

# Coalition for Sustainable Cement Manufacturing & Environment

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June 30, 2023

Ms. Liane M. Randolph  
Chair  
California Air Resources Board  
1001 "I" Street  
Post Office Box 2815  
Sacramento, California 95812

Subject: **The California Cement Industry's Comments on Second Workshop for SB 596 Cement Sector Net-Zero Emissions Strategy**

Dear Ms. Randolph:

The Coalition for Sustainable Cement Manufacturing and Environment ("CSCME") provides these comments on the California Air Resources Board ("CARB") May 31, 2023 Second Workshop for SB 596 Cement Sector Net-Zero Emissions Strategy (the "Strategy").

CSCME is a coalition of all five cement manufacturers in California.<sup>1</sup> Since the passage of AB 32 in 2006, we have worked cooperatively and constructively with legislators and regulators to develop policies that advance California's climate goals and promote the reduction of greenhouse gas ("GHG") emissions in the cement industry while minimizing the risk of economic and emissions leakage. Those efforts include working with CARB on the design and implementation of the cap-and-trade program and working with legislators to refine and extend the program under AB 398.

As a result of these policies and associated industry investments, the cement industry has made significant contributions to achieving California's GHG emissions reduction targets. For instance, the industry produced roughly the same amount of cement in 2020 as it did in 2008, but with 13% fewer total GHG emissions and 22% fewer combustion-related emissions.<sup>2</sup> Although the global cement industry accounts for roughly 8% of global GHG emissions, the California cement industry accounts for just 2% of the state's GHG emissions.<sup>3</sup>

But the industry's progress to date is just a first step. We understand that our ability to survive in California in the long term will depend on achieving deep decarbonization while also remaining competitive in a

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<sup>1</sup> The Coalition includes CalPortland Company, Cemex, Inc., Martin Marietta Materials, Mitsubishi Cement Corporation, and National Cement Company of California Inc. There are seven cement plants currently in operation in California.

<sup>2</sup> Calculated using industry data from U.S. Geological Survey (2000-2019). Annual Mineral Commodity Summary.; California Air Resources Board (2021). 2000-2019 GHG Inventory (2021 Edition). Full Inventory - Economic Sector Categorization.; and California Air Resources Board (2021). 2020 GHG Facility and Entity Emissions. Full Inventory - Economic Sector Categorization.

<sup>3</sup> For global estimates, see *Chatham House (2018). Making Concrete Change*. For California estimates, see *CARB (Oct 2022). California Greenhouse Gas Emissions for 2000 to 2020 - Trends of Emissions and Other Indicators. Figure 4*.

global market. Accordingly, in April 2021, the industry released the first edition of “Achieving Carbon Neutrality in the California Cement Industry” — a forward-leaning report that expressed the industry’s commitment to reach net carbon neutrality by 2045 and outlined the opportunities and challenges associated with achieving that ambitious goal. In 2022, the industry worked collaboratively with legislators, environmental advocacy groups, and other stakeholders to develop SB 596, which aligned with the industry’s vision and many of the principles reflected in the industry’s roadmap, such as ensuring that all cement consumed in California is subjected to similar carbon requirements and focusing on the removal of various barriers that currently prevent the industry from achieving deep decarbonization. The industry also actively worked to build bipartisan support for the bill and secure its passage.

Our support for SB 596 was underpinned by a simple reality — the California cement industry cannot achieve net carbon neutrality by itself. We need assistance from legislators, regulators, and other stakeholders to both unlock various decarbonization pathways and ensure that all cement sold into the California market, regardless of where it was produced, is held to similar standards. We look forward to working with CARB to realize the vision set out in SB 596 and design a strategy that supports a vibrant, competitive, and sustainable California cement industry.

Our comments are generally organized around the specific questions presented by CARB during the workshop on May 31<sup>st</sup>. That said, we encourage CARB and other interested stakeholders to review the industry’s roadmap to net carbon neutrality to better understand the full landscape of issues associated with achieving deep decarbonization in the California cement industry. The industry is actively working on a second edition that provides an updated assessment of barriers and policy solutions, which will be released in the coming weeks.

