosure submission be based on a fiscal calendar year or a rolling 12-month timeline? Many companies have a lot of internal confusion on this issue with where the rulemaking sits. We formally submitted this request for clarity in the rulemaking via email (*Climatedisclosure@arb.ca.gov*) on September 10, 2025, and are, again, submitting it in this formal letter.

The California Retailers Association seeks clarity from CARB on whether data is for Fiscal Year or Calendar Year, recognizing that companies have different year ends. CARB needs to keep the time of compiling data as equitable as possible for all companies.

IV. Reporting Deadline (Scopes 1 and 2)

a. January 1, 2026, Deadline

Many companies have challenges with CARB setting a reporting deadline of January 1, 2026, for the 2025 calendar year data in SB 261. It will be difficult for companies to finalize 2025 data and report it
070.8 on January 1st, especially since that is a federal holiday. The California Retailers Association understands CARB has stated "good faith efforts" rather than penalties in the first year of implementation, but we request CARB go further and move the deadline to a date in March 2026, so companies have time to compile full, accurate data with the spirit of ensuring successful compliance.

Additional reasons for compliance difficulty with a January 1, 2026, due date are listed below and were provided to CARB via email (*Climatedisclosure@arb.ca.gov)* on September 11, 2025.

- Retailers have a particular challenge given most fiscal years end in January vs. December.

- For more background, retailers typically receive final (January) utility bills in March/April. Retailers must do iterative calculations which takes weeks to months, then submit them for verification.
- Verification alone takes 6-8 weeks.
- Ultimately, retailers can do some estimating of missing data to meet the time frame, but then there is less accuracy. Since retailers are tracking towards emissions reductions, retailers would prefer to have more accuracy, and our member companies want to successfully comply with California's Corporate Climate Reporting Laws.

In summary: Retailers' preference is for California to align with the CDP voluntary climate disclosure timeline, which allows more time for accurate calculations and verification. An earlier disclosure date could be a challenge for retailers to get the data from their third parties in time.

b. June 30, 2026, Deadline

In CARBs August 21, 2025, public workshop, CARB sought comment on a proposed June 30, 2026, deadline for Scope 1 and 2 emissions reporting. Many retailers' fiscal year doesn't end until the end of February each year, so a June 30 deadline is not feasible. The California Retailers Association proposes either (1) using the previous fiscal year for the reporting requirement (for example by saying that the June 30, 2026, deadline applies to the fiscal year that ended between January 1, 2025 and December 31, 2025) or (2) having a rolling deadline of six months after a company's fiscal year end for their reporting deadline instead of a hard deadline of June 30, 2026. *The California Retailers Association submitted this comment to CARB via email on September 10, 2025.*

070.9

V. Scope 3 Reporting

For Scope 3 emissions, the California Retailers Association is requesting clarity from CARB on whether the Board is expecting all categories to be reported or only those that a company considers material? If CARB hasn't acknowledged that only material categories need to be reported, CRA recommends that CARB clarify that only material Scope 3 categories be required to be reported. *The California Retailers Association also submitted this comment to CARB via email on September 10, 2025.*

070.10

If CARB's Climate Disclosure Team has questions or needs additional information on the issues raised in this letter, please do not hesitate to contact me directly either at 916/443-1975 or Sarah@calretailers.com

Sincerely,

Sarah Pollo Moo Director, Public Affairs
California Retailers Association

Included with this letter:

- California Retailers Association's official responses to CARB's Information Solicitation to Inform Implementation of California Climate-Disclosure Legislation: Senate Bills 253 and 261, as amended by SB 219 released in December 2024

California Retailers Association responses are highlighted in yellow underneath the questions we provided answers for CARB.

Information Solicitation to Inform Implementation of California Climate-Disclosure Legislation: Senate Bills 253 and 261, as amended by SB 219

General: Applicability

1. SB 253 and 261 both require an entity that "does business in California" to provide specified information to CARB. This terminology is not defined in the statutes.
    a. Should CARB adopt the interpretation of "doing business in California" found in the Revenue and Tax Code section 23101?

070.11 The California Retailers Association Response: No, as this does not specify a revenue threshold.

    b. Should federal and state government entities that generate revenue be included in the definition of a "business entity" that "does business in California?"
    c. Should SB 253 and 261 cover entities that are owned in part or wholly owned by a foreign government?
    d. Should entities that sell energy, or other goods and services, into California through a separate market, like the energy imbalance market or extended day ahead market, be covered?

2. What are your recommendations on a cost-effective manner to identify all businesses covered by the laws (i.e., that exceed the annual revenue thresholds in the statutes and do business in California)?
    a. For private companies, what databases or datasets should CARB rely on to identify reporting entities? What is the frequency by which these data are updated and how is it verified?
    b. In what way(s) should CARB track parent/subsidiary relationships to assure companies doing business in California that report under a parent are clearly identified and included in any reporting requirements?

General: Standards in Regulation

3. CARB is tasked with implementing both SB 253 and 261 in ways that would rely on protocols or standards published by external and potentially non-governmental entities.
    a. How do we ensure that CARB's regulations address California-specific needs and are also kept current and stay in alignment with standards incorporated into the statute as these external standards and protocols evolve?

070.12 The California Retailers Association Response: Align with the Task Force on Climate-related Financial Disclosures (TCFD) and ISSB reporting and standardize reporting in alignment with either framework. Additionally, we recommend CARB follow the most updated GHG Protocol standards. If this references external standards and protocols such as the GHG Protocol, the assurance requirements set out by CARB will ensure that company reporting is in alignment with the evolving guidance.

The GHG Protocol was designed in 1998 and is the standard framework for measuring and reporting greenhouse gas emissions, making it the most common method for corporate carbon accounting and reporting globally. Additionally, the Task Force on Climate-Related Financial Disclosure (TCFD) provides guidelines for companies seeking to assess and mitigate their exposure to climate-related risks. Since incorporation of the TCFD into the International Sustainability Standards Board, it provides a structural approach to a complex, highly technical process that involves four themes: governance, strategy, risk management and metrics and targets.

Both standards have a transparent governance process to take feedback, allow for updates and publish a basis for conclusions. CRA recommends that CARB adopt both standards to ease compliance for reporting companies.

    b. How could CARB ensure reporting under the laws minimizes a duplication of effort for entities that are required to report GHG emissions or financial risk under other mandatory programs and under SB 253 or 261 reporting requirements?

The California Retailers Association (CRA) Response: We stress the importance of alignment with existing mandatory regulations and programs. For example, SEC regulation and European Union CSRD, which is the directive on corporate sustainability reporting that empowers the European Union Commission to adopt delegated and implementing acts to specify how competent authorities and market participants shall comply with the obligations laid down in the directive. In particular, CRA stresses the importance of aligning Scope 3 emission reporting and assurance:

070.13
- As currently written, CA requires limited assurance in 2030 whereas SEC regulation requires reasonable assurance in 2034.
- As currently written and understood, CA requires disclosure and verification on all categories of Scope 3, but later references the use the GHG Protocol to comply, which refers to disclosing relevant categories of

Scope 3 emissions. Clarity will be necessary in the final draft of CARB's regulations.

The use of "relevant" categories is similar in CSRD, which requires disclosure of significant categories of Scope 3.

Additionally, CRA recommends CARB outsource to a third party like CDP for reporting emissions so companies aren't disclosing the same information in multiple places. Similarly, since SB 261 is TCFD-aligned, CARB can access the TCFD disclosure in a company's annual ESG report to satisfy this requirement. We recommend CARB accept the CDP Climate reporting in accordance with TCFD guidance.

c. To the extent the standards and protocols incorporated into the statute provide flexibility in reporting methods, should reporting entities be required to pick a specific reporting method and consistently use it year-to-year?

The California Retailers Association (CRA) Response: Given the multitude of frameworks and protocols in the statute, CRA recommends CARB provide companies with the flexibility to adjust their reporting methods year over year with a constantly changing and evolving reporting environment. There are
070.14 times when retailers change methods as data collection improves. If retailers change methods, similar to standard accounting procedures, companies should be able to explain the reasoning behind the change.

Flexibility with the option for companies to utilize common reporting disclosures as the basis for compliance (i.e., CDP questionnaire) would be ideal. Additionally, companies are always looking for opportunities to standardize across jurisdictions to ease the patchwork of regulations that are being adopted at the state-level across the country. CRA recommends CARB utilize common reporting disclosures to allow for consistency and efficiencies.

General: Data Reporting

4. To inform CARB's regulatory processes, are there any public datasets that identify the costs for voluntary reporting already being submitted by companies? What factors affect the cost or anticipated cost for entities to comply with either legislation? What data should CARB rely on when assessing the fiscal impacts of either regulation?

The California Retailers Association (CRA) Response: Anticipated costs are impacted by the usage of carbon accounting/ESG data platforms, associated set up/management fees, and related headcount requirements. Additional costs include consultant labor to obtain and analyze relevant data and develop reports.

For companies that have not completed a GHG inventory and set targets, this reporting will be significantly more expensive initially. Costs depend on business size, where a company does business, whether a company has in-house staff to conduct the assessment and subsequent reporting, the variety of a company's product categories, and more. For example, a company that sells consumer goods must evaluate the environmental/GHG impact of the use and disposal of those goods.

070.15 The number of approved assurance providers will also impact costs (e.g., if only the big 4 are allowed, costs will go up).

Requiring reasonable vs limited assurance will drive costs. Reasonable assurance will be more expensive and burdensome from both an audit and resources perspective. CRA is concerned about labor costs if enough time is not allowed following the end of the fiscal year for reporting – at least 180 days is recommended.

CRA recommends CARB conduct a survey or study to determine what the costs are today for companies to do climate disclosures - consultants, submission fees, audit fees, tech platforms, etc.

5. Should the state require reporting directly to CARB or contract out to an "emissions" and/or "climate" reporting organization?

The California Retailers Association (CRA) Response: Many entities already report emissions through CDP. This tool could be leveraged and reporting companies could select an option to share emissions to
070.16 CARB through the CDP portal. CARB could outsource to another third party like CDP for reporting, so companies aren't disclosing the same information in multiple places.

Alternatively, if CARB maintains a disclosure website for SBs 253 and 261, companies that include Scope 1-3 emissions and TCFD disclosure in their annual ESG report should be given the option to provide a link to the report on the CARB disclosure website to satisfy reporting requirements for both SBs253 and 261.

CRA recommends CARB allow for CDP Climate reporting to "count" in lieu of direct reporting and therefore reduce additional workload for companies that are already voluntarily reporting. We urge the Board to explore the option to use the CDP platform for all emissions reporting so reporting is consolidated under one resource.

CRA would also recommends CARB allow companies to utilize Workiva or CDP (where a data feed transferred over more "seamlessly"); conversely, CRA would also prefer that it is not aligned to CSRD reporting, as many companies are not currently beholden to those disclosure regulations.

Retailer companies want to use the platforms they already use (e.g. S&G report, website, etc).

6. If contracting out for reporting services, are there non-profits or private companies that already provide these services?

070.17 The California Retailers Association (CRA) Response: CARB should outsource to a third party like CDP for reporting, so companies aren't disclosing the same information in multiple places. CDP https://www.cdp.net/en

Any standardization would need to happen by industry. CRA requests that Scope 3 does not require assurance and reiterates that retail companies should be able to use their existing platforms (e.g. S&G report, etc).

SB 253: Climate Corporate Data Accountability Act

7. Entities must measure and report their emissions of greenhouse gases in conformance with the GHG Protocol,[1] which allows for flexibility in some areas (i.e. boundary setting, apportioning emissions in multiple ownerships, GHGs subject to reporting, reporting by sector vs business unit, or others). Are there specific aspects of scopes 1, 2, or 3 reporting that CARB should consider standardizing?

070.18 The California Retailers Association (CRA) Response: Boundaries, market vs. location-based scope 2 emissions, and different scope 3 categories should be taken into consideration. CRA recommends CARB consider whether the reporting should include US operations only or global operations. For companies that have a global footprint, it will prove challenging to separate the two.

We recommend CARB allow companies to follow pre-established guidance and existing framework outlined in the GHG Protocol or other established accounting standards, which allow for flexibility, but are credible and widely accepted and used and to avoid introducing separate standards.

If various states set state specific "standards" this will become a very complex reporting landscape. The existing frameworks allow for consistency across all reporting requirements.

Fiscal year is preferred. Retailers also need enough time (180 days) after the fiscal year ends to ensure

companies can report.

8. SB 253 requires that reporting entities obtain "assurance providers." An assurance provider is required to be third-party, independent, and have significant experience in measuring, analyzing, reporting, or attesting in accordance with professional standards and applicable legal and regulatory requirements.
    a. For entities required to report under SB 253, what options exist for third-party verification or assurance for scope 3 emissions?

070.19 The California Retailers Association (CRA) Response: CRA recommends Assurance, which allows the ISO standard - standard for emissions - or other established accounting standards like ISAE. Many assurance vendors exist and are experts in GHG emissions assurance, which differs from financial assurance. CRA urges CARB to not use SB 253 to mandate that companies use a Big 4 accounting firm for emissions assurance. Additional options for standard verification/assurance providers are: Keramid Standard, KPMG and Apex.

    b. For purposes of implementing SB 253, what standards should be used to define limited assurance and reasonable level of assurance? Should the existing definition for "reasonable assurance[2]" in MRR be utilized, and if not why?

070.20 The California Retailers Association (CRA) Response: The existing definitions of reasonable vs. limited assurance should remain as those are the standards that companies have already been using to inform their assurance reports.

Assurance allows ISO standard, which is standard for emissions, or other established accounting standards. CRA recommends CARB establish definitions for limited and reasonable assurance, which have been in place for emissions verification for many years. There is no need to create something new.

The ability to use commonly-accepted assurance standards is preferred (i.e., AICPA standards, ISO standards, international standards, etc). The International Auditing and Assurance Standards Board (IAASB) is the comprehensive standard for both reasonable and limited assurance engagements on non-financial information.

Some assurance providers only use certain standards so clarity on acceptable standards, as well as provider qualifications is needed.

Additional clarity about the reporting requirements is needed for retailers to estimate costs (e.g., a mandate to use a big 4 accounting firm would increase company costs of compliance).

It is better to keep at limited assurance. Jumping to "reasonable assurance" will be more expensive and resource-intensive for companies.

9. How should voluntary emissions reporting inform CARB's approach to implementing SB 253 requirements? For those parties currently reporting scopes 1 and 2 emissions on a voluntary basis:
    c. What frequency (annual or other) and time period (1 year or more) are currently used for reporting?

070.21 The California Retailers Association (CRA) Response: Annual reporting on one fiscal year of data is the frequency and time period currently being used for reporting.

The timing for reporting should be relative to a company's fiscal year close in order to allow time for companies to calculate and assure data. October would be recommended since it aligns with CDP disclosure, which many companies are already reporting to. Major annual reporting requirements are 180 days or more for retail companies.

    d. When are data available from the prior year to support reporting?

070.22 The California Retailers Association (CRA) Response: Historically, emissions data becomes available at the end of February or early March (throughout Q1 and sometimes even into Q2) and is not finalized until early Summer. This then requires verification. Therefore, data is not ready to be reported typically until six months following the fiscal year end. This can range from late July to late August or in October to align with CDP Climate disclosure timeline.

    e. What software systems are commonly used for voluntary reporting?

070.23 The California Retailers Association (CRA) Response: Software systems commonly used for voluntary reporting emissions data in an annual ESG Report include: Watershed, Persefoni, Net Zero Cloud, Carbon Trail, Schneider Electric, Workiva, CDP Climate, S&P Global's CSA, and other voluntary ESG surveys. Some companies still do calculations in Excel. GHG calculations are performed in these software systems and reported through the CDP Climate disclosure platform.

SB 261: Climate Related Financial Risk Disclosure

10. For SB 261, if the data needed to develop each biennial report are the prior year's data, what is the appropriate timeframe within a reporting year to ensure data are available, reporting is complete, and the necessary assurance review is completed?

070.24 The California Retailers Association (CRA) Response: The timeframe should be at least six months following a company's fiscal year end and align with timing for SB 253 and CDP deadlines. Synchronizing timing for these bills will minimize the reporting burden on companies.

[1] https://ghgprotocol.org/
[2] "Reasonable Assurance" under MRR means a "high degree of confidence that submitted data and statements are valid.

11. Should CARB require a standardized reporting year (i.e., 2027, 2029, 2031, etc.), or allow for reporting any time in a two-year period (2026-2027, 2028-2029, etc.)?

12. SB 261 requires entities to prepare a climate-related financial risk report biennially. What, if any, disclosures should be required by an entity that qualifies as a reporting entity (because it exceeds the revenue threshold) for the first time during the two years before a reporting year?