### **The Definition of “Net Zero” Emissions in the Cement Industry**

SB 596 requires CARB to develop a strategy to achieve net-zero GHG emissions associated with cement used within the state as soon as possible, but no later than December 31, 2045.

As a general principle, the concept of net GHG emissions represents the quantity of GHG emissions released into the atmosphere minus any GHG emissions removed from the atmosphere. Cement is unusual as a product in that it is both a source and a sink of GHG emissions. The GHG emissions associated with the production of cement are well understood and extensively quantified. In contrast, many stakeholders do not realize that a substantial portion of the GHG emissions associated with the production of cement are effectively reabsorbed and sequestered over time.

The production of cement requires heating limestone at high temperatures, which results in a chemical transformation that drives off the CO<sub>2</sub> embedded in limestone (i.e., process emissions). This process of using energy to drive off CO<sub>2</sub> in the limestone is effectively undone by nature over time as the cement in hydrated concrete reacts with and reabsorbs CO<sub>2</sub> in the ambient air — a process known as “recarbonation”.

According to the United Nations Intergovernmental Panel on Climate Change, “the uptake of CO<sub>2</sub> in cement infrastructure ([re]carbonation) offsets about one half of the carbonate emissions from current ce-

ment production.”<sup>4</sup> The exact amount of CO<sub>2</sub> reabsorbed by cement depends on specific conditions, particularly the amount captured during the lifetime of the structure and the cement in hydrated concrete that is exposed to the atmosphere when crushed and demolished at the end of its life. But the key point is that recarbonation represents a non-zero, non-trivial amount of the industry’s GHG footprint, and therefore, CARB should incorporate recarbonation in its definition of net-zero emissions by: (1) amending its inventory of carbon sinks to include cement; (2) recognizing recarbonation in its definition of net emissions from the cement industry; and (3) factoring recarbonation into the metrics that it uses to measure the cement industry’s progress toward net-zero emissions.

In addition to the impact of recarbonation, CARB’s definition of net emissions in the cement industry should also recognize actions that California cement manufacturers take to, for example, prevent the release of GHG emissions into the atmosphere; (e.g., carbon capture at cement plants) and actively capture GHG emissions already released into the atmosphere (e.g., direct air capture).

Finally, SB 596’s requirement for CARB to account for the GHG emissions associated the cement used in California means that it will need to develop an accounting framework that includes the verifiable GHG emissions associated with cement that is imported and consumed in California, including production and transportation to the California market. This could be achieved by requiring cement importers to provide the same or similar emissions data as required under CARB’s mandatory reporting requirements, as well as information regarding the distance and mode of transport. Such data could be collected in some form of third-party verified Environmental Product Declaration (EPD) or other type of declaration or certification.

In short, “net-zero emissions” should not be synonymous with “zero emissions” in the context of SB 596. There are a variety of avenues to effectively offset the initial GHG emissions directly generated by the production of cement in California, including recognizing the role of recarbonation, capturing and sequestering carbon in the cement industry, and supporting the removal of carbon from the atmosphere. Likewise, CARB’s definition of net GHG emissions associated with the use of cement in California should account for the GHG emission associated with cement produced outside of the state and transported to the California market.

### **The Definition of Cement**

SB 596 also requires CARB to establish interim targets for reducing the GHG intensity of “cement used within the state”. In contrast to the requirements associated with the net zero goal, SB 596 prohibits CARB from considering reductions unrelated to, “the raw materials, fuels or other energy sources, processes, or transportation involved in making or using cement or its inputs” when setting interim GHG intensity targets. The need to establish a GHG intensity metric to measure progress toward interim goals heightens the importance of defining what should constitutes “cement” for regulatory purposes.

Under the current cap-and-trade regulation, cement is qualitatively described as, “...a building material that is produced by heating mixtures of limestone and other minerals or additives at high temperatures

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<sup>4</sup> United Nations Intergovernmental Panel on Climate Change (2021). Assessment Report 6 Climate Change 2021: The Physical Science Basis.

in a rotary kiln to form clinker, followed by cooling and grinding with blended additives. Finished cement is a powder used with water, sand, and gravel to make concrete and mortar.”

However, this qualitative description is broader than the quantitative definition used for the output-based allowance allocation system, which defines cement as the amount of clinker produced in a given year and adjusted for the amount of gypsum and limestone consumed in that year to convert clinker into cement (i.e., “adjusted clinker”).

When CARB established the narrower definition of cement to support the output-based allowance allocation system, the cement produced and sold in California consisted almost exclusively of clinker, gypsum, and limestone. But the industry has evolved significantly since that time, due in part to state climate policies as well as individual corporate commitments to improve environmental performance across their entire operations. As a result, there is substantial interest in expanding the production of “blended cements” that include clinker, gypsum, limestone, and one or more supplementary cementitious materials (SCMs). The use of SCMs effectively reduces the share of clinker content and, as a result, reduces the GHG footprint of the product. By expanding the definition of cement to include SCMs, CARB would be recognizing, incentivizing, and accelerating the investments needed to produce lower-emissions blended cements and bring them to market.

CARB will also need to specify what qualifies as an SCM. We recommend that the definition explicitly mention supplementary cementitious materials that are commonly used today, including granulated ground blast furnace slag; fly ash; natural pozzolans; calcined clays; and silica fume. We also recommend that CARB establish a process that allows producers to petition to add a new material to the list of SCMs that have the potential to reduce the clinker content of cement without sacrificing product performance.

Although expanding the definition of cement is a strong first step, it is not sufficient to fully unlock GHG reductions via clinker substitution. Other barriers to increasing the production of blended cements include but are not limited to:

**Capital Investments:** The capital costs associated with increasing the production of blended cements will depend on a plant’s current circumstances. The capital costs for a “well positioned” plant are likely to be non-trivial but manageable, but the capital costs for a “poorly positioned” plant could be significant. Factors that are likely to impact where a particular plant lies along this spectrum include grinding capacity (i.e., plants that do not currently have excess grinding capacity will likely require much more capital investment than those who do) and storage capacity (i.e., plants that do not currently have sufficient silos to produce a broader slate of cement types will likely require much more capital investment than those who do). The uncertainties of protracted permitting processes for such modifications also impact a producer’s ability to make the necessary capital investments to increase blended cement production

**Availability of SCMs:** The potential to increase the production of blended cements is dependent on California cement producers’ ability to access SCM supplies at an acceptable cost and quality. Fly ash and slag are the most commonly used SCMs today, but their availability in the California market is likely to be increasingly constrained given their origin (primary steel production in the case of slag and coal-fired electricity production in the case of fly ash). In contrast, natural pozzolans and calcined clays are likely to offer a more sustainable and locally sourced supply of SCMs along the path to net zero. Policy or regulatory

measures to increase RD&D investments in the beneficial use of natural pozzolans and calcined clays have the potential to accelerate their use in the California market. Likewise, policy or regulatory measures to increase RD&D investments in the beneficial use of ponded or stored fly ash have the potential to extend the availability of fly ash while also safely removing waste from the natural environment.

**Market Awareness, Education, and Acceptance of Blended Cements:** Any increases in the local production of blended cements must ultimately be met with an increase in the local demand for blended cements. Improving the market's awareness, education, and acceptance of relatively new products is always a challenge. This is especially true in the construction industry, which tends to be relatively risk-averse given that products or projects that fail can have severe consequences. Policy or regulatory measures that increase awareness, education, and acceptance of blended cements could help accelerate the use of those products in the California market.

**Performance-Based Specifications for Cement and Concrete:** The concrete and construction industries remain highly prescriptive in that owners, engineers, and architects often specify the type of cement and concrete used, as opposed to the performance standards (e.g., strength) that the concrete should meet. California lags the rest of the world when it comes to using performance-based standards, which suppresses the market for blended cements and other innovations that deliver GHG savings while maintaining or even improving the product's performance. Policy or regulatory measures that accelerate the transition to performance-based standards would provide stakeholders throughout the cement-concrete-construction value chain with the flexibility needed to capitalize on opportunities to use blended cements when appropriate for a given project or project component.