The California Retailers Association (CRA) Response: CRA recommends CARB begin with Scope 1 & 2 emissions for year one and provide a two-year cycle grace period for other climate related financial risks and metrics such as scenario analysis and quantification of material risks.

070.25

13. Many entities that are potentially subject to reporting requirements under SB 261 are already providing other types of climate financial risk disclosures.
    f. What other types of existing climate financial risk disclosures are entities already preparing?

The California Retailers Association (CRA) Response: Existing climate financial disclosures companies are already preparing include: ISSB, ESG Reports, 10K reports, Proxy statements, CDP Climate and Corporate Responsibility Reporting following Task Force on Climate-Related Financial Disclosures (TCFD) guidelines.

070.26

    g. For covered entities that already report climate related financial risk, what approaches do entities use?

The California Retailers Association (CRA) Response: Companies are using the following approaches: Climate risk/scenario analysis; Enterprise Risk Management; EU Taxonomy. CRA recommends that CARB allow companies to align the definition of materiality / substantive impact with existing company frameworks, such as enterprise risk management or other financial reporting frameworks across the organization. This approach aligns with CSRD.

070.27

    h. In what areas, if any, is current reporting typically different than the guidance provided by the Final Report of Recommendations of the Task Force on Climate-related Financial Disclosures?

070.28 The California Retailers Association (CRA) Response: Aligned with TCFD.

    i. If not consistent with the Final Report of Recommendations of the Task Force on Climate-related Financial Disclosures, are there other laws, regulations, or listing requirements issued by any regulated exchange, national government, or other governmental entity that is guiding the development of these reports?

070.29 The California Retailers Association (CRA) Response: CSRD; ISSB/IFRS S2. TCFD is folding into the IFRS Foundation standard: https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/

Respondents may also provide any additional information they feel is important to inform staff's work to

070.30 Additional, over-arching comments and concerns by the California Retailers Association (CRA) include:

Top priorities in rulemaking for CRA are:

1. Maintain reporting based on Fiscal Year
2. Provide sufficient timing to report (minimum 180 days). Businesses need enough time (180 days) after the fiscal year ends to ensure they can gather data, complete calculations, and obtain assurance
3. "Reasonable assurance" level creates biggest cost burden.
4. Compliance Costs: Overly complex requirements could lead to the need for implementing costly new systems and processes. Retailers would need to invest in new software, hire additional staff, or seek external consultants to ensure compliance.
5. Scope 3 Emissions: Although not immediately required, future reporting of Scope 3 emissions (indirect emissions from the entire value chain) is a significant concern. Retailers will need to engage with suppliers and other partners to gather this data, which can be complex and time-consuming. We will need clearly defined thresholds to exempt small and medium sized businesses.
6. Defining Materiality: Retailers need strong indicators of what is material and what is not, as well as acceptable methods for screening Scope 3 emissions. This will help ensure that the reporting is both accurate and relevant, and that it meets regulatory expectations.
7. Subsidiary of Parent Company Reporting Obligations: The inclusion of non-California subsidiaries in the parent company's emissions reporting significantly increases the data collection and reporting burden, creates operational discrepancies, requires additional resources, leads to regulatory overlap, and exposes companies to reputational risks due to potential misinterpretation of consolidated data. Additionally, these subsidiaries may be immaterial to the overall emissions profile, making their inclusion unnecessary and burdensome.

Companies currently disclose Scope 1 and 2 GHG emissions, and two categories of Scope 3 GHG emissions in its annual voluntary sustainability report and all Scopes and applicable categories of emissions through CDP. Companies evaluate whether their current disclosures would comply with all specific information and data required under the California laws, acknowledging that much of the information and data they disclose does conform in principle with the California laws' requirements.

Sustainability consultants assist companies with their GHG emissions data gathering and calculations, and obtain limited assurance over their disclosed emissions from third-party assurance providers. Costs associated with these services are contemplated within companies' disclosure to CDP and not

necessarily related to additional disclosures that would be required by the California climate-related disclosure laws.

Nonetheless, costs associated with additional external service providers, such as those for financial-related guidance and support, as well as assurance, may be incurred and are unascertainable at present time.

In addition to these general statements and concerns regarding SBs 253 and 261, CRA has questions about CARB's expectations for compliance with the requirements of the California climate-disclosure laws, in particular those included in SB 261:

- Does CARB expect the "biennial report" to cover a two-year period?
- Would a report issued "at least every two years" with annual information and data, which aligns with typical reporting commitments by a large-cap company, satisfy the "biennial report" obligation?
- Will disclosures under SB 261 need to be standardized across respondents?
- If CARB expects a standard format for SB 261 reports, will the Board issue a template for completion by responding entities?
- If a company responds to the annual CDP questionnaire, which itself is aligned with the TCFD recommendations and the ISSB IFRS S2 climate standard, could that company publish a copy of its CDP response on its own website to satisfy the requirements of SB 261?

Further, CRA has questions about CARB's expectations for compliance with the requirements of the GHG emissions disclosures and specific formatting for regulations to be promulgated under SB 253:

- Given CARB's focus on minimizing the duplication of efforts for entities that are required (or elect) to disclose emissions (and financial risk) under other programs, could compliance be satisfied through the sharing of existing disclosures, such as those submitted to CDP?
- Is CARB considering allowing for qualitative explanation to accompany emissions data?
- If CARB requires disclosers to follow a specific methodology or protocol, and that methodology or protocol is not one currently used by a company, will CARB grant a "grace period" for disclosures to allow for companies to change their approach on capturing and reporting relevant GHG emissions data?

February 9, 2026

California Air Resources Board
Clerk's Office
1001 I Street
Sacramento, California 95814

Re: Public Comment on Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear California Air Resources Board (CARB):

We appreciate the opportunity to comment on CARB's "Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation" ("Proposed Regulation").[1] We are legal scholars affiliated with the Elisabeth Haub School of Law at Pace University and Stanford Law School.[2] Our scholarship focuses on the role of the legal industry in global climate change.[3] As part of this work, we study law firms' "advised emissions"—the greenhouse gas (GHG) emissions associated with projects and matters on which lawyers advise.[4]

We write to urge CARB to clarify how this Proposed Regulation, the Climate-Related Financial Risk Act (S.B. 261), and the Climate Corporate Data Accountability Act (S.B. 253) apply to U.S. law firms. As we explain below, it appears that at least some large U.S. law firms may be considered "reporting" entities for S.B. 253 under the Proposed Regulation.[5] We therefore request that CARB (1) develop a list of law firms that are "covered" and "reporting" entities for S.B. 261 and S.B. 253, respectively; and (2) publish this list separately or update CARB's existing "Preliminary List of Reporting/Covered Entities" to include law firms and other limited liability partnerships or professional corporations.[6] 071.1

[1] *Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation*, CAL. AIR RESOURCES BOARD (Dec. 23, 2025), https://ww2.arb.ca.gov/rulemaking/2025/california-corporate-greenhouse-gas-reporting-and-climate-related-financial-risk [https://perma.cc/XZD2-TKPE].

[2] This document does not purport to present the views, if any, of Elisabeth Haub School of Law at Pace University, Pace University, Stanford Law School, or Stanford University. The authors' information is included in the signature.

[3] *See* Camila Bustos, *Representing Climate Wreckers*, 33 N.Y.U. ENV'T L.J. 157 (2025); Camila Bustos, *The Role of Lawyers and Law Firms*, *in* THE OXFORD HANDBOOK OF CLIMATE CHANGE AND PRIVATE LAW 3-4 (Douglas Kysar & Ernest Lim eds., forthcoming 2026); Alisa White, *Advised Emissions*, STAN. ENV'T L.J. (forthcoming 2026), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5376346. When they were law students, Professors Bustos and White also co-authored and developed the methodology for the first Law Firm Climate Change Scorecard. LAW STUDENTS FOR CLIMATE ACCOUNTABILITY, THE 2020 LAW FIRM CLIMATE CHANGE SCORECARD (2020), https://www.ls4ca.org/scorecard [https://perma.cc/TCZ6-KRN2].

[4] *See* Tracy Hester, *Can Counselors Be Complicit?*, 41 ENV'T L.F. 38 (2024); *The Impact of Climate Change on Solicitors*, THE LAW SOCIETY (Apr. 19, 2023), https://www.lawsociety.org.uk/topics/climate-change/impact-of-climate-change-on-solicitors [https://perma.cc/5GQN-4YMR].

[5] We decline to comment further at this time on how S.B. 261 may apply to law firms.

[6] *Posted: Preliminary List of Reporting/Covered Entities and Stakeholder Survey*, CAL. AIR RESOURCES BOARD (Sep. 24, 2025, at 14:54 PT), https://content.govdelivery.com/accounts/CARB/bulletins/3f42d2c [https://perma.cc/JN54-GK5D].

It appears that at least some large U.S. law firms may be reporting entities for S.B. 253, based on the Proposed Regulation.[7] S.B. 253 defines a "reporting entity" as a "partnership, corporation, limited liability company, or other business entity formed under the laws of this state, the laws of any other state of the United States or the District of Columbia, or under an act of the Congress of the United States with total annual revenues in excess of one billion dollars ($1,000,000,000) and that does business in California."[8] This definition explicitly covers partnerships and corporations, which are typical U.S. law firm structures.[9] In California, for example, a law firm can be structured as a Professional Corporation or Limited Liability Partnership (LLP).[10]

071.2

Some large U.S. law firms may also meet the next part of the "reporting entity" definition: they have "total annual revenues in excess of one billion dollars."[11] The Proposed Regulation defines "revenue" as "gross receipts," per Section 25120(f)(2) of the California Revenue and Taxation Code.[12] As CARB has noted in an FAQ, "[r]evenue considers total gross receipts, regardless of whether the revenue was generated within California."[13] At the time of writing this comment, the authors do not have access to law firms' exact gross receipts from their tax filings for purposes of this definition.[14] But the publicly available data suggests that the annual gross receipts of some large U.S. law firms may be in excess of $1 billion. The Am Law 100 reports that, in 2024, fifty-eight law firms in the United States had gross revenue of $1 billion or more.[15]

At least some of the large U.S. law firms with over $1 billion in annual revenue may do business in California, meeting the final part of the "reporting entity" definition.[16] The Proposed

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[7] Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation, § 96072(a)(5), (11) [hereinafter *Proposed Regulation*].
[8] CAL. HEALTH & SAFETY CODE § 38532(b)(2); *Proposed Regulation* § 96072(a)(11) (same).
[9] *See* Lynn Bai & Sarah Harden, *Limited Liability Partnerships: An (Overlooked) Hole in the Shield*, 23 U. PA. J. BUS. L. 862 (2021) ("At least eighty-five percent of the top 350 law firms in the U.S. are formed as LLPs . . . .").
[10] *See* CAL. CORPORATIONS CODE § 16953; Cal. Bar, tit. 3, R. 3.150-3.161, https://www.calbar.ca.gov/legal-professionals/rules/rules-state-bar/title-3-programs-and-services/chapter-3-law-corporations. In California, law firms may not adopt a Limited Liability Company (LLC) structure. *See* CAL. CORPORATIONS CODE § 17375 (preventing LLCs in California from "render[ing] professional services").
[11] CAL. HEALTH & SAFETY CODE § 38532(b)(2).
[12] *Proposed Regulation* § 96072(a)(13).
[13] *California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs: Frequently Asked Questions About Regulatory Development and Initial Reports*, CAL. AIR RESOURCES BOARD, (Nov. 17, 2025), https://ww2.arb.ca.gov/sites/default/files/classic/FAQs%20Regarding%20California%20Climate%20Disclosure%20Requirements_Nov.pdf [https://perma.cc/Z375-VEYH].
[14] *See id.* ("To determine the gross receipts, entities should reference their corporate tax filings."); *SB 253/261/219 Public Workshop: Update on California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs*, CAL. AIR RESOURCES BOARD (Nov. 18, 2025), https://ww2.arb.ca.gov/sites/default/files/classic/SB%20253%20261%20Nov%20Workshop%20slides_v2.pdf (describing total revenue as gross receipts listed on a partnership's Form 565 tax filing with California's Franchise Tax Board).
[15] *The 2025 Am Law 100: Ranked by Gross Revenue*, LAW.COM (Apr. 15, 2025), https://www.law.com/americanlawyer/2025/04/15/the-2025-am-law-100-ranked-by-gross-revenue/. In 2023, fifty-four firms posted gross revenue of $1 billion or more. *The 2024 Am Law 100: Ranked by Gross Revenue*, LAW.COM (Apr. 16, 2024), https://www.law.com/americanlawyer/2024/04/16/the-2024-am-law-100-ranked-by-gross-revenue/. We include both years because the Proposed Regulation states that an "entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue." *Proposed Regulation* § 96072(a)(11).
[16] CAL. HEALTH & SAFETY CODE § 38532(b)(2).

Regulation defines "doing business" as "actively engaging in any transaction for the purpose of financial or pecuniary gain or profit."[17] For-profit law firms are "doing business" through their sale of legal services. The Proposed Regulation further defines doing business in California as "doing business" and either: (1) the business entity is "organized or commercially domiciled" in California or (2) the business entity's sales in California exceed the lesser of 25% of total sales or an inflation-adjusted threshold amount—$735,019 in 2024 dollars.[18] We anticipate that some large U.S. law firms may meet one or both of these criteria. For one example, the law firm Gibson, Dunn & Crutcher LLP, which reported gross revenue of over $3.5 billion in 2024, may be organized or commercially domiciled in California as it appears to be headquartered and have its primary place of business in Los Angeles.[19] At this time, the authors do not have access to California sales data for large U.S. law firms reporting over $1 billion in gross annual revenue. But, based on the extent of their revenue, it stands to reason that at least some of these firms may have annual sales of over $735,019 in California.

Finally, none of the applicability exceptions listed in Section 96071(b) of the Proposed Regulation appear to apply to for-profit U.S. law firms. We further note that other professional service providers, including multiple consulting companies, already appear on CARB's "Preliminary List of Reporting/Covered Entities."[20]

Altogether, this analysis suggests that at least some large U.S. law firms may be reporting entities for S.B. 253. We therefore request the following from CARB: (1) develop a list of law firms that are "covered" or "reporting" entities for S.B. 261 and S.B. 253, respectively; and (2) publish this list separately or update CARB's existing "Preliminary List of Reporting/Covered Entities" to include law firms and other limited liability partnerships or professional corporations.[21] As S.B. 253 states, "California investors, consumers, and other stakeholders deserve transparency from companies regarding their greenhouse gas (GHG) emissions to inform their decisionmaking."[22]

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[17] *Proposed Regulation* § 96072(a)(7); CAL. REVENUE & TAXATION CODE § 23101(a).
[18] *Proposed Regulation* § 96072(a)(8); CAL. REVENUE & TAXATION CODE § 23101(b)(1), (2); *see* CAL. AIR RESOURCES BOARD, *supra* note 14 (describing "inflation adjusted thresholds of seven hundred thirty-five thousand and nineteen ($735,019)" in sales); *see Doing Business in California*, STATE OF CAL. FRANCHISE TAX BOARD (Nov. 27, 2025), https://www.ftb.ca.gov/file/business/doing-business-in-california.html [https://perma.cc/NKV9-WDS2]. The term "sales" includes the "gross amounts realized" for "the performance of services." CAL. REVENUE & TAXATION CODE § 25120(f). Please note that the threshold amount of sales is adjusted for inflation annually.
[19] *The 2025 Am Law 100: Ranked by Gross Revenue*, LAW.COM (Apr. 15, 2025), https://www.law.com/americanlawyer/2025/04/15/the-2025-am-law-100-ranked-by-gross-revenue/; *see The Monitor*, GIBSON DUNN (Apr. 5, 2023), https://themonitor.gibsondunn.com/privacy-statement/ [https://perma.cc/VD8Z-RJMM] (a Gibson Dunn publication identifying "registered office at 333 South Grand Avenue, Los Angeles, CA 90071-3197"); *Registration Statement Pursuant to the Foreign Agents Registration Act of 1938*, GIBSON, DUNN & CRUTCHER (Sept. 4, 2024 at 17:15 ET), https://efile.fara.gov/docs/7454-Registration-Statement-20240904-1.pdf [https://perma.cc/YT3K-AS63] (listing Los Angeles, California office as location of primary business address); *Gibson Dunn & Crutcher LLP*, THE LAW SOCIETY, https://solicitors.lawsociety.org.uk/office/496085/gibson-dunn-crutcher-llp [https://perma.cc/YMA7-DD2R] (last visited Feb. 7, 2026) (listing Gibson Dunn's "[h]ead office" as the office in Los Angeles, California); *Gibson, Dunn & Crutcher*, FORBES (Dec. 17, 2025 at 06:30 ET), https://www.forbes.com/companies/gibson-dunn-crutcher/ [https://perma.cc/K3A5-AJL4] (listing the firm as "[h]eadquartered in Los Angeles").
[20] CAL. AIR RESOURCES BOARD, *supra* note 6 (listing consulting groups including The Boston Consulting Group, Atlas Technical Consultants, and others).
[21] *Id.*
[22] Climate Corporate Data Accountability Act, CAL. HEALTH & SAFETY CODE § 38532 S.B. 253 § 1(e).