In addition to expanding the definition of cement to include SCMs, CARB's SB 596 strategy should include specific actions to remove these other barriers to increasing both the production and consumption of blended cements.

### **Establishing the 2019 Baseline**

SB 596 requires CARB to "establish interim targets for reductions in the greenhouse gas intensity of cement used within the state relative to the average greenhouse gas intensity of cement used within the state during the 2019 calendar year, with the goal of reducing the greenhouse gas intensity of cement used within the state to 40 percent below the 2019 average levels by December 31, 2035." As a result, CARB must establish a GHG intensity baseline based on 2019 data. This raises questions with respect to both the scope of the numerator (i.e., GHG emissions) and denominator (i.e., cement).

With respect to the numerator, the scope should account for the GHG emissions produced up until the point at which the product is first sold into the California market, including the emissions associated with calcination, fuel combustion, electricity consumption, and transportation to the California market, if applicable. With respect to the denominator, the scope should include clinker, gypsum, limestone, and SCMs that are blended at a cement plant, as described above.

Determining the numerator and denominator for cement produced in California in 2019 should be relatively straightforward given data collected by CARB under mandatory reporting requirements (MRR). In

contrast, determining these values for cement imported into California in 2019 will likely require estimation based on best available data. That will likely include some combination of data sources and methods, such as:

- Cement imports by country of origin.
- Cement GHG emissions by country.
- Estimated indirect emissions based on electricity consumption and country grid GHG intensities.
- Estimated transportation emissions based on assumptions about port-to-port distances, vessel type, vessel fuel efficiency, and the GHG intensity of the likely maritime fuel used, as well as estimates of the GHG emissions associated with loading and unloading the product at ports.

When conducting this analysis, CARB should pay particularly close attention to the coverage and quality of data. For instance, although the coverage of the Global Cement & Concrete Association (GCCA) “Getting the Numbers Right” database is robust for many countries, it is quite thin for some, such as China. Low coverage heightens the potential for a “selection bias” in the data, as high performing plants are more likely to voluntarily report in the system. In addition, as with any voluntary reporting system, the accuracy of the data should be scrutinized to ensure that they align with industry experience and other credible data points.

#### **Establishing Future Reporting Requirements for Imported Cement**

In addition to establishing a 2019 baseline, CARB will need to develop reporting requirements for cement imports. This could include requiring importers to provide the same or similar emissions data as required under CARB’s mandatory reporting requirements, as well as information regarding the distance and mode of transport. As noted above, such data could be collected in some form of Environmental Product Declaration (EPD) or other type of declaration or certification. To ensure data integrity, CARB should require that any report, EPD, or other declaration/certification of data meet certain standards, are produced or verified by credible third parties, and are subject to effective enforcement measures.

#### **Additional Barriers and GHG Reduction Opportunities that CARB Should Consider**

In developing the SB 596 strategy, CARB should consider the full range of options for reducing GHG emissions in the California cement industry, including measures to reduce process emissions, fuel combustion emissions, and indirect emissions from electricity consumption. Achieving net carbon neutrality will require unlocking as many pathways as possible so that each cement producer can invest in the portfolio of abatement measures that best aligns with the conditions and circumstances associated with each plant.

As noted in the CSCME comment letter in response to the first SB 596 workshop, the successful deployment of CCUS throughout the entire California cement industry will be especially important to achieving net carbon neutrality. This will require overcoming significant barriers, including lengthy and uncertain permitting processes; the daunting economics associated with high-cost, high-risk investments to capture CO<sub>2</sub> at cement plants; and the need to develop an extensive infrastructure system to safely transport and durably store CO<sub>2</sub> in geological formations. The SB 596 strategy should provide a clear-eyed assessment and thoughtful approach to overcoming these barriers in a systematic fashion.

For more detail on these pathways and the barriers associated with them, please see the cement industry’s carbon neutrality roadmap, which can be found on the California-Nevada Cement Association’s website ([www.cncement.org/attaining-carbon-neutrality](http://www.cncement.org/attaining-carbon-neutrality)).