This entails transparency from all reporting entities, including any U.S. law firms that meet the statutory and regulatory requirements.

We conclude with a note on different types of GHG emissions from law firms. Some of law firms' GHG emissions stem from their business operations, including natural gas and refrigerant losses from firm offices, purchased electricity, and vehicle and air travel for business purposes.[23] But the bulk of law firms' GHG emissions are indirect, *advised emissions*—the greenhouse gas emissions associated with projects and matters on which lawyers advise.[24] These are also known as "[s]erviced emissions"—GHG emissions "arising from or impacted by client activities that are informed or enabled by the advice or services of a professional service provider."[25] Professional service providers include law firms, consultants, and advertisers, among others. 071.4

Law firms currently provide indispensable services to fossil fuel and other GHG-emitting projects, including advising on project finance and permitting. Without these legal services, those projects would not operate and produce GHG emissions. Law firms' advised emissions have recently come under greater scrutiny internationally, as the Law Society of England and Wales has issued guidance stating that, "For lawyers, the most significant GHG emissions associated with [their] organisation[s] are likely to be emissions associated with the matters upon which they advise . . . . "[26] These advised emissions could ultimately be considered scope 3 GHG emissions, as they are downstream emissions from the use of the law firm's sold product—legal services for fossil fuel and other GHG-emitting projects.[27] Advised emissions are an emerging topic, and we look forward to future opportunities to engage with CARB on the topic.

In sum, we believe that law firms and the legal industry in California could benefit from additional guidance on how the Proposed Regulation, S.B. 261, and S.B. 253 apply to law firms. We look forward to your response. 071.5

Sincerely,

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[23] *See, e.g.* FRESHFIELD SECR CARBON FOOTPRINT REPORT, FRESHFIELDS LLP (Aug. 15, 2025), https://www.freshfields.com/globalassets/about-us/rb/reports/freshfields-secr-carbon-footprint-report-2024-2025.pdf [https://perma.cc/PD78-PVLE] (a law firm reporting their Scope 1, 2, and 3 GHG emissions under the United Kingdom's Streamlined Energy & Carbon Reporting for May 2024 to April 2025).

[24] THE LAW SOCIETY, *supra* note 4. We hope to provide additional comments on advised emissions quantification when CARB releases it draft regulations on Scope 3 emissions reporting for S.B. 253.

[25] *The Serviced Emission Hub*, OXFORD NET ZERO, https://netzeroclimate.org/research/serviced-emissions-hub/ [https://perma.cc/JPN2-KPZH] (last visited Feb. 7, 2026); *see also* UN RACE TO ZERO, CATALYSING CLIMATE ACTION: THE ROLE OF PROFESSIONAL SERVICE PROVIDERS IN REALIZING A NET-ZERO FUTURE 6-7, 9-11, 16-17 (2024) (noting that "Serviced Emissions are likely to be the main type of GHG emissions associated with [Professional Service Providers]").

[26] THE LAW SOCIETY, *supra* note 4.

[27] *See* GREENHOUSE GAS PROTOCOL, CORPORATE VALUE CHAIN (SCOPE 3) ACCOUNTING AND REPORTING STANDARD 5 (2013) (identifying "use of sold products" as part of Scope 3 emissions); *id.* at 36 (summarizing GHG Protocol Category 11 as emissions from the "[e]nd use of goods and services sold by the reporting company"); *id.* at 48.

Davis Wright Tremaine LLP (Stacey Sprenkel)

Davis Wright Tremaine LLP provides the attached comments.

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February 9, 2026

Climate Disclosure
California Air Resources Board (CARB)
1001 I Street Sacramento, CA 95814

Uploaded to CARB comment portal

RE: Comments on Proposed Regulations implementing the California Corporate Greenhouse Gas Reporting Program (Senate Bill 253) and the Climate-Related Financial Risk Disclosure Program (Senate Bill 261)

On behalf of a diverse array of clients represented by Davis Wright Tremaine LLP, we submit these comments regarding the proposed regulations implementing the Corporate Greenhouse Gas Reporting Program (Senate Bill ("SB") 253) and the Climate-Related Financial Risk Disclosure Program (SB 261). To be consistent with both statutes and to clarify which entities are "reporting entities" and/or "covered entities" under the law, we request that the California Air Resources Board (CARB) consider the following recommendations.

A. Amend the definitions of "doing business" and "doing business in California" to reduce confusion and provide clarification regarding which entities are "reporting entities" and/or "covered entities."

072.1

As proposed, section 96072(a)(7) states: "'[d]oing business' shall have the same definition as set forth in section 23101(a) of the California Revenue and Taxation Code." Proposed section 96072(a)(8) defines "[d]oing business in California" as "doing business and meeting either of the criteria set forth in subsections 23101(b)(1) or 23101(b)(2) of the California Revenue and Taxation Code."

The adoption of these definitions from the Revenue and Taxation Code (RTC) would present two significant challenges requiring clarification so that entities know whether they will be considered a "reporting entity" (under SB 253) or a "covered entity" (under SB 261).

First, RTC section 23101 is focused on whether a "taxpayer" is doing business in California, and the term "taxpayer" under the RTC may not be the same thing as "entity" under SB 253 and 261. "Taxpayer" is defined in RTC section 23037 as a person subject to the State's corporate income taxes. Staff should ensure that the application of this definition is consistent with the enabling statute. The statutory language is clear that the "reporting entity" or "covered entity" is a single entity, which may in some cases be inconsistent with the "taxpayer" concept. It would thus be appropriate to substitute the word "entity" for the word "taxpayer" so that the definitions are consistent with SB 253 and SB 261. We propose that CARB revise the definition in section 96072(a)(8) as follows:

> "Doing business in California" means doing business and meeting either of the criteria set forth in subsections 23101(b)(1) or 23101(b)(2) of the California Revenue and Taxation Code. For purposes of this section, the term "taxpayer" in subsection 23101(b) is substituted with the term "entity."

Second, CARB should clarify the intended meaning of "doing business" in California in the draft regulation. RTC section 23101(a) defines "doing business" as "actively engaging in any transaction for the purpose of financial or pecuniary gain or profit." RTC section 23101(b) provides a set of objective "tests" to determine whether an entity is "doing business." Staff has indicated that rather than adopting the definition in RTC section 23101 wholesale, it made changes to address concerns that RTC section 23101 was overly broad, "potentially including businesses that conduct too few transactions to merit inclusion under this regulation."[1] For this reason, proposed section 96072(a)(8) makes subsections (a) and (b) of RTC section 23101 conjunctive. This change apparently seeks to narrow the definition of "doing business in California" to include only those entities whose activities in the state are for "financial or pecuniary gain or profit."[2] Yet CARB does not clarify the meaning of "financial or pecuniary

[1] CARB, *Kickoff Workshop: California Corporate Greenhouse Gas Reporting and Climate Related Financial Risk Disclosure Programs* ("Kickoff Workshop"), slide 23 (May 29, 2025), https://ww2.arb.ca.gov/sites/default/files/2025-05/SB%20253%20261%20Workshop%20slides%205-29.pdf.

[2] As currently set forth in the proposed regulation, this distinction/limitation is circular, because RTC section 23101(a) defines "doing business" as "actively engaging in any transaction for the purpose of financial or pecuniary gain or profit," whereas (b) provides a set of objective "tests" to determine whether an entity is "actively engaging in any transaction for the purpose of financial or pecuniary gain or profit."

gain or profit" nor does it provide examples of businesses that *do not* engage in transactions that drive "financial or pecuniary gain or profit."

If RTC section 23101(a) is interpreted to mean *any* transaction that benefits the corporation in any way, then establishing RTC section 23101(a) as a separate requirement in order to avoid "including businesses that conduct too few transactions to merit inclusion under this regulation," as was Staff's stated intention, does not serve this stated purpose. In order to serve Staff's stated purpose of excluding "businesses that conduct too few transactions to merit inclusion under this regulation" and to provide clarity to businesses regarding Staff's intention in making subsections (a) and (b) of RTC section 23101(a) conjunctive, we propose that the definition in section 96072(a)(7) be revised as follows:

> "Doing business" shall have the same definition as set forth in section 23101(a) of the California Revenue and Taxation Code except that, for purposes of this section, "financial or pecuniary gain" means engaging in a transaction with the primary purpose or objective of earning a profit for the entity that engages in the transaction. The term does not include internal administrative, payroll, treasury, financing support, intercompany guarantees, or other intra-enterprise support activities that are not undertaken with a profit objective and do not directly generate profit or revenue for the entity.

072.2

B. Amend the definitions of "reporting entity" and "covered entity" to clarify that the application of these definitions should be on an entity-by-entity basis, notwithstanding any unitary tax return filed by any entity, to ensure consistency with the clear language of the enabling statute and California law.

SB 253 defines a "[r]eporting entity" as a "partnership, corporation, limited liability company, or other business entity … with total annual revenues in excess of one billion dollars ($1,000,000,000) and that does business in California. Applicability shall be determined based on the *reporting entity's* revenue for the prior fiscal year." Similarly, SB 261 defines "[c]overed entity" as a "corporation, partnership, limited liability company, or other business entity … with total annual revenues in excess of five hundred million United States dollars ($500,000,000) and that does business in California. Applicability shall be determined based on the *business entity's* revenue for the prior fiscal year."

As stated in the Staff Report: Initial Statement of Reasons: "Per Health and Safety Code sections 38532 and 38533, each of these types of regulated entities must meet each of the following criteria:

(1) The entity is a corporation, partnership, limited liability company, or other business entity formed under the laws of the state, the laws of any other state of the United States or the District of Columbia, or under an act of the Congress of the United States;
(2) The entity has total annual revenues exceeding the applicable monetary thresholds set by Health and Safety Code sections 38532 or 38533; and
(3) The entity does business in California."

Staff also recognized that the statutory language explicitly calls for an entity-by-entity analysis, making it clear at the November 18 public workshop that "parent-subsidiary relationships **do not** determine which entities are regulated."[3] But in stark contradiction with both the statute and Staff's statements, Staff have indicated at both the very same November 18 workshop and in an FAQ published on its website that "if a parent company and its subsidiaries file California taxes as a unitary business, then the revenue of the subsidiaries counts towards the revenue of the parent company as part of its gross receipts."[4]

Under California law, it is well settled that a parent company and its subsidiaries are separate and distinct legal entities.[5] The general rule is that, because a parent and a subsidiary are separate

[3] CARB, *SB 253/261/219 Public Workshop: Update on California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs* (slide presentation), Slide 26 (Nov. 18, 2025), https://ww2.arb.ca.gov/sites/default/files/classic/SB%20253%20261%20Nov%20Workshop%20slides%20%28Updated%29.pdf.

[4] CARB, *California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Programs: Frequently Asked Questions About Regulatory Development and Initial Reports*, FAQ 15 (updated Nov. 17, 2025), https://ww2.arb.ca.gov/sites/default/files/classic/FAQs%20Regarding%20California%20Climate%20Disclosure%20Requirements_Nov.pdf.

[5] *See Sonora Diamond Corp. v. Super. Ct.*, 83 Cal. App. 4th 523, 540 (2000) ("We start with the firm proposition that neither ownership nor control of a subsidiary corporation by a foreign parent corporation, without more, subjects the parent to the jurisdiction of the state where the subsidiary does business.").

legal entities, the subsidiary's inclusion in the scope of a law does not automatically make the parent covered or liable.[6]

072.3 Both statutes here explicitly define "reporting entity" and "covered entity" as a specific business entity that meets the enumerated criteria. We are aware of no relevant legal basis to suggest that one entity must be bound by a law based on another entity's revenues or activities *simply because they file a unitary tax return*. Rather, unitary filing is only relevant for the limited purpose of tax apportionment computations. Unitary filing does not dissolve the separate corporate entity of each member entity.

Thus, nothing supports consolidating parent and subsidiary revenue for determining which entities are in scope for SB 253 and SB 261 simply because the entity chose or was required to file tax returns on a unitary basis.

In the same vein, CARB should not attribute one entity's California activities to another for purposes of determining whether that entity is "doing business in California," again, because the
072.4 entity chose or was required to file tax returns on a unitary basis. Staff have not suggested that they intend to do so (and any decision to do so would raise due process issues, as the determination as to whether an entity is "doing business in California" is a jurisdictional question). It would nonetheless help to clarify this point in the regulations. To that end, we

[6] *See id.* at 541 (only "when the acts of the parent may be found to trespass the boundaries of legitimate ownership and control of the subsidiary" is the parent exposed to the "power of the state in which the subsidiary does business."). *See also United States v. Bestfoods*, 524 U.S. 51, 61 (1998) ("It is a general principle of corporate law deeply ingrained in our economic and legal systems that a parent corporation (so-called because of control through ownership of another corporation's stock) is not liable for the acts of its subsidiaries." (cleaned up; citations omitted)). There are very limited circumstances in which this distinction may be disregarded, for example, when the corporate form is abused, is used for inequitable conduct, or when a subsidiary merely serves as an agent for its parent. *See, e.g., Sonora Diamond* , 83 Cal. App. 4th at 538 ("Ordinarily, a corporation is regarded as a legal entity, separate and distinct from its stockholders, officers and directors, with separate and distinct liabilities and obligations. … A corporate identity may be disregarded—the 'corporate veil' pierced—where an abuse of the corporate privilege justifies holding the equitable ownership of a corporation liable for the actions of the corporation."); *id.* at 541 ("[T]he case law identifies one situation when the acts of the parent may be found to trespass the boundaries of legitimate ownership and control of the subsidiary and expose the parent to the power of the state in which the subsidiary does business. Thus, where the nature and extent of the control exercised over the subsidiary by the parent is so pervasive and continual that the subsidiary may be considered nothing more than an agent or instrumentality of the parent, notwithstanding the maintenance of separate corporate formalities, jurisdiction over the parent may be grounded in the acts of the subsidiary/agent.").

propose that the definition of "covered entity" set forth in section 96072(a)(5) be revised as follows:

072.5

> "Covered entity" means a corporation, partnership, limited liability company, or other business entity formed under the laws of the state, the laws of any other state of the United States or the District of Columbia, or under an act of the Congress of the United States with total annual revenues in excess of five hundred million United States dollars ($500,000,000) and that does business in California. The entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue. "Covered entity" does not include a business entity that is subject to regulation by the Department of Insurance in this state, or that is in the business of insurance in any other state. The revenues, in-state sales, and other activities of a subsidiary will not be attributed to its parent for purposes of determining whether an entity is a "covered entity," notwithstanding any unitary tax return filed by them.

We similarly propose that the definition of "reporting entity" set forth in section 96072(a)(11) be revised as follows:

072.6

> "Reporting entity" means a corporation, partnership, limited liability company, or other business entity formed under the laws of this state, the laws of any other state of the United States or the District of Columbia, or under an act of the Congress of the United States with total annual revenues in excess of one billion United States dollars ($1,000,000,000) and that does business in California. The entity's revenue amount shall be determined by the lesser of the entity's two previous fiscal years of revenue. The revenues, in-state sales, and other activities of a subsidiary will not be attributed to its parent for purposes of determining whether an entity is a "reporting entity," notwithstanding any unitary tax return filed by them.

Thank you for the opportunity to provide comments on these important issues impacting many of our clients.

Very truly yours,

Davis Wright Tremaine LLP

Stacey Sprenkel

American Coatings Association (Annebelle Klein)

Please see ACA's comments in response to CARB's proposed regulations for SB 253 and SB 261 attached.

American Coatings ASSOCIATION

February 9, 2026

Courtney Prideaux Smith
Principal Deputy Executive Officer
Clerks' Office
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Comments in Response to Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear Ms. Smith:

The American Coatings Association (ACA) submits the following comments to the California Air Resources Board (CARB or Board) regarding the agency's Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation (Proposed Regulation) for the Climate Corporate Data Accountability Act (SB 253) and the Climate-Related Financial Risk Act (SB 261). ACA is a voluntary, nonprofit trade association working to advance the needs of the paint and coatings industry and the professionals who work in it. The organization represents paint and coatings manufacturers, raw materials suppliers, distributors, and technical professionals. ACA serves as an advocate and ally for members on legislative, regulatory, and judicial issues, and provides forums for the advancement and promotion of the industry and coatings science. ACA appreciates the opportunity to comment and looks forward to working with CARB throughout the rulemaking process.

ACA provides the following recommendations to alleviate any undue burden imposed on the paint and coatings industry.

1. **Businesses within the paint and coatings industry should be exempt from the reporting requirements of SB 253 and SB 261.** 073.1

Under section 96071(b) of the Proposed Regulation, CARB has proposed that the following entities be exempt from SB 253's and SB 261's reporting requirements: (1) non-profit or charitable, tax-exempt organizations; (2) businesses subject to regulation by California's Department of Insurance, and insurance businesses in other states; (3) government bodies as well as companies that are majority-owned by government bodies; (4) businesses whose activity in the state of California consists solely of wholesale electricity transactions; and (5) businesses whose activity in the state of California derives solely from employee compensation or payroll expenses, including teleworking employees.

Businesses in the paint and coatings industry should be exempt from the reporting requirements of SB 253 and SB 261 as they are already subject to a plethora of reporting requirements in air quality and toxics regulations in the state. Regulations governing the industry include statewide requirements under the Board as well as the

Office of Environmental Health Hazard Assessment, the Department of Toxic Substances Control, and the state's thirty-five local Air Districts (e.g., South Coast Air Quality Management District (SCAQMD), Bay Area Air Quality Management District, etc.). For instance, the Board imposes fees on certain architectural coatings manufacturers and consumer product manufacturers for volatile organic compound emissions in the state of California. Many of the same companies are also subject to fees assessed by the SCAQMD. The Proposed Regulation's reporting requirements and fee assessments will negatively impact the paint and coatings industry by piling on additional reporting obligations and fees to companies operating in California. Accordingly, given CARB's existing oversight of the paint and coatings industry in California, ACA urges the Board to exempt businesses within the paint and coatings industry.

2. The proposed definition for the term 'doing business in California' should clearly indicate that it refers to either the sales of a parent company or a subsidiary company. 073.2

Under section 96072(a)(8) of the Proposed Regulation, CARB has proposed that the term 'doing business in California' refer to entities that meet certain criteria within the state's Revenue and Taxation Code. Section 23101(b)(2) of California's Revenue and Taxation Code provides that an entity does business in the state of California if the taxpayer's sales in the state exceed the lesser of five hundred thousand dollars or twenty-five percent of the taxpayer's total sales. CARB's proposal fails to clarify whether the term 'doing business in California' refers to either the sales of a parent company or a subsidiary company. Without clarification, there is no certainty as to the meaning of this provision and how it applies to specific corporate relationships and structures. Companies in the paint and coatings industry utilize many different corporate structures and application of this provision may determine whether certain entities are covered and must report. Accordingly, ACA urges CARB to clarify its proposed definition of 'doing business in California' so that companies with varying structures understand the scope of the requirements.

3. Revise CARB's proposed definition for the term 'parent.' 073.3

Section 96072(a)(10) of the Proposed Regulation contains CARB's proposed definition for the term 'parent.' Currently, section 96072(a)(10) provides that factors to be used when determining ownership or control of another business entity can be found in section 96072(a)(6) of the Proposed Regulation. ACA believes that reference to section 96072(a)(6) is an inadvertent error. The factors that will be considered when determining ownership or control of another business entity are listed in section 96072(a)(16). ACA appreciates CARB's thoroughness in drafting the Proposed Regulation, and recommends that the text be revised to provide the following: "[t]he indicia determining ownership or control are set forth in section 96072(a)(16)."

4. The proposed definition for the term 'revenue' should clearly indicate that it refers to revenue generated in the state of California. 073.4

Under section 96072(a)(13) of the Proposed Regulation, CARB has proposed that the term 'revenue' have the same meaning as the term 'gross receipts.' California's Revenue and Taxation Code defines the term 'gross receipts' as the following:

> [T]he gross amounts realized (the sum of money and the fair market value of other property or services received) on the sale or exchange of property, the performance of services, or the

use of property or capital (including rents, royalties, interest, and dividends) in a transaction that produces business income, in which the income, gain, or loss is recognized (or would be recognized if the transaction were in the United States) under the Internal Revenue Code, as applicable for purposes of this part. Amounts realized on the sale or exchange of property shall not be reduced by the cost of goods sold or the basis of property sold.

CARB's proposal unfairly burdens members of the paint and coatings industry by failing to clarify whether the term 'gross receipts' refers to a company's global gross income or state gross income. Without clarification, the term 'gross receipts' refers to a company's global gross income. Companies with over $1 billion or $500 million in gross receipts, no matter the actual size of the entity's business activities in California, will be forced to comply with SB 253's and SB 261's reporting requirements and fee assessments. Accordingly, ACA urges CARB to revise its proposed definition for the term 'revenue' and clarify that only entities' state gross income will be considered.

5. Scope 3 greenhouse gas emissions should not be included in any reporting requirements. 073.5

Under SB 253, companies with over $1 billion in annual revenue that are doing business in California are required to report their Scope 1, Scope 2, and Scope 3 greenhouse gas (GHG) emissions. Section 96072(a) of the Proposed Regulation does not contain a definition for the term 'Scope 3 Emissions,' and ACA believes that the Scope 3 GHG emissions reporting requirement under SB 253 should be disregarded entirely. As generally understood, Scope 3 GHG emissions are generated by upstream and downstream partners in the chain of manufacturing, and ACA members do not have access to this information. Extraordinary efforts are required to obtain such information from upstream and downstream partners, which significantly increases costs for the industry. California should eliminate the requirement to report Scope 3 GHG emissions since this information will be obtained directly from the upstream and downstream partners in their Scope 1 and Scope 2 GHG emissions reports. Not only does this requirement significantly increase the cost of compliance, it will likely lead to GHG emissions being double reported by submitters. Accordingly, ACA recommends that CARB not enforce SB 253's reporting requirement for Scope 3 GHG emissions.

6. CARB's data collection process has not been properly utilized to calculate the proposed fee assessment. 073.6

SB 253 and SB 261 authorize CARB to assess an annual fee to reporting and covered entities for the implementation and administration of the Climate Corporate Data Accountability Act and the Climate-Related Financial Risk Act. Under section 96073(c) and (d), CARB has proposed issuing a flat fee per entity, which means that an entity's annual fees under SB 253 and SB 261 will be calculated by dividing the annual program cost by the total number of reporting and covered entities.

ACA is concerned that CARB's proposed fee assessment will require members of the paint and coatings industry to pay an annual fee that is disproportionate to the company's actual performance in the state of California (e.g., based off the company's GHG emissions, etc.). It does not appear that the Board's standard data collection process is being implemented appropriately in the rulemaking for SB 253 and SB 261. Accordingly, ACA recommends that CARB

take the necessary steps to conduct an evaluation or survey of reporting and covered entities' activities in the state of California prior to assessing any annual fee requirements.

7. **Extend CARB's proposed reporting deadline under SB 253 to December 31, 2026, at the earliest.** 073.7

Under section 96076(a) of the Proposed Regulation, CARB has proposed an August 10, 2026 reporting deadline. Given the rulemaking schedule, an August deadline for reporting does not provide enough time for paint and coatings companies to develop the necessary report. The deadline should be extended to December 31, 2026, at the earliest.

A public hearing on the Proposed Regulation will be held on February 26, 2026. Upon Board approval, the Proposed Regulation will be sent to the state's Office of Administrative Law (OAL) for review.[1] The OAL will have thirty working days to approve or disapprove the Proposed Regulation. Consequently, the final regulations for SB 253 could come as late as April 2026. Without any relevant existing guidance or final regulations for SB 253 in place, ACA is concerned that members of the paint and coatings industry will be forced to hastily develop their Scope 1 and Scope 2 GHG emissions report by the August 10, 2026 deadline. Accordingly, ACA urges CARB to extend the proposed reporting deadline under section 96076(a) of the Proposed Regulation to December 31, 2026, at the earliest.

8. **Provide that a company's climate-related financial risk report under SB 261 can use either calendar year or fiscal year data.** 073.8

SB 261 does not specify whether a company submitting a climate-related financial risk report must use calendar year or fiscal year data. Rather, covered entities have been instructed to use the "most recent/best available data." CARB's failure to specify whether using calendar year or fiscal year data is acceptable for a company's report under SB 261 unduly burdens members of the paint and coatings industry by requiring businesses to ascertain whether calendar year or fiscal year data constitutes the most recent/best available data. Given that many of the reporting requirements in state air quality and toxics regulations already require or permit the use of calendar year data, businesses in the paint and coatings industry should have the option to decide whether they use calendar year or fiscal year data for their climate-related financial risk reports. Accordingly, ACA recommends that CARB provide that a company's climate-related financial risk report under SB 261 can use either calendar year or fiscal year data if it comports with standard company operating procedures.

Thank you for your consideration of ACA's comments. Please do not hesitate to contact me should you have any questions and/or require further clarification.

Sincerely,

[1] If, however, the Board approves and substantially modifies the Proposed Regulation's text, then another public comment period will open and the OAL's review of the regulations for SB 253 will be further delayed.

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Covington & Burling LLP (Jayni Hein)

Dear Deputy Executive Officer Sahota and California Air Resources Board:

Please find the attached comment letter submitted on behalf of our client in response to the California Air Resources Board's request for public comment on its December 23, 2025 proposed initial regulation for Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure.

Respectfully,
Jayni Hein

COVINGTON

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Submitted Electronically

February 9, 2026

Rajinder Sahota
Deputy Executive Officer
California Air Resources Board
1001 I Street
Sacramento, California 95814

Re: Comment on the Proposed Initial Regulation for Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure

Dear Deputy Executive Officer Sahota:

We submit these comments on behalf of our client in response to the California Air Resources Board's ("CARB") request for public comment on its December 23, 2025 proposed initial regulation for Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure.[1] The proposed initial regulation implements Senate Bill 253 ("SB 253," the "Climate Corporate Data Accountability Act") and Senate Bill 261 ("SB 261," the "Climate Related Financial Risk Act"). The initial regulation sets out rules and a 2026 deadline for initial reporting of Scope 1 and 2 greenhouse gas emissions.

Our client, a United States-based entity whose parent is a Japanese public company,[2] provides three main comments to promote flexibility and harmonization with other reporting rules.

074.1 • First, our client supports CARB's proposal to provide companies with flexibility to submit information from their most recent preceding fiscal year notwithstanding their fiscal year ending after February 1, as this promotes cross-jurisdictional harmonization and flexibility.

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[1] Cal. Air Res. Bd, Notice of Public Hearing to Consider the Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation (Dec. 9, 2025), https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/notice1.pdf.

[2] Our client is a U.S. entity headquartered in New York, New York, with operations across the United States. The preparation and submission of these comments relate to the client's U.S. operations and interests, including domestic regulatory considerations and matters affecting U.S. activities, stakeholders, and compliance obligations.

074.2 • Second, our client encourages CARB, in drafting future Scope 3 reporting rules, to clarify that a reporting entity with a non-reporting corporate parent can report the Scope 3 emissions of its corporate parent (even if the reporting entity reports the Scope 1 and 2 emissions of its own operations).

074.3 • Third, our client encourages CARB, in selecting the deadline for reporting Scope 3 emissions in a future rulemaking, to choose the end of the calendar year—i.e., December 31 each year.

Each of these measures would promote harmonization, ease compliance burdens, and facilitate disclosure of the highest quality data.

First, our client appreciates that, for the first SB 253 reporting deadline of August 10, 2026, CARB's proposed regulation allows a reporting entity to report emissions from an "applicable preceding fiscal year" ending after February 1, 2026. The proposed text for Section 96076(b)(2) provides that a reporting entity "may choose to report their Scope 1 and Scope 2 emissions from their most recent preceding fiscal year notwithstanding their fiscal year ending after February 1, where that data is available."[3] In response to the August 21, 2025 workshop, our client submitted a comment requesting this type of flexibility.[4] We noted that our client has a Japanese parent company, and Japanese parent companies and their subsidiaries typically end their fiscal year on March 31. We also explained that Japan's Financial Services Agency ("FSA") is expected to require public companies to submit an emissions report for each fiscal year (likely with an assurance requirement), to be due around the end of the calendar year. By allowing entities the option to prepare, assure, and submit the same report that is submitted to Japanese authorities (i.e., for the fiscal year ending on March 31), CARB will help to "ensure" that its "emissions reporting is structured in a way that minimizes duplication of effort and allows a reporting entity to submit . . . reports prepared to meet other national and international reporting requirements."[5] Where entities choose this option, they will be disclosing the most recent and highest quality emissions data that is available. In its regulations for future years, our client encourages CARB to choose the same or later August 10 deadline and the same flexible approach to the "applicable preceding fiscal year."

074.4

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Second, our client encourages CARB, in designing its Scope 3 regulations, to clarify that a reporting entity with a non-reporting corporate parent can report the Scope 3 emissions of its corporate parent (even if the reporting entity reports the Scope 1 and 2 emissions only of its own operations). This clarification would enhance cross-jurisdictional harmonization, ease compliance burdens, and support data accuracy and transparency.

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[3] Cal. Air Res. Bd., Proposed Regulatory Text, at 6, https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2025/sb253-261/reg%20text.pdf.

[4] Jayni Hein, Comment in Response to August 21, 2025, Public Workshop for California Climate-Disclosure Legislation: Senate Bills 253 and 261, as amended by Senate Bill 219 (Sept. 11, 2025), https://ww2.arb.ca.gov/form/public-comments/submissions/52196.

[5] Cal. Health & Saf. Code § 38532(c)(2)(D)(i).

Our client's parent company, which is based in Japan, is not a reporting entity under SB 253.[6] As noted, however, the parent will be subject to other emissions reporting requirements (including those promulgated by Japan's FSA) that will encompass Scope 3 emissions and likely require assurance. Reporting Scope 3 emissions can be challenging as it often implicates logistical challenges including the collection, aggregation, and analysis of data from third parties. To prepare for compliance with Japan's requirements, our client's parent company is planning to develop a sophisticated process for calculating Scope 3 emissions for the full organization, including our client. However, due to the corporate organizational structure, the data being developed by the corporate parent will not necessarily be disaggregated by subsidiary. Further, our client will not be leading this Scope 3 data collection for the corporate parent organization and it would be burdensome for our client to develop its own, potentially duplicative procedures to calculate what subset of its parent's Scope 3 emissions correspond to its own organizational boundaries (and down the line, to independently assure that data). As a result, our client expects to have accurate Scope 3 data for the corporate parent organization, but faces barriers in securing accurate Scope 3 data specific to its own organizational boundaries, alone.

CARB should clarify through regulation that a reporting entity that is a U.S. subsidiary of a foreign corporate parent can submit its parent's Scope 3 data that covers the full parent organization. This approach would help to harmonize California's rules with other jurisdictional requirements and alleviate compliance burdens. While the text of the statute already appears to allow for this flexibility,[7] additional regulatory clarification on this point would be very helpful because reporting entities may wish to use different organizational boundaries when reporting their Scope 1 and 2 data and their Scope 3 data (for example, reporting on behalf of the U.S. subsidiary for Scopes 1 and 2 and at the foreign parent level for Scope 3 emissions). Such an approach may differ in certain respects from the general GHG Protocol guidance on setting organizational boundaries; however, to provide for clarity and transparency as to the approach taken, reporting entities could simply state that their Scope 1 and 2 emissions correspond to their own operations and their Scope 3 emissions correspond to the broader operations of the parent organization.

This proposed flexibility would also enhance transparency, as in its absence, investors and consumers could potentially be confused by a major disparity between comprehensive Scope 3 data publicly reported to Japanese (or other non-U.S.) authorities by a parent company and Scope 3 data publicly reported to CARB by certain U.S. subsidiaries of those parent companies. In short, this modest flexibility would support SB 253's goals of cross-jurisdictional harmonization and transparency while minimizing compliance burdens.[8]

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[6] *See id.* § 38532(b)(2) (defining "[r]eporting entity" to include entities "formed under the laws of this state, the laws of any other state of the United States or the District of Columbia, or under an act of the Congress of the United States . . .").

[7] *See* Cal. Health & Saf. Code § 38532(c)(2)(A)(iii) ("Reports may be consolidated at the parent company level. If a subsidiary of a parent company qualifies as a reporting entity pursuant to paragraph (2) of subdivision (b), the subsidiary is not required to prepare a separate report.").

[8] We note that relatively few entities are likely to take advantage of this flexibility, as it is likely to be most helpful to reporting entities that have foreign parents that are not reporting entities.