### **Recommendations on Actions to Address Adverse Air Quality Impacts and Support Economic and Workforce Development in Local Communities**

The California cement industry routinely works with local communities to ensure that changes to plant operations avoid adverse air quality impacts, contribute to the local economy, and support workforce development. This includes working with local air districts to ensure that major changes to operations are consistent with plant permits, which effectively limit total emission levels and impose severe legal and financial consequences if those limits are exceeded. It also includes maintaining our role as an economic engine and major employer within local communities, providing high-paying jobs and contributing to the local tax base through both sales and property taxes. We look forward to continuing, expanding, and deepening our collaboration with local communities in the coming years, enlisting them in our pursuit of net carbon neutrality, and ensuring that our efforts strengthen the local economy, workforce, and environment.

### **Suggestions on Actionable Steps to Increase Collective Readiness to Deploy GHG Reduction Strategies**

As detailed in prior submissions over many years, the most important step that CARB can take to increase the collective readiness to deploy GHG reduction strategies is to hold imported cement to a similar environmental standard as cement that is produced locally.

Under a status quo scenario, the California cement industry will continue to experience rising carbon prices and declining allowance allocations — resulting in increased regulatory costs that are not borne by imports. By investing in GHG abatement measures, cement producers will simply be converting these regulatory costs into capital and operating expenses. In either case, the result is the same: California cement producers will consistently and persistently lose competitiveness.

These circumstances make it exceptionally difficult for private investors to approve any significant GHG reduction projects, especially high-cost, high-risk projects like CCUS. The absence of assurances that imports will be held to similar standards simply serves to increase the odds that any major investments in deep decarbonization will eventually be undermined, resulting in a “throwing good money after bad” dynamic that will be difficult for decision makers to overcome.

Simply put, the California cement industry cannot make the capital investments needed to substantially reduce its GHG footprint (much less achieve carbon neutrality) in the absence of a policy mechanism that holds imported cement to similar environmental standards and effectively closes the “carbon loophole” that exists in California’s GHG accounting systems.

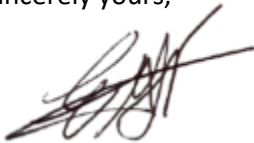
It is important to note that the adoption of policy mechanisms to level the playing field with imported products is neither unprecedented nor impractical. CARB has effectively been implementing such a mechanism in the electric power sector since the inception of the cap-and-trade program almost a decade ago. Likewise, CARB has adopted resolutions recognizing the importance of such measures to the California

cement industry and directed staff to investigate their feasibility. Finally, as has been noted in prior comments, cement is the ideal product to pilot such a measure, as it is a commodity that is rarely transported long distances over land, it is imported through a small number of known coastal ports, and it is rarely if ever transported in the form of a more integrated, downstream product (i.e., concrete cannot be economically transported long distances).

For these reasons and as required under SB 596 “to minimize and mitigate potential leakage and account for embedded emissions of greenhouse gases in imported cement in a similar manner to emissions of greenhouse gases for cement produced in the state, such as through a border carbon adjustment mechanism”, CARB should incorporate such a mechanism into its SB 596 strategy that levels the carbon playing field between locally-produced and imported cement. Specifically, we propose that CARB endorse an incremental carbon border adjustment (or functionally similar mechanism) that subjects locally produced and imported cement to similar environmental regulatory standards and compliance costs. Unless and until such a measure is adopted, it will be difficult (if not impossible) for local cement producers to confidently invest large sums of capital in any of the deep decarbonization measures contemplated by the SB 596 strategy — thereby putting the goal of achieving net zero GHG emissions in the cement industry out of reach.

We look forward to continuing to work with CARB and other stakeholders in the development of an effective strategy under SB 596 for the California cement industry to reach carbon neutrality by 2045.

Sincerely yours,



Erika Guerra  
Chair, Executive Committee  
Coalition for Sustainable Cement Manufacturing & Environment

CC:

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