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Third, our client encourages CARB, in selecting the deadline for reporting Scope 3 emissions, to choose the end of the calendar year—i.e., December 31 each year. Due to the challenges of Scope 3 reporting—particularly in the early years of implementation—entities would benefit from having several months after reporting their Scope 1 and 2 data to prepare and ensure accuracy of Scope 3 data. The Legislature indicated in both SB 253 and SB 219 that it expected that significant time would be needed between the deadline for Scope 1 and 2 reporting and the deadline for Scope 3 reporting.[9] Further, because the law will eventually require assurance of Scope 3 data, a meaningful gap between these reporting dates is critical to ensure that assurance providers with expertise in Scope 3 data can meet the market's need in a timely manner.[10] A Scope 3 deadline of no earlier than December 31 would provide reporting entities with 4.5 months after the proposed August 10 reporting deadline for Scopes 1 and 2 to vet their Scope 3 data.

We appreciate the opportunity to assist CARB in effective implementation of SB 253 and SB 261. Please feel free to contact me with any questions.

Sincerely,

Jayni Hein

COVINGTON & BURLING LLP
Salesforce Tower
415 Mission Street, Suite 5400
San Francisco, CA 94105
jhein@cov.com

[9] The original text of SB 253 assumed that the deadline for reporting Scope 3 emissions would be significantly after—albeit "no later than 180 days after"—the deadline for reporting Scope 1 and 2 emissions. SB 253 (2023-2024 Reg. Sess.); Stats. 2023, ch. 382, § 2(c)(1)(A)(II). SB 219 amended the law to provide CARB with further flexibility in selecting the Scope 3 deadline. SB 219 (2023-2024 Reg. Sess.); Stats. 2024, ch. 766, § 1(c)(2)(A)(i)(II) (codified at Cal. Health & Saf. Code § 38532(c)(2)(A)(i)(II)). CARB can therefore select a Scope 3 deadline that is more than 180 days after the Scope 1 and 2 deadline.

[10] *Id.* § 38532(c)(2)(F)(iii) (providing that "[t]he assurance engagement for scope 3 emissions shall be performed at a limited assurance level beginning in 2030" and authorizing CARB to establish an assurance requirement for Scope 3 emissions earlier).

February 9th, 2026

California Air Resources Board
1101 I Street
Sacramento, CA 95814

RE: Proposed California Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs Initial Regulation

Dear Chair Sanchez,

California Environmental Voters appreciates the opportunity to comment on the proposed "Initial Regulation" for the California Corporate Greenhouse Gas (GHG) Reporting and Climate Related Financial Risk Disclosure Programs. The development of this initial regulatory text is much-needed to encourage timely implementation of the original legislation, SB 253 (Wiener, Chaptered 2023) the Climate Corporate Data Accountability Act and SB 261 (Stern, Chaptered 2023) the Climate-Related Financial Risk Reporting Act, amended by SB 219 (Wiener, Chaptered 2024).

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Our organization would like to recognize the comprehensive work done by CARB staff to develop this regulatory proposal. **The passage and subsequent implementation of these laws in California mark yet another landmark climate policy victory for the state**. The programs parallel established reporting frameworks already in use internationally and underscore California's commitment to policy that aligns with the evolving needs of the climate crisis. In alignment with changing times, these programs will deliver greater information about climate-related financial risks and corporate greenhouse gas emissions that consumers, lenders, key stakeholders, and the general public will benefit from.

Consistent with a letter EnviroVoters submitted during the initial Request for Information in December 2024, we appreciate CARB staff's proposal to reference the definition of "doing business in California" found in the Revenue and Tax Code, section 23101. This is in alignment with the intent of the bill language. Furthermore, we agree with the exemption below:

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- A business entity whose only business within California consists of wholesale electricity transactions.

Per clarification from Senators Wiener and Stern in a letter submitted to the Senate Daily Journal, January 29th, 2024, the legislative intent of SB 253 and SB 261 did not include

business entities whose sole activity within the state consists of wholesale electricity transactions[1].

Additionally, we recommend against CARB staff's proposal to exempt insurance companies from SB 253 compliance. The ISOR explains the basis of this exclusion is "for continuity[2]". We are concerned about the basis of this rationale. To clarify, the groups of covered and reporting entities for the two different programs are expected to differ due to the distinct revenue thresholds that will change the scope of entities for each.

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Moreover, we believe the emissions disclosures of insurance entities to be extremely pertinent given California's current climate landscape and series of natural disasters exacerbated by global warming. Per the aim of these programs – providing increased transparency to consumers, investors, shareholders, and additional stakeholders – it is prudent that these programs are not preemptively exempted when the need for public access to emissions information is especially high.

We appreciate CARB staff's intent with this proposed exemption, however, urge consideration of the above factors.

075.5

This initial regulatory proposal is a substantial and critical component needed to move forward in the implementation process. The development of this proposal was preceded by multiple thorough opportunities for stakeholder feedback as well as proactive work from staff to gather input on resources to inform reporting logistics. Our organizations commend CARB staff for this thoughtful work. We look forward to engaging deeply in the subsequent regulatory process to ensure timely and robust policy that delivers greater climate transparency to the public.

Regards,

Gracyna Mohabir
Clean Air & Energy Regulatory Advocate
California Environmental Voters

[1] Senate Daily Journal, "Re: Legislative Intent – SB 253 and SB 261", January 29th, 2024
[2] Staff Report: Initial Statement of Reasons

Edison International (Aurora Winslade)

Thank you for accepting Edison International's comments regarding the reporting deadline and Scope 2 definition for the proposed rulemaking for SB 253.

February 9, 2026

Sydney Vergis, Ph.D.
Assistant Division Chief
Industrial Strategies Division
California Air Resources Board
1001 I Street, Sacramento, CA 95814

RE: Article 6: California Climate Disclosures Proposed Regulation Text

Dear Dr. Vergis:

Edison International (company) appreciates the opportunity to provide feedback on the proposed regulation text for the California Climate Disclosures regulations. Edison International is a leading electric utility holding company[1] and the parent company to Southern California Edison (SCE), a large regulated electric utility serving over 15 million people in Central, Coastal, and Southern California. Edison International and SCE are committed to supporting California's clean energy transition and are supportive of the California Air Resources Board's (CARB) efforts to create a successful climate-related disclosure program.

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This letter provides Edison International's comments on CARB's proposed regulation text and reporting timeline under Senate Bill 253 (SB 253), the Climate Corporate Data Accountability Act. It clarifies and expands upon our previous comments,[2] offering additional details, concerns, and recommendations.

To support true, complete and accurate greenhouse gas (GHG) emissions reporting and ensure the success of the climate disclosures program, we recommend that CARB:

1. Amend the reporting deadline for Scope 1 and Scope 2 GHG emissions to allow submissions from August 10, 2026 through December 31, 2026, to better align

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[1] In addition to SCE, "Trio", operating under Edison Energy, LLC, is an indirect, wholly-owned, non-utility subsidiary of Edison International, and is a global energy advisory firm providing integrated sustainability and energy solutions to commercial, industrial and institutional customers. Trio is not the same company as SCE, the utility, and Trio is not regulated by the California Public Utilities Commission (CPUC). GHG Emissions from Trio are de minimis.

[2] The prior comment letter submitted by Edison International on September 11, 2025 can be found here: https://ww2.arb.ca.gov/form/public-comments/submissions/52341

with other compliance requirements and allow for true, complete, and accurate reporting through third-party assurance; or

2. Alternatively, clarify that the December 5, 2024 enforcement notice allows companies to submit 2024 fiscal-year Scope 1 and Scope 2 emissions by the August 10, 2026 deadline as part of good faith efforts to comply with the requirements of the law; and 076.3
3. Amend the definition of Scope 2 to explicitly include Transmission and Distribution (T&D) losses, and ensure future reporting template structures allow for separate accounting of T&D line losses in addition to facility electricity, steam, heating, or cooling emissions. 076.4

I. The reporting deadline should align with other compliance requirements and allow adequate time for third-party assurance

California Health and Safety Code Sections 38532(c)(2)(A)(vi) and 38532(c)(2)(B)[3] require that CARB establish a reporting deadline that reflects stakeholder input; accounts for when reporting entities typically receive data used to calculate scope 1, scope 2, and scope 3 GHG emissions; allows sufficient time for third-party assurance; and leads to comprehensive, detailed, and easily understandable public disclosures. The proposed August 10, 2026 deadline for the reporting of Scope 1 and Scope 2 GHG emissions for the 2025 fiscal year does not align with Edison International's data-collection and reporting timelines and does not allow for adequate time to complete both regulatory-driven and voluntary third-party assurance processes. As a result, that deadline increases the risk of incomplete and inaccurate public disclosures. 076.5

Edison International appreciates CARB's enforcement discretion for the first reporting year[4], which is intended to ensure companies are not penalized if they demonstrate "good faith efforts" to comply with the requirements of the law for the first reporting cycle. However, this flexibility does not eliminate the legal and reputation risks associated with inaccurate public disclosures in regulatory filings that may require restatements or revisions. Aligning the SB 253 reporting deadline with other regulatory reporting timelines and allowing time needed for third-party assurance prior to first year reporting are essential to allow for true, 076.6 076.7

[3] California Health and Safety Code Section 38532(c)(2)(A)(vi) and (c)(2)(B) reference: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=38532.&lawCode=HSC

[4] December 5, 2024 Enforcement Notice reference: https://ww2.arb.ca.gov/sites/default/files/2024-12/The%20Climate%20Corporate%20Data%20Accountability%20Act%20Enforcement%20Notice%20Dec%202024.pdf

complete, and accurate disclosures that minimize legal and reputational risks for reporting entities.

Alternatively, allowing companies with fiscal-year deadlines of December 31, 2025 to submit 2024 fiscal-year emissions would eliminate the legal and reputation risks associated with submitting unassured data. This approach is consistent with the December 5, 2025 enforcement notice which allows for use of "…information the reporting entity already possesses or is already collecting at the time this Notice was issued."[4] Edison International is prepared to submit Scope 1 and Scope 2 emissions disclosures based on fully assured 2024 reporting year data. 076.8

A. True, complete, and accurate source data from Power Source Disclosure program reporting is not available until October 1

1. Existing California GHG emissions reporting requirements

Edison International's principal subsidiary, SCE, accounts for more than 99.9% of Edison International's total GHG emissions. SCE is subject to multiple regulatory reporting requirements from local air districts, the U.S. Environmental Protection Agency (EPA), CARB, and the California Energy Commission (CEC). These reports provide the source data required to develop true, complete, and accurate GHG emissions inventories. Many reporting deadlines fall between March and July each year and require their own assurance processes, with one completed as late as October. 076.9

Table 1: Select regulatory compliance reports contributing to GHG source data

Scope	Category	Regulatory Body (*Program*)	Reporting Deadline	Third-Party Assurance Deadline
1	Emergency generators	Various local air districts	May 1[5]	NA
1	Sulfur hexafluoride[6]	EPA	March 31	NA
		CARB	June 1	NA
1	Mobile sources	CARB *(various)*	June 30[7]	NA

[5] Various air districts have reporting deadlines that begin in March and run through May 1.
[6] Sulfur hexafluoride emissions calculations reported to CARB under subpart DD slightly differ from those submitted to the USEPA. For purposes of SB 253 GHG reporting, Edison will rely on CARB reported emissions to ensure internal consistency between California disclosures.
[7] Various fleet regulations have reporting deadlines that begin in January and run through June 30.

Scope	Category	Regulatory Body (*Program*)	Reporting Deadline	Third-Party Assurance Deadline
1	Utility-owned generation	CARB (*Mandatory Reporting Regulation*)	July 17[8]	August 10
2	Transmission & distribution losses	CEC *(Power Source Disclosure program)*	June 1	October 1
3	Power purchased and delivered (Category 3)			

2. Alignment between CEC Power Source Disclosure and SB 253 reporting timelines

Over 80% of SCE's electricity sales (bundled load) come from electricity sourced from third-party generators. GHG emissions associated with power purchases and delivery are reported as either Scope 3, Category 3 (Fuel- and Energy-Related Activities Not Included in Scopes 1 and 2) or Scope 2 Transmission & Distribution (T&D) line loss. These two categories of GHG emissions represent approximately 70% of Edison International's total GHG emissions.

Estimating GHG emissions in these categories requires data from more than 600 power generation sources, reported annually through the CEC's Power Source Disclosure (PSD) program by June 1.[9] Subsequently, third-party assurance is required by October 1 to verify the accuracy and completeness of the reported data. Following that assurance, SCE publishes the Power Content Label[10] with fuel type and GHG intensity information for delivered power by the end of the first complete fourth-quarter billing cycle.

Under the draft regulation, the August 10, 2026 deadline would require Edison International to publicly report Scope 2 GHG emissions based on PSD data that has not yet completed third-party assurance for completeness or accuracy. This creates risk of restatements and conflicting GHG emissions disclosures across multiple regulatory filings, exposing the company to legal and reputational risks.

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[8] Final RPS adjustments deadline. Initial data submitted to CARB on April 10 for electric generating facilities and June 2 for power entities.
[9] The current Power Source Disclosure regulation can be found here: https://efiling.energy.ca.gov/GetDocument.aspx?tn=264974&DocumentContentId=101752
[10] SCE's 2024 Power Content Label can be found here: https://www.energy.ca.gov/filebrowser/download/9168

B. Third-party assurance requires an additional 90 days after GHG emission inventory development is complete

1. Typical GHG emissions reporting and assurance timeline

Edison International recognizes the importance of true, complete, and accurate GHG disclosures and has voluntarily reported GHG emissions in its annual Sustainability Report (SR) since 2012,[11] with reasonable assurance for Scopes 1 and 2 and limited assurance for Scope 3 GHG emissions since 2020. The SR is typically published at the end of May, using the best available data at that time. Additional or revised source data is then incorporated to update GHG emissions estimates, which are voluntarily submitted to The Climate Registry (TCR) by August 1 to begin third-party assurance against relevant TCR protocols.[12] It is Edison International's experience that the assurance process requires approximately 90 days, inclusive of field visits, multiple data review cycles, and time to correct any findings. The assurance process is typically completed by the year's end or the first quarter of the following year, with any corrections reflected in the next SR publication.

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This timeline is driven in part by SCE's Power Source Disclosure filing, due June 1, after which it takes the company at least three weeks to process the data and identify the appropriate GHG emissions factors which update annually based on site-specific information. A fully assured inventory is generally not available until early October at the earliest. However, delays outside of the company's control can impact this timeline. For example, in 2025, delays with the Renewable Energy Certificate (REC) tracking system[13] and changes to the PSD reporting template delayed reporting, pushing the earliest potential completion of a fully assured inventory to early November.[14]

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[11] The most recent Sustainability Report and links to past reports can be found on this webpage: https://www.edison.com/sustainability/sustainability-report

[12] Edison International obtains third-party verification in accordance with The Climate Registry's (TCR) General and Electric Sector protocols. These protocols are fully aligned with the WRI GHG Protocol, while also providing additional and specific guidance for electric utility sector operations not explicitly outlined in the WRI Protocol. The relevant TCR protocols can be found here: https://theclimateregistry.org/registries-resources/protocols/

[13] RECs are tracked via a web-based system, the Western Renewable Energy Generation Information System or WREGIS, which is a division of Western Electricity Coordinating Council (WECC). The CEC coordinates with WECC to reconciliate REC data. Issues with the WREGIS system delayed utility access to 2024 REC data needed for PSD submissions.

[14] Due to the PSD reporting delay and other company considerations, third-party assurance is currently ongoing for the 2025 emissions inventory year.

2. Third-party assurance is necessary to mitigate legal and reputational risks

The draft August 10, 2026 deadline would require Edison International to publicly report Scope 2 GHG emissions as part of a compliance submission before third-party assurance can be completed. SB 253 filings will be subject to a heightened level of public scrutiny and elevated legal and reputational exposure compared to existing voluntary disclosures. While CARB has provided enforcement discretion for the first reporting year, Edison International believes it is necessary to complete third-party assurance to ensure that SB 253 disclosures are true, complete, and accurate. This is aligned with California Health and Safety Code Section 38532(c)(2)(A)(vi), which requires CARB consideration of the "timelines by which reporting entities typically receive scope 1, scope 2, and scope 3 emissions data, as well as the capacity for an independent third-party engagement to be performed by a third-party assurance provider."

C. Recommend reporting window between August 10 and December 31

To align SB 253 reporting with other California compliance timelines and ensure sufficient time for true, complete, and accurate data and to complete third-party assurance, Edison International recommends that CARB establish a reporting window between August 10, 2026 and December 31, 2026. This approach would (1) reflect CARB's statutory obligation to consider stakeholder input and the timing by which reporting entities receive GHG emissions data, and (2) provide for adequate time for companies to provide true, complete, and accurate reporting through third-party assurance from reputable providers.

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A broader reporting window would also help mitigate potential delays resulting from growing demand for assurance and the limited availability of providers with the sophistication and resources needed to provide high quality assurance services. Maintaining this window for future reporting years would ensure reporting entities have the necessary time to meet assurance requirements when CARB enforcement discretion is no longer applicable.

D. Alternatively, clarify that the December 5, 2024 enforcement notice allows companies to submit 2024 fiscal year Scope 1 and Scope 2 emissions

As an alternative to extending the reporting window, Edison International recommends that CARB clarify their enforcement discretion allows companies with a December 31, 2025 fiscal-year end to submit 2024 fiscal-year emissions by the August 10, 2026 reporting deadline. This clarification would ensure companies are not forced to choose between

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submitting 2025 fiscal-year data and mitigating legal and reputational risks. It would also align with the intent and language of the December 5, 2024 enforcement notice, which allows for use of "…information the reporting entity already possesses or is already collecting at the time this Notice was issued".

II. Clarify Scope 2 definition to clearly include reporting of Transmission & Distribution losses

The regulation defines Scope 2 emissions as "indirect greenhouse gas emissions from consumed electricity, steam, heating, or cooling purchased or acquired by a reporting entity, regardless of location." This is consistent with the WRI's GHG protocol but does not clearly indicate whether GHG emissions from Transmission & Distribution (T&D) losses are included.

076.13 T&D line loss occurs when electricity is lost as it travels across the electric grid between power plants and the end-use customers.[15] To promote consistent reporting across electric utilities and avoid double-counting across scopes, Edison International recommends that CARB explicitly include all T&D line loss emissions, excluding losses associated with owned generation,[16] in the Scope 2 definition, in alignment with guidance from The Climate Registry's (TCR) Electric Power Sector Protocol.

076.14 Edison International also recommends that CARB allow entities to report separate line items for: (1) GHG emissions from T&D line losses; and (2), GHG emissions from facility electricity, steam, heating, or cooling. Because T&D losses represent approximately 97% of Edison International's Scope 2 GHG emissions, combining emissions from both categories could mislead reviewers into thinking that most of Edison International's scope 2 GHG emissions are associated with facility energy use.

III. Conclusion

Edison International appreciates CARB's consideration of these recommendations as the rulemaking process advances. The company remains committed to delivering safe, reliable, affordable, and clean energy in support of California's goal of achieving carbon neutrality by 2045. A well-implemented Corporate Greenhouse Gas Reporting program is essential to

[15] Includes SCE's retail customers as well our Direct Access customers and community choice aggregators (CCAs).
[16] T&D losses associated with owned generation are captured under Scope 1 as these emissions are based on production activity and not consumption data.

that vision, and we support CARB in achieving this objective with the modifications outlined in this letter.

If you have any questions regarding this letter, please contact Andrew Lembeck, Senior Strategy & Sustainability Advisor, at Andrew.LembeckEdens@edisonintl.com.

Sincerely,

Aurora Winslade
Director, Head of Sustainability
Edison International

CC: Andrew Lembeck, Edison International
Hrishikesh Dalvi, Southern California Edison
Joy Brooks, Southern California Edison
Casey Brahms, Southern California Edison

Consumer Technology Association (Katie Reilly)

Please see attached file for comments from the Consumer Technology Association.

1919 S. Eads St.
Arlington, VA 22202
703-907-7600
CTA.tech

February 9, 2026

California Air Resources Board
1001 I Street
Sacramento, CA 95814

Submitted online via https://carb.commentinput.com/?id=ekNF7gTx2h

RE: Proposed California Corporate Greenhouse Gas Reporting and Climate-Related Financial Risk Disclosure Initial Regulation

Dear California Air Resources Board (CARB):

The Consumer Technology Association (CTA) appreciates the opportunity to provide comments on the initial regulatory draft for the General Requirements for California Climate Disclosures Reporting. As North America's largest technology trade association, CTA® is the tech sector. Our members are the world's leading innovators—from startups to global brands—helping support more than 18 million American jobs. CTA owns and produces CES®—the most powerful tech event in the world.

CTA has long supported efforts to reduce industry impacts on climate, and for companies to disclose their climate impacts. For example, CTA issues an Industry Report on Greenhouse Gas (GHG) Emissions, which highlights the collective and individual accomplishments of member companies in reducing greenhouse gas (GHG) emissions year-over-year — both globally and in the U.S. The report is part of CTA's pledge to encourage its members to calculate and publicly disclose their emissions while also recognizing individual company programs and initiatives.

As a representative of companies operating globally across the technology sector, we support the intent of California's corporate GHG and climate related financial risk disclosure programs to enhance transparency and climate accountability. We appreciate this opportunity to comment on the draft of the initial regulation for the General Requirements for California Climate Disclosures Reporting to ensure effective and feasible compliance for companies operating across the globe, including California. 077.1

§96076. Deadline for Reporting Under Health and Safety Code Section 38532:
CARB is proposing that reporting entities report their Scope 1 and Scope 2 emissions for the applicable preceding fiscal year on or before August 10, 2026. CARB also defined the "applicable preceding fiscal year" as a fiscal year that ends on or before February 1 in a 077.2

calendar year or, if after February 1, the fiscal year ending in the previous calendar year. This means, at minimum, there are approximately six months between the end of a fiscal year (Feb. 1) and the reporting deadline (Aug. 10) for this initial reporting year (2026).

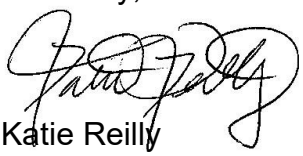
As stated in our September 2025 comments, CTA supports a minimum of six months or 180 days from the end of a company's fiscal year before any reporting or, if a fixed calendar deadline is needed, CARB must accept the most recent fiscal year report available as of the fixed date. CARB's proposal is aligned with CTA's prior comments.

However, CTA is concerned with future challenges presented by a rigid August 10 date given additional complexity will be added with Scope 3 reporting requirements as well as the possibility of a transition from "limited" to "reasonable" assurance. As CTA noted in our prior comments, reasonable assurance significantly increases complexity (with limited value add) and CTA supports withdraw of the mandatory reasonable assurance in favor of limited assurance. In future years with additional reporting requirements and/or with a requirement of reasonable assurance, six months or 180 days may prove insufficient. Flexibility will be needed from CARB as the program continues to evolve. 077.3

Conclusion

We thank CARB for its continued engagement with stakeholders. We look forward to opportunities to comment on forthcoming rulemaking proceedings related to the California Corporate Greenhouse Gas Reporting and Climate Related Financial Risk Disclosure Programs. If you have any questions, please do not hesitate to contact me at kreilly@cta.tech. 077.4

Sincerely,



Katie Reilly
Vice President, Environmental Affairs and Industry Sustainability

COMMENTS OF THE CLASS OF '85 REGULATORY RESPONSE GROUP

ON THE

CALIFORNIA AIR RESOURCES BOARD'S PROPOSED CALIFORNIA CORPORATE GREENHOUSE GAS REPORTING AND CLIMATE-RELATED FINANCIAL RISK DISCLOSURE INITIAL REGULATION

I. INTRODUCTION

The Class of '85 Regulatory Response Group ("Class of '85" or "Group") respectfully submits these comments in response to the California Air Resources Board's ("CARB") proposed initial regulation to implement Senate Bills ("SB") 253 and 261 as amended by SB 219. The Class of '85 is a voluntary, ad hoc coalition of over 40 electric generating companies from around the country that has been actively involved in the development of regulations to implement the federal Clean Air Act and other environmental statutes for 35 years.[1] Members of the Class of '85 own and operate electric generating, transmission, and distribution facilities throughout the United States. Members of the Group may be subject to reporting requirements depending on the scope of the final regulations implementing SB 253 and 261 and thus have a direct interest in this rulemaking action.

SB 253 requires both public and private U.S. businesses with revenues over $1 billion that do business in California to annually report Scopes 1 and 2 greenhouse gas ("GHG") emissions beginning in 2026, and Scope 3 emissions beginning in 2027. SB 261 requires both public and private U.S. businesses with revenues over $500 million that do business in California to prepare biennial climate-related financial risk disclosures in compliance with the Task Force on Climate-related Financial Disclosures reporting framework or another equivalent framework.

078.1 The Class of '85 would like to emphasize the importance of ensuring that California accomplishes its objectives without unduly burdening businesses by requiring the reporting of immaterial emission sources or unnecessarily granular or out-of-scope information. Balancing the compliance burden on regulated businesses alongside California's interest in information collection would help to ensure that the data ultimately reported are useful, pertinent, and relevant.

078.2 In particular, CARB must ensure that its regulations adequately assess "the potential for adverse economic impact on California business enterprises" and address competitive impacts for existing businesses.[2] California Government Code § 11346.2(b)(4) also requires CARB to consider "reasonable alternatives to the regulation that would lessen any adverse impact on small business," and reasonable alternatives that are "less burdensome." As part of these alternatives, CARB must consider "overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health."[3] To comply with these statutory directives, CARB should develop a cost-effective reporting program that does not impose unnecessary burdens on reporting entities, especially those that have little, if any, presence in California. This includes out-of-state business entities whose

078.3

078.4

[1] Attachment A contains a list of Class of '85 members who support these comments.
[2] *See* Cal. Gov. Code §§ 11346.3(a), (e) and 11340.1(a).
[3] Cal. Health & Safety Code § 38562(b)(6).

only activity within California consists of wholesale electricity transactions, renewable energy certificates ("RECs") transactions, carbon offset transactions, or sale or purchase of renewable natural gas ("RNG") credits, as well as out-of-state business entities whose only business in California is employee compensation or payroll expenses, including teleworking employees.

078.5 Without clear guardrails, thresholds, and standards associated with determining applicability and scope of the regulations, an open-ended data grab will not help to advance California's objectives, and will be expensive, complicated, and daunting for both those charged with complying and those tasked with implementation, review, and enforcement. Potentially affected businesses need clear direction on applicability, requirements, costs, and timelines for completing the new disclosure requirements, as well as flexibility to accommodate differing reporting timelines and information available in diverse sectors. Providing certainty and clarity in the form of bright-line definitions, exclusions, and off-ramps will help to narrow the focus to those businesses whose operations are most applicable to greenhouse gas emissions in California.

II. COMMENTS

The Class of '85 respectfully submits the following comments in response to the proposed initial regulation.

A. The Class of '85 Supports CARB's Proposed Exemption for Wholesale Electricity Transactions.

078.6 The Class of '85 supports CARB's proposed exemption for a business entity whose only activity within California consists of wholesale electricity transactions and appreciates the Agency's consideration of the Group's previous comments on the issue.[4] The Group agrees that out-of-state business entities that sell energy, or other energy goods or services (e.g., transmission or reserves), into California through a separate market (such as the Western Energy Imbalance Market or the Extended Day Ahead Market) should not be covered, as these entities are one step removed from directly performing business activity in California and lack control over the ultimate disposition of their energy goods or services due to the presence of an intermediate market entity.

Additionally, as CARB acknowledged in the accompanying Initial Statement of Reasons ("ISOR"), this exemption is consistent with an intent letter from the lead sponsors of SB 253 and 261 in which Senator Wiener and Senator Stern specifically stated that the bills "are not intended to include a business entity whose only activity within California consists of wholesale electricity transactions …."[5] Consistent with this intent and CARB's proposed exemption, any business entity that satisfies this requirement should not be covered.

078.7 To provide greater regulatory certainty, the Class of '85 respectfully requests that CARB clarify the scope of this exemption to address specific transactions. First, CARB should confirm that its proposed exemption for wholesale electricity transactions encompasses bilateral sales or

[4] Comments of the Class of '85 Regulatory Response Group on the information solicitation issued by CARB, Submission No. 22601, (Mar. 21, 2025). These previous comments are included as Attachment B.

[5] California Legislature 2023-24, Senate Daily Journal, 3058, (Jan. 30, 2024), https://leginfo.legislature.ca.gov/faces/pubSenDailyJrn2.xhtml?type=doc&sessionyear=20232024&pagenum=3057&sessionnum=0&fileid=996.

purchases of energy or other energy goods (e.g., energy commodities) or services (e.g., transmission) that occur in interstate commerce. Such sales or purchases are a type of wholesale electricity transaction.

078.8 Second, the Group urges CARB to clarify and ensure the exemption for wholesale electricity transactions also explicitly includes renewable energy certificate transactions. As the Group commented in response to CARB's information solicitation for the implementation of SB 253 and 261, REC transactions should be excluded, as such transactions support renewable energy projects and therefore should be encouraged and not discouraged in any way. Refraining from disincentivizing RECs aligns with CARB's duty to consider "overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health."[6]

B. The Group Supports CARB's Proposed Exemption for Employee Compensation or Payroll Expenses.

078.9 The Group supports CARB's proposed exemption for business entities whose only business in California is employee compensation or payroll expenses, including teleworking employees. This exemption recognizes that the connection these out-of-state business entities have with California, as well as their environmental impact within the state, is minimal and tenuous. This approach aligns with CARB's mandate to consider alternatives that would limit regulatory burdens for covered entities by clarifying regulatory requirements and avoiding unnecessary reporting.[7] This approach also aligns with CARB's mandate to consider the effect of a regulation on the elimination of jobs within the state.[8]

C. The Group Supports CARB's Other Proposed Exemptions

1. CARB should exempt non-profits, charitable organizations, and not-for-profits.

078.10 The Group supports CARB's proposed exemption for non-profits and charitable organizations that are tax-exempt under the Internal Revenue Code. This exemption is consistent with the legislative intent of the statutes and aligns with both federal and California laws that grant tax-exempt status. Additionally, subjecting such non-profits and charitable organizations to the disclosure requirements of SB 253 and 261 would impose significant burdens that could jeopardize their continued viability. For these same reasons, the Group requests that the proposed exemption

078.11 also includes not-for-profit organizations that are tax-exempt under the Internal Revenue Code.

2. CARB should exempt government entities (including subdivisions of governments) and companies that are majority-owned by government entities.

078.12 The Group also supports CARB's proposed exemption for government entities and to exclude companies that are majority-owned by government entities. To provide greater regulatory

[6] Cal. Health & Safety Code § 38562(b)(6).
[7] *See* Cal. Gov. Code § 11346.2(b)(4).
[8] *See* Cal. Gov. Code § 11346.2(c)(1)(A).

certainty, the Group respectfully requests that CARB clarify the scope of such exemption to include subdivisions of government entities (e.g., a political subdivision of the state). A government entity is not a "business entity" based upon the plain meaning of that phrase. Government entities (which, in certain cases, delegate their power to their subdivisions) are sovereign entities responsible for the public welfare—not business entities. 078.13

D. CARB Should Exempt Carbon Offset Transactions.

CARB also should exclude carbon offset transactions from regulations under SB 253 and 261. CARB has a statutory duty to avoid duplicative regulations;[9] carbon offset transactions already are subject to disclosure requirements under AB 1305.[10] Further, regulating these transactions could create a disincentive for entities to invest in carbon offsets, which are a critical tool for reducing overall greenhouse gas emissions. An exemption would encourage participation in these markets. 078.14

E. CARB Should Exempt Renewable Natural Gas Credit Sales and Purchases.

CARB also should exclude entities whose only activity within California consists of the sale or purchase of RNG credits, such as renewable identification numbers ("RINs") under the U.S. Environmental Protection Agency's ("EPA") Renewable Fuel Standard ("RFS") program or credits under California's Low Carbon Fuel Standard ("LCFS"). This exemption would encourage, rather than discourage, the monetization of environmental benefits through clean fuels necessary for compliance and voluntary sustainability goals. 078.15

F. The Group Supports Determining a Regulated Entity's Revenue by the Lesser of Two Previous Fiscal Years.

The Group supports CARB's proposed definition of a "reporting entity" under SB 253 and a "covered entity" under SB 261 as an entity that meets the respective revenue threshold based on the lesser of its revenue from the two previous fiscal years. This approach provides crucial predictability for potentially regulated entities, ensuring that only business entities with sustained revenue above the threshold are subject to the regulations. It avoids unfairly capturing business entities that may experience a temporary, one-time revenue spike that is not indicative of their typical operational scale, thereby preventing unnecessary regulatory burdens. 078.16

G. CARB Should Extend the Implementation Deadline for SB 253 Scope 1 and 2 Reporting.

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[9] *See* Cal. Gov't Code § 11349(f) ("'Nonduplication' means that a regulation does not serve the same purpose as a state or federal statute or another regulation. This standard requires that an agency proposing to amend or adopt a regulation must identify any state or federal statute or regulation which is overlapped or duplicated by the proposed regulation and justify any overlap or duplication.").

[10] *See* Cal. Health & Safety Code § 44475 ("A business entity that is marketing or selling voluntary carbon offsets within the state shall disclose" details related to GHG emissions, including the annual emissions reduced and accountability measures if a project does not meet the projected emissions reductions or removal benefits).

CARB proposes August 10, 2026, as the implementation deadline for SB 253 Scope 1 and 2 reporting. The Class of '85 cautions CARB against the proposed August 10, 2026, implementation date. Regulatory compliance requires certainty regarding the specific reporting requirements with sufficient lead time. Without clarity on fundamental aspects—such as precise reporting and data assurance requirements—regulated entities may be unable to adequately prepare compliant reports. A more reasonable approach would be to set the reporting deadline at the end of the calendar year. Alternatively, if the proposed deadline is finalized, CARB should finalize the critical, detailed requirements in a subsequent rulemaking as soon as possible to provide business entities with sufficient time to establish the necessary systems and processes to facilitate reporting.

078.17

078.18

Given the current lack of regulatory certainty, the Group also supports the exercise of enforcement discretion for SB 253 reporting during the 2026 reporting year, consistent with the notice CARB provided on December 5, 2024.[11]

078.19

H. CARB Should Assess Implementation Fees on a "Per Filing" Basis Instead of Imposing a "Flat" Fee.

CARB proposes to issue a "flat" fee per regulated entity, which would require subsidiaries included in a consolidated parent company report to pay a separate fee. As an initial matter, the Class of '85 reiterates its previous comment that CARB should track parent/subsidiary relationships as detailed in tax filings to ensure consistency and accuracy in reporting and fee assessment. Regarding CARB's proposed "flat" fee, the Group recommends that CARB instead assess filing fees on a "per filing" basis. Under this approach, if a parent company submits a consolidated disclosure on behalf of two or more in-scope subsidiaries within its corporate structure, only a single filing fee should be required for each of SB 253 and SB 261. This method would avoid duplicative fees for business entities included in consolidated reports and reduce unnecessary compliance expenses for companies with complex corporate structures. Under this approach, CARB should also allow flexibility as to whether the parent or subsidiary pays the fee. A "per filing" structure would also reduce overhead costs, an outcome which, as CARB acknowledges in the ISOR, would "minimiz[e] the cost assessed to regulated entities, and provide[] higher predictability for the cost for all reporting and covered entities from year to year without the need for estimations tied to emission volumes or financial metrics."

078.20

I. CARB Should Allow Flexibility for Subsidiaries to Calculate Revenue at the Parent Level or at the Subsidiary Level.

The Group recommends that CARB allow subsidiaries the flexibility to calculate "revenue" at the parent level. For some companies, particularly those with complex corporate structures, preparing revenue information for an individual subsidiary may present significant challenges. For example, such companies often prepare consolidated financial statements at the ultimate parent entity level and file tax reports that combine multiple entities within the corporate group. These companies should have the option to calculate revenue at the parent level. Because each company's

078.21

[11] *See* CARB, *The Climate Corporate Data Accountability Act Enforcement Notice*, (Dec. 5, 2024), https://ww2.arb.ca.gov/sites/default/files/2024-12/The%20Climate%20Corporate%20Data%20Accountability%20Act%20Enforcement%20Notice%20Dec%202024.pdf.

circumstances are unique, providing this flexibility would enable companies to make decisions based on their specific business needs and operational capabilities.

078.22 CARB also proposes that a subsidiary included in a parent company's report would still be considered a separate entity subject to the fee. The Group disagrees with this approach. CARB should provide flexibility for companies to report either at the parent or subsidiary level, and to determine which entities pay the associated fees on a per filing basis, rather than mandating that fees be assessed solely at the subsidiary level.

J. CARB Should Not Adopt the Interpretation of "Doing Business in California" Found in the Revenue and Tax Code Section 23101.

CARB's proposed definition of "doing business in California" is based on the California Revenue and Tax Code ("RTC"). The Class of '85 urges CARB not to adopt the California RTC's definition. The RTC's definition was not intended for use in the context of statewide GHG emissions and is therefore overly broad in this context. Instead, CARB should narrow the definition to ensure that businesses with only minimal or immaterial business activity related to California are clearly exempted from regulatory applicability.

078.23 CARB has regulatory authority over sources that emit within the state and should implement the rule in a manner that covers only business entities with a physical presence that directly emit greenhouse gases within California. Cal. Health & Safety Code § 38530 states: "(b) The regulations shall do all of the following: . . . (1) Require the monitoring and annual reporting of greenhouse gas emissions from greenhouse gas emission sources beginning with the sources or categories of sources that contribute the most to ***statewide*** emissions."[12] Additionally, the Legislature declared in SB 253 that "United States companies that have access to California's tremendously valuable consumer market ***by virtue of exercising their corporate franchise in the state*** also share responsibility for disclosing their contributions to global GHG emissions."[13] This indicates that CARB's regulations must focus on business entities that generate emissions within California rather than out-of-state business entities that do not.

078.24 The Group further requests that CARB clarify that the revenue thresholds used in SB 253 and 261 to determine whether an entity is doing business in California pertain specifically to revenue generated through sales in California, rather than the total revenue for the company as a whole. Furthermore, CARB should clarify that this threshold applies only to business entities actually doing business in California, and not to their corporate parents, that may not even be located in the United States.

078.25 If CARB elects to retain the California RTC's definition, additional clarity is needed for business entities to determine applicability. For example, even with definitions for "revenue" and "doing business in California" based on the California RTC, it can be difficult for a business entity to determine applicability, particularly for out-of-state companies with subsidiaries in California that plan to file a consolidated report at a higher corporate level.

[12] Emphasis added.

[13] SB 253, § 1 (emphasis added).

K. CARB Should Clarify that Utilities' Self-Consumed Electricity Would Be Scope 1 Emissions.

078.26 CARB should clarify that for electric utilities, electricity used at facilities located within their own service area (and not purchased from another utility) is encompassed by Scope 1 emissions and not Scope 2 emissions. This clarification is necessary to avoid the potential for double-counting emissions that could result from the inclusion of the phrase "regardless of location" in CARB's proposed definition of "Scope 2 Emissions."[14]

* * *

078.27 The Class of '85 appreciates the opportunity to comment on the proposed initial regulation of SB 253 and 261 and urges CARB to consider the above comments. To avoid adverse economic and competitive impacts, the final implementing regulations must include clear guardrails, thresholds, and standards for determining applicability and scope. This will ensure the regulations advance California's objectives without creating undue expense and complexity for businesses and regulators. CARB also should finalize the critical, detailed requirements of the rulemaking as soon as possible to provide regulated entities with greater regulatory certainty.

Dated: February 9, 2026

Respectfully submitted,

The Class of '85 Regulatory Response Group
contact@class-of-85.com

[14] *See* Electric Power Research Institute, *Greenhouse Gas Emissions Accounting for Electric Companies*, 2-5–2-6 (Sept. 2021), https://www.epri.com/research/products/000000003002022366.

ATTACHMENT A

List of Class of ’85 members supporting these comments

List of Signatories

AES Corporation
Alliant Energy Corporation
Ameren
Arizona Electric Power Cooperative, Inc.
Arkansas Electric Cooperative Corporation
Basin Electric Power Cooperative City of Tallahassee
Cleco Corporation
Cogentrix Energy Power Management, LLC
CPS Energy
Dairyland Power Cooperative
Dayton Power & Light Company
Entergy Services, LLC
Evergy, Inc.
Florida Municipal Electric Association
Gainesville Regional Utilities
Great River Energy
Hawaiian Electric Company, Inc.
Indianapolis Power & Light Company
JEA
Lakeland Electric
Louisville Gas & Electric/Kentucky Utilities
Minnesota Power
NRG Energy
OGE Energy Corp.
Orlando Utilities Commission
Otter Tail Power Company
Portland General Electric
PowerSouth Energy Cooperative
Public Service Company of New Mexico
Puget Sound Energy
Rainbow Energy Center, LLC
Talen Energy
Tampa Electric Company
Western Farmers Electric Cooperative
Xcel Energy

ATTACHMENT B

Comments of the Class of ’85 Regulatory Response Group on the information solicitation issued by CARB, Submission No. 22601 (Mar. 21, 2025)

COMMENTS OF THE CLASS OF '85 REGULATORY RESPONSE GROUP

ON THE

CALIFORNIA AIR RESOURCES BOARD'S INFORMATION SOLICITATION TO INFORM IMPLEMENTATION OF CALIFORNIA CLIMATE-DISCLOSURE LEGISLATION

I. INTRODUCTION

The Class of '85 Regulatory Response Group ("Class of '85" or "Group") respectfully submits these comments on the information solicitation issued by the California Air Resources Board ("CARB") to inform implementation of Senate Bill ("SB") 253 and 261.[1] The Class of '85 is a voluntary, ad hoc coalition of over 40 electric generating companies from around the country that has been actively involved in the development of regulations to implement the Clean Air Act and other statutes for 35 years.[2]

SB 253 requires both public and private U.S. businesses with revenues over $1 billion that do business in California to annually report their greenhouse gas ("GHG") emissions, including scopes 1, 2, beginning in 2026, and Scope 3 emissions, beginning in 2027. Meanwhile, SB 261 requires both public and private U.S. businesses with revenues over $500 million that do business in California to prepare biennial climate-related financial risk disclosures in compliance with the Task Force on Climate-related Financial Disclosures ("TCFD") reporting framework or another equivalent framework.

The Class of '85 would like to stress the importance of ensuring California accomplishes its regulatory objectives of collecting useful, actionable data and information, without unduly burdening businesses only tangentially connected to California and unintentionally harming grid reliability. Balancing the compliance burden on regulated businesses alongside California's interest in information collection will help to ensure that the data ultimately reported is useful, pertinent, and relevant.

078.28

In particular, CARB must ensure that its regulations adequately assess "the potential for adverse economic impact on California business enterprises" and address competitive impacts for existing businesses. *See* Cal. Gov. Code §§ 11346.3(a), (e) and 11340.1(a). California Government Code § 11346.2(b)(4) also requires CARB to consider "reasonable alternatives to the regulation that would lessen any adverse impact on small business," and reasonable alternatives that are "less burdensome." As part of these alternatives, CARB must consider "overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health." To comply with these statutory directives, CARB should develop a cost-effective reporting program that does not impose unnecessary burdens on

[1] CARB, *Information Solicitation to Inform Implementation of California Climate-Disclosure Legislation: Senate Bills 253 and 261, as amended by SB 219*, (Dec. 16, 2024), https://ww2.arb.ca.gov/sites/default/files/2025-01/ClimateDisclosureQs_Dec2024_v2.pdf.

[2] Attachment A contains a list of Class of '85 members who support these comments.

reporting entities especially those entities that have little, if any, presence in California. This includes out-of-state entities that engage in wholesale electricity, renewable energy certificate, or carbon offset transactions with California entities, as well as out-of-state companies that have a de minimis number of employees working in California.

Without clear guardrails, thresholds, and standards associated with determining applicability and scope of the regulations, an open-ended data grab will not help to advance California's objectives, and will be expensive, complicated, and daunting for both those charged with complying and those tasked with implementation, review, and enforcement. Potentially affected businesses need clear direction on applicability, requirements, costs, and timelines for completing the new disclosure requirements, as well as flexibility to accommodate differing reporting timelines and information available in diverse sectors. Providing certainty and clarity in the form of bright-line definitions, exclusions, and off-ramps will help to narrow the focus to those businesses whose operations are most applicable to greenhouse gas emissions in California.

II. COMMENTS

The Class of '85 provides the following responses to the questions posed in CARB's information solicitation.

Question (1)(a): Should CARB adopt the interpretation of "doing business in California" found in the Revenue and Tax Code section 23101?

As an initial matter, CARB should clarify that the revenue thresholds in SB 253 and 261
078.53 are specific to California-generated revenue, not revenue for the company as a whole. Furthermore, CARB should clarify that this threshold applies only to entities actually doing business in California rather than their corporate parents, which may not even be located in the United States.

The California Revenue and Tax Code's definition of "doing business in California" should not be adopted, as this particular definition was not intended to apply in the context of statewide greenhouse gas emissions and is thus overly broad. CARB should consider narrowing the
078.29 definition to ensure that businesses who have only minimal/immaterial business activity related to California are clearly exempted from regulatory applicability.

CARB has regulatory authority over sources that emit within the state and so should implement the rule in a manner that covers only entities that have a physical presence and directly emit greenhouse gases within California. Cal. Health and Saf. Code § 38530 states: "(b) The regulations shall do all of the following: . . . (1) Require the monitoring and annual reporting of greenhouse gas emissions from greenhouse gas emission sources beginning with the sources or categories of sources that contribute the most to ***statewide*** emissions."[3] Additionally, the Legislature declared in SB 253 that "United States companies that have access to California's tremendously valuable consumer market ***by virtue of exercising their corporate franchise in the state*** also share responsibility for disclosing their contributions to global GHG emissions."[4] This

[3] Emphasis added.

[4] SB 253, § 1 (emphasis added).

indicates that CARB's regulations must focus on entities that generate emissions within California rather than out-of-state entities that do not generate emissions within the state.

Furthermore, out-of-state companies that have a de minimis number of employees working in California should not be covered. The de minimis threshold should encompass companies not principally located or operating in California and have 1% or less of their employees whose primary residence is in California. These approaches would align with CARB's mandate to consider alternatives that would limit regulatory burdens for covered entities by clarifying regulatory requirements and avoiding unnecessary reporting. *See* Cal. Gov. Code § 11346.2(b)(4).

Question 1(b): Should federal and state government entities that generate revenue be included in the definition of a "business entity" that does business in California?

078.30 Government entities and their subdivisions (e.g., a political subdivision of a state) should not be included, regardless of whether they generate revenue. Each such entity is not a "business entity" based upon the plain meaning of that phrase. Government entities are sovereign entities responsible for the public welfare (and, in certain cases, delegate their power to their subdivisions)—not business entities.

Question 1(d): Should entities that sell energy, or other goods and services, into California through a separate market, like the energy imbalance market or extended day ahead market, be covered?

078.31 Out-of-state entities that sell energy, or other goods and services (e.g., transmission, reserves, or other energy-related products), into California through a separate market should not be covered. These entities are "one step removed" from directly performing business activity in California, and it is therefore appropriate to exempt them due to the existence of the *intermediate entity* of a separate market. In many such cases, the seller in such circumstances has very little or no control over the ultimate fate of their offered goods or services—whether those items end up in California or California markets, how, when, or for how much. It is often not logistically possible for a seller to control, monitor, track, or trace such transactions to that level, which is in any case, the actual function and purpose of the market, brokerage, or other seller.

This interpretation is supported by a letter from the lead sponsors of SB 253 and 261, Senator Wiener and Senator Stern, who clarified the bills were not intended to include companies participating in the Western Energy Imbalance Market and the Extended Day Ahead Market within the scope of the reporting obligation. Specifically, the letter provides the bills "are not intended to include a business entity whose only activity within California consists of wholesale electricity transactions that occur in interstate commerce."[5] To the extent CARB is concerned about the potential emissions associated with imported electricity, such emissions are already accounted for under California's cap-and-trade program.[6]

[5] California Legislature 2023-24, Senate Daily Journal, 3058, (Jan. 30, 2024), https://leginfo.legislature.ca.gov/faces/pubSenDailyJrn2.xhtml?type=doc&sessionyear=20232024&pagenum=3057&sessionnum=0&fileid=996.

[6] *See* Cal. Code Regs. tit. 17, § 95852(b)(1).

Subjecting out-of-state companies to substantial reporting burdens just for helping balance California's electric grid would disincentivize companies from engaging in such transactions in the future. CARB should strive to avoid disincentives to electricity reliability in California, especially in light of the North American Reliability Corporation's *2024 Long-Term Reliability Assessment*, which highlights future reliability concerns in future years due to a combination of demand growth and planned generator retirements.[7] Furthermore, creating such disincentives could hinder California's goal of electrifying the transportation sector, including Executive Order N-79-20's target of 100% in-state sales of new passenger cars and trucks being zero-emission by 2035,[8] as well as the electrifying other sectors, such as buildings.[9]

Finally, subjecting out-of-state companies to substantial reporting burdens for activities outside of California could be subject to legal challenges. Under the Due Process Clause of the U.S. Constitution, such requirements would be out of proportion to the out-of-state company's connection with California.[10] Similarly, under the Commerce Clause, such requirements would have the impermissible practical effect of regulating activities wholly outside of California's borders by requiring the disclosure of non-California activity.[11] Additionally, SB 253 and SB 261 may violate the First Amendment by compelling speech, as alleged in *Chamber of Commerce of the United States v. California Air Resources Board*, Case No. 2:24-cv-00801-ODW (C.D. Cal.). Excluding out-of-state utilities that do not generate emissions in California will help avoid these potential legal issues.

078.32 Separately, CARB should also exclude carbon offset transactions from regulations under SB 253 and 261, because disclosures about such transactions are already covered under AB 1305.[12] CARB has a statutory duty to avoid such duplicative regulations.[13] Imposing additional carbon offset disclosure requirements under statutes other than AB 1305 would be unduly duplicative.

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[7] North American Electric Reliability Corporation, *2024 Long-Term Reliability Assessment*, 17 (Dec. 2024), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_Long%20Term%20Reliability%20Assessment_2024.pdf.

[8] CARB, *Going Zero: Leading the Way to Zero-Emission Drive*, https://ww2.arb.ca.gov/going-zero (last visited Mar. 17, 2025).

[9] CARB, *Building Decarbonization*, https://www.energy.ca.gov/programs-and-topics/topics/building-decarbonization (last visited Mar. 17, 2025).

[10] *See Allied-Signal, Inc. v. Dir., Div. of Tax'n*, 504 U.S. 768, 777 (1992) ("The principle that a State may not tax value earned outside its borders rests on the fundamental requirement of both the Due Process and Commerce Clauses that there be 'some definite link, some minimum connection, between a state and the person, property or transaction it seeks to tax.'") (quoting *Miller Brothers Co. v. Maryland*, 347 U.S. 340, 344–345 (1954)).

[11] *See Healy v. Beer Inst., Inc.*, 491 U.S. 324, 332 (1989) ("[A] state law that has the 'practical effect' of regulating commerce occurring wholly outside that State's borders is invalid under the Commerce Clause.").

[12] Cal. Health and Saf. Code § 44475 ("A business entity that is marketing or selling voluntary carbon offsets within the state shall disclose on the business entity's internet website all of the following information . . .").

[13] *See* Cal. Gov't Code § 11349(f) ("'Nonduplication' means that a regulation does not serve the same purpose as a state or federal statute or another regulation. This standard requires that an agency proposing to amend or adopt a regulation must identify any state or federal statute or regulation which is overlapped or duplicated by the proposed regulation and justify any overlap or duplication.").

CARB should also exclude bilateral sales of energy or other energy-related products that occur in interstate commerce. Such sales constitute another type of wholesale electricity transactions. Again, the letter of Senator Wiener and Senator Stern (as discussed above) provides that the bills "are not intended to include a business entity whose only activity within California consists of wholesale electricity transactions that occur in interstate commerce."

Additionally, CARB should exclude renewable energy certificate ("REC") sales, as such
078.33 transactions mitigate emissions of GHG and therefore should be encouraged and not discouraged in any way.

Question 2(a): For private companies, what databases or datasets should CARB rely on to identify reporting entities? What is the frequency by which these data are updated and how is it verified?

Annual tax return data can be used to identify covered businesses, once the definition of
078.34 "do[ing] business in California" is appropriately clarified. Additionally, entities not required to file any California state taxes have so little economic impact upon or from the State that they also should not be subject to any of California's climate disclosure regulations.

Question 2(b): In what way(s) should CARB track parent/subsidiary relationships to assure companies doing business in California that report under a parent are clearly identified and included in any reporting requirements?

078.35 CARB should track parent/subsidiary relationships as they are detailed in tax filings.

Question 3(b): How could CARB ensure reporting under the laws minimizes a duplication of effort for entities that are required to report GHG emissions or financial risk under other mandatory programs and under SB 253 or 261 reporting requirements?

For GHG emissions, the mandatory reporting regulations could be incorporated by reference. This would ensure consistency in this reporting between these regulations, e.g., Scope
078.36 1 emissions reported to CARB under the state's Mandatory Reporting of Greenhouse Gas Emissions ("MRR") regulations could satisfy all or some of the Scope 1 reporting obligations under SB 253. This approach would minimize the burden on reporting entities, consistent with Cal. Gov. Code § 11346.2(b)(4).

Question 3(c): To the extent the standards and protocols incorporated into the statute provide flexibility in reporting methods, should reporting entities be required to pick a specific reporting method and consistently use it year-to-year?

Companies subject to this reporting would already have GHG reporting methodologies to
078.37 calculate emissions, and likely already have their methodologies third-party verified. However, companies should not be locked into a particular methodology, as their business needs may evolve. As such, companies should be required to report which protocol they use and note if the methodology has changed from prior reporting years.

Question 4: To inform CARB's regulatory processes, are there any public datasets that identify the costs for voluntary reporting already being submitted by companies? What

factors affect the cost or anticipated cost for entities to comply with either legislation? What data should CARB rely on when assessing the fiscal impacts of either regulation?

078.38 Regarding public datasets that identify the costs for voluntary reporting already being submitted by companies, CARB should consult Federal or state rulemaking dockets of other similar disclosure regulations, such as the 2024 U.S. Securities and Exchange Commission climate disclosure regulation, which has a regulatory impact analysis for the economic impacts of similar regulations.[14]

CARB should also consider the lifetime, ongoing burden on regulated entities for complying with these regulations, and quantify the actual monetary benefits projected from the rules to ensure that a non-negative cost-to-benefit ratio exists.

Question 5: Should the state require reporting directly to CARB or contract out to an "emissions" and/or "climate" reporting organization?

078.39 The state should require reporting directly to CARB.

Question 6: If contracting out for reporting services, are there non-profits or private companies that already provide these services?

078.40 Yes. The Climate Registry ("TCR") and Trinity Consultants ("Trinity") are capable of providing these services. TCR maintains a database for companies voluntarily reporting Scope 1, 2, and 3 emissions. Trinity is the private consulting firm contracted by Colorado Department of Public Health and Environment to gather Scope 1 GHG emissions data from reporting companies under the Colorado Natural Gas Transmission and Storage Segment Performance Based Program Emission Inventory Protocol. CARB should ensure that any contracted reporting service conducts such services in alignment with the relevant accounting and reporting principles.

Question 7: Entities must measure and report their emissions of greenhouse gases in conformance with the GHG Protocol, which allows for flexibility in some areas (i.e. boundary setting, apportioning emissions in multiple ownerships, GHGs subject to reporting, reporting by sector vs business unit, or others). Are there specific aspects of scopes 1, 2, or 3 reporting that CARB should consider standardizing?

078.41 CARB should ensure that rulemaking does not deviate from the flexibilities currently allowed by the GHG Protocol permitting a reporter to establish their own operational, financial, or control boundaries. These determinations are critical to ensuring accurate reporting of emissions that are within the actual control of the reporter.

Question 8(a): For entities required to report under SB 253, what options exist for third-party verification or assurance for scope 3 emissions?

078.42 Large corporate auditing firms such as Deloitte, EY, KPMG, and PricewaterhouseCoopers, provide some level of Environmental, Social, and Governance auditing services. Additionally,

[14] *See* U.S. Securities and Exchange Commission, *The Enhancement of Climate-Related Disclosures for Investors*, 89 Fed. Reg. 21,668, 21,829–21,894 (Mar. 28, 2024).

private consulting firms such as Cameron-Cole LLC, LRQA, and TÜV SÜD America, Inc. provide greenhouse gas emissions verification services and are accredited by ANSI National Accreditation Board to ISO 14065. At least one Class of '85 member utilizes auditors allowed by TCR.

Question 8(b): For purposes of implementing SB 253, what standards should be used to define limited assurance and reasonable level of assurance? Should the existing definition for "reasonable assurance" in MRR be utilized, and if not why?

078.43 The "reasonable assurance" standard is appropriate for Scope 1 and 2 emissions. However, the "limited assurance" standard is more appropriate for Scope 3 emissions because reporters have no control over the source of these emissions, have limited capability to verify the methodologies used by others to calculate the emissions provided to them, and may need to rely on inaccurate or incomplete data to calculate certain Scope 3 emission categories.

Question 9(c): What frequency (annual or other) and time period (1 year or more) are currently used for reporting?

078.44 Currently, at least one Class of '85 member reports voluntary, partial Scope 1 and Scope 2 emissions in its Corporate Sustainability Report on an annual frequency, 1 year time period basis. Another member annually reports Scope 1 and 2 emissions, verified to a reasonable level of assurance, and voluntarily reports Scope 3 emissions. Another member annually reports its Scope 1, 2, and 3 emissions and obtains limited assurance of Scope 1 and 2 emissions. This member's disclosures often include the current reporting year plus 3 to 5 years of historical emissions.

SB 253 reporting should be required no earlier than the end of the year following the reporting year, in order to provide time to make the necessary calculations, obtain regulatory verification of data from EPA and other agencies, and have the data go through third-party verification. In the experience of some Class of '85 members, verification can take longer, depending upon the staff resources of the verification entity, so there should be appropriate exceptions if such circumstances arise.

Question 9(d): When are data available from the prior year to support reporting?

078.45 Select emissions and operational data are available from the prior year by the annual March 31 federal EPA air emissions reporting deadline for electric utilities. Other information, such as data regarding purchased power or power sales, or information supplied to the state or federal government in other reports, are not available until later in the year, up to July 1 in some cases. Third-party verification is generally completed by the end of the year following the reporting year. However, verification can take longer depending upon the available staff resources of the verification entity.

Question 9(e): What software systems are commonly used for voluntary reporting?

078.46 Certain Class of '85 members do not use a dedicated ESG-type software system for voluntary reporting. Through research and review, these members found these systems both too expensive and too complex for their needs, both in their installation and ongoing use.

Other Class of ’85 members generally used Microsoft Excel workbooks for reporting. At least one Class of ’85 member uses Workiva. Another member is in the process of implementing a third-party software called SWEEP to assist in reporting.

Question 10: For SB 261, if the data needed to develop each biennial report are the prior year’s data, what is the appropriate timeframe within a reporting year to ensure data are available, reporting is complete, and the necessary assurance review is completed?

Much information for ESG reporting is taken from other properly vetted, qualified, and submitted state and federal reports, which have various reporting deadlines up to and including July 1 following the previous reporting year. Therefore, the Class of ’85 considers July 1 to be the earliest by which all necessary data and information is available for the prior year.

078.47

The Class of ’85 disagrees that assurance is required under SB 261 and thus encourages CARB to omit any such requirement in the promulgated regulations. In the event assurance is required, a reasonable period of time for verification should be considered.

Question 11: Should CARB require a standardized reporting year (i.e., 2027, 2029, 2031, etc.), or allow for reporting any time in a two-year period (2026-2027, 2028-2029, etc.)?

CARB should provide great flexibility to covered entities in preparing their climate-related financial risk reports and allow reporting any time within the biennial reporting period, e.g., 2026-2027 reporting made available not later than December 31, 2027. This would allow covered entities already reporting pursuant to TCFD to align their reporting cadence to the biennial requirements of SB 261. In addition, this would provide a transition period to covered entities not following TCFD disclosure standards to align with the requirements of SB 261. This flexibility in reporting will also help give companies adequate time to perform a thorough materiality risk assessment and to prepare disclosures on their climate risk mitigation and adaptation efforts.

078.48

Question 12: SB 261 requires entities to prepare a climate-related financial risk report biennially. What, if any, disclosures should be required by an entity that qualifies as a reporting entity (because it exceeds the revenue threshold) for the first time during the two years before a reporting year?

CARB should provide for a transition process for an entity that needs to move into reporting for a partial reporting period. Such regulations can reference program transition methods of existing standards and frameworks, such as the International Sustainability Standards Board’s (“ISSB”) framework.

078.49

Question 13(f): What other types of existing climate financial risk disclosures are entities already preparing?

At least one Class of ’85 member has historically followed the TCFD framework, now disbanded and incorporated into the ISSB’s framework.

078.50

Another Class of ’85 member is continuing to publish a TCFD report, which references the climate financial risk disclosures in the member’s 10-K and proxy statement. The member is currently evaluating utilizing disclosures in accordance with the ISSB standards.

Question 13(g): For covered entities that already report climate related financial risk, what approaches do entities use?

078.51 At least some Class of ’85 members have historically followed the TCFD framework in their voluntary sustainability reporting.

Question 13(h): In what areas, if any, is current reporting typically different than the guidance provided by the Final Report of Recommendations of the Task Force on Climate Related Financial Disclosures?

078.52 SB 261 requires disclosure with the TCFD framework (or a successor). However, the TCFD framework does not include discussion of mitigation measures required in SB 261.[15] This will be a new disclosure requirement.

III. CONCLUSION

The Class of ’85 appreciates the opportunity to comment on CARB’s implementation of SB 253 and 261. If you have any questions about our comments you would like to discuss, please reach out to us at contact@class-of-85.com.

Dated: March 21, 2025

Respectfully submitted,

The Class of ’85 Regulatory Response Group
contact@class-of-85.com

[15] Cal. Health and Saf. Code § 38533(b)(1)(A)(ii) (requiring a covered entity to disclose “[i]ts measures adopted to reduce and adapt to climate-related financial risk disclosed pursuant to clause (i).”).

ATTACHMENT A

List of Class of ’85 members supporting these comments

List of Signatories

AES Corporation
Alliant Energy Corporation
Ameren
Arizona Electric Power Cooperative, Inc.
Arkansas Electric Cooperative Corporation
City of Tallahassee
Cleco Corporation
Cogentrix Energy Power Management, LLC
Dairyland Power Cooperative
Dayton Power & Light Company
Dominion Energy
Duke Energy
Entergy Services, LLC
Evergy, Inc.
Florida Municipal Electric Association
Gainesville Regional Utilities
Great River Energy
Hawaiian Electric Company, Inc.
Indianapolis Power & Light Company
JEA
Lakeland Electric
Louisville Gas & Electric/Kentucky Utilities
Minnesota Power
NRG Energy
OGE Energy Corp.
Orlando Utilities Commission
Portland General Electric
PowerSouth Energy Cooperative
Public Service Company of New Mexico
Rainbow Energy Center, LLC
Southern Company
Talen Energy
Tampa Electric Company
TXNM Energy
Western Farmers Electric Cooperative
Xcel Energy

Leona Hwang

1. Regarding Reporting Entities

1.1. Request for additional criteria beyond revenue for determining entities subject to disclosure
- It appears excessive to impose disclosure obligations on companies that only perform sales functions, have no production facilities, or operate with a relatively small number of employees.
079.1 - In particular, for companies that operate only office facilities, both the climate-related financial impacts and the level of GHG emissions are likely to be limited, and in such cases, the benefits of disclosure may be minimal compared to the effort and resources required to comply.
- Therefore, we respectfully request that you consider introducing additional criteria, such as an employee headcount threshold (as seen under the EU CSRD) or limiting the disclosure obligation to companies that operate production facilities.

1.2. Request for detailed guidance on entities exempt from reporting
- For entities whose first-year disclosure obligation under SB 253 is exempt, it will be important to avoid any misunderstanding that they have failed to comply with the 2026 disclosure requirements. To this end, we request that clear guidance be provided so that such entities may submit a statement in lieu of disclosure by the GHG emissions disclosure deadline of August 10. 079.2
- We therefore kindly request the early finalization and publication of detailed requirements for the submission of such statements (for example, the submission deadline, the information that must be included in the statement, and the method of submission).
- In addition, we would like to ask whether there are any plans to introduce similar exemption conditions under SB 261 as those under SB 253.

2. Regarding the Reporting Scope

2.1. Reporting approach when the parent company submits consolidated disclosure
079.3 - Where a parent company located outside California submits consolidated disclosure that includes subsidiaries subject to SB 253 and SB 261, it would be helpful to have clear rules on whether California based subsidiaries may simply be covered by the consolidated information, or whether their information must be explicitly broken out and reported separately within the same report.

3. Regarding SB 253

3.1. Request for information on the launch schedule and user guidance for the disclosure platform
- We would appreciate detailed guidance on the planned launch schedule of the disclosure platform and on how California based subsidiaries can submit their information using the consolidated disclosure prepared by the parent company, including how such submissions would be handled via the platform. 079.4

3.2. Request for clear rules on the use of GWPs
079.5 - With respect to the Global Warming Potentials (GWPs) to be used in calculating GHG emissions,

we believe it is necessary to clarify whether entities are required to use the latest available GWP values or may select among different versions at their discretion.

3.3. Request for consideration of a one-year deferral of Scope 3 disclosure for entities exempt from 2026 reporting

- For entities exempt from 2026 disclosure whose GHG emissions measurement systems are not yet fully in place, it may be practically challenging to report Scope 1, Scope 2, and Scope 3 emissions together in 2027.
- Accordingly, we respectfully request that you consider granting entities exempt from 2026 disclosure an additional one year deferral for Scope 3 reporting, so that they would begin disclosing Scope 3 emissions from 2028 instead.

079.6

3.4. Request for guidance regarding GHG emissions verification bodies

079.7

- For companies measuring and verifying their GHG emissions for the first time, it can be difficult to assess which verification bodies are sufficiently reliable. It would be very helpful if you could provide a list of verification bodies within California that meet the appropriate qualifications and competencies.

4. Regarding SB 261

- We understand that CARB plans to review the climate related financial risk reports disclosed by companies under SB 261. If CARB could publish the criteria or examples that would be used to determine whether a disclosure is considered inadequate or not made in good faith, this would greatly assist companies in preparing their reports in a thorough and diligent manner.

079.8

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