

April 14, 2024

California Air Resources Board Attn: Pamela Gupta, Branch Chief, Building Decarbonization Liang Liu, Manager, Building Embodied Carbon Policy Section Lex Mitchell, Manger, Building Embodied Carbon Analysis Section

Letter of Public Comment on the March 13th Embodied Carbon in Buildings Workshop 2

Dear Ms. Gupta, Ms. Liu, and Mr. Mitchell,

On behalf of the Carbon Leadership Forum (CLF), I am writing to offer comments for your consideration in the development of programs under AB 2446 and AB43. CLF is highly supportive of CARB's program efforts and commends CARB staff for developing a program informed by stakeholder input. This will undoubtedly result in better program outcomes. This is critical work for California that has the potential to influence policy more broadly as we've already seen with the Buy Clean California policy of 2017. We support continued program resources to address embodied carbon since there are solutions to reduce embodied carbon along the entire supply chain of actors in the built environment. CLF looks forward to continued engagement in CARB's process.

Responses to Requests for Feedback - BASELINE

- 1. Staff are requesting feedback on the definitions staff have presented for "building material", "building sector", and "baseline".
 - <u>CARB definition:</u> "Building material" refers to a physical product or system that is used or produced by the building sector that is intended to become an integral and inseparable part of the completed structure
 - i. Since CARB is proposing to cover vertical buildings and horizontal infrastructure, CLF suggests a definition that also covers those sectors. We think including the word "inseparable" in the definition may limit the inclusion of materials covered under this regulation. Practically all building materials are separable from a structure. For example, the regulation proposes to cover asphalt shingles, which are typically replaced every 10-15 years and are "separable" from a structure. Finally, the phrase "structure" may not apply to all infrastructure projects (e.g., pavements).
 - ii. Consider: "Building material" refers to a physical product or system that is used or produced by the building sector and typically used in the construction of buildings and infrastructure.
 - <u>CARB definition</u>: The "baseline" is an estimate of total GHG emissions attributable to the estimated use of building materials in California in 2026



- The word "use" might be limiting here. Depending how the baseline scope is defined, we'd encourage a more comprehensive definition of "baseline".
 Consider "....an estimate of production, use, and disposal/recovery of building materials...." Or, consider a simpler option that refers to the "lifecycle" emissions of building materials. Finally, it will be important to clarify that this regulation covers building materials consumed in CA.
- ii. Consider: "Baseline" is an estimate of the total lifecycle GHG emissions attributable to the consumption of building materials in California in 2026.
- 2. Staff are requesting feedback on the LCA scope and system boundary for the baseline. Are there additional considerations?
 - Generally, CLF doesn't recommend using an EEIO approach to establish a baseline <u>if</u> <u>that baseline is used as a reference against which embodied carbon reductions are</u> <u>being measured.</u> CARB's "bottom-up" emissions estimates (e.g. EPDs/LCAs) for subsequent years won't be comparable to a top-down EEIO-based baseline due to differing methods and scope. If used for comparison, projects or products would therefore be claiming a reduction for switching emissions reporting methodologies, rather than making progress towards California's decarbonization goals. EEIO also won't be able to track the success of CARB's future efforts, depending on the frequency of updates to the EEIO data, as EEIO doesn't capture reductions like using alternative products or assemblies that reduce emissions but don't reduce cost.
 - However, CLF recognizes that the legislation requires CARB to set a baseline based on EPDs or the most up-to-date data for 2026. We understand that EEIO may be useful for an initial Baseline as an estimate of the entire embodied carbon sector in CA to identify hot spots and inform the initial areas of focus. This exercise might help prioritize program efforts and reduction strategies for specific sectors. We also recognize that CARB can adjust that baseline as they learn more during their initial bottom-up reporting that begins in 2026.
 - We understand that sector-specific strategies will be developed during the next phase of program efforts. These strategies should include sector-specific baselines and reduction targets based on the best available data. It is critical that these baselines match the measurement methodology and scope of the reporting requirements to ensure that claimed reductions are based on real decarbonization progress.
 - If CARB pursues EEIO:
 - i. CLF recommends that CARB utilize a multi-pronged approach to develop an initial baseline. Both top-down methods should be used to understand the difference in results before choosing a final method. Option 2 has the potential to inform sector-specific strategies and could be useful beyond the establishment of a baseline. For LCA scope, we recommend including the full lifecycle (A–C) scope in the EEIO analysis. We recommend meeting with



Oregon Department of Environmental Quality (DEQ), who can help illuminate methods for attributing waste sector emissions to the building sector.

- Once reporting begins in 2026 and CARB has access to better data for measuring policy effectiveness, CLF recommends that CARB shift its focus to bottom-up approaches that have market utility beyond CARB's scope.
- 3. What is an acceptable cutoff year for historic data that should be used to estimate the 2026 baseline?
 - No comment
- 4. Are there other models or platforms that CARB should consider using for estimating a top-down baseline other than USEEIO?
 - We suggest speaking with the Oregon Department of Environmental Quality since they've been producing an EEIO-based consumption-based emissions inventory in Oregon for over 10 years. They'll have lessons to share with the CARB team and experience substituting bottom-up data into EEIO models when available.

Responses to Requests for Feedback - MANUFACTURER REPORTING (EPD)

- How should the agency approach data collection for manufacturers and downstream supply chain entities (e.g., resale, retail, wholesale) to enable chain-of-custody tracking?
 No comment.
- 2. What annual revenue thresholds should be considered for exemption?
 - No comment.
- 3. Staff is seeking feedback on the concepts presented for the data reporting regulations. How might any concerns be addressed?
 - CARB proposed some data reporting requirements for EPDs. CLF's feedback is as follows:
 - i. CLF agrees with the separate reporting of RECs. CARB should be aware that this approach contradicts ACLCA guidance and US EPA's PCR Criteria:
 - 1. The <u>ACLCA's PCR Open Standard</u> addendum "Quantifying Renewable Electricity Instruments in Environmental Product Declarations" recommends that EPDs include in their main set of impact results any contributions from RECs or other renewable energy attribute certificates (EACs).
 - 2. The <u>US EPA's PCR Criteria</u> also allow the inclusion of EACs in the reported impact results, though it provides many recommendations for transparency beyond the ACLCA's guidance. This includes the recommendation to require EPDs to disclose with their results the electricity accounting methodology used "location-based"



(excluding EACs) versus "market-based" (including EACs where applicable).

- ii. Primary data <2 years is reasonable.
- iii. **Background data:** Clarify what CARB is referring to here for "background data."
 - If CARB is referring to <u>quantities of input ingredients</u>, <u>fuels</u>, <u>etc.</u> (e.g., the manufacturer uses 500 kg of Ingredient A and 100 therms of natural gas), then <2 years old is reasonable. (Such facility-specific quantities could also reasonably be called "primary data.")
 - 2. If CARB is referring to the <u>emissions per unit quantity of those input</u> <u>ingredients, fuels, etc.</u>, then <2 years old will not be achievable for many A1 supply chain materials, fuels, and transport data. Study the age of available relevant LCI data in each material before rulemaking.
- iv. Default emissions factors: Before any rulemaking mandating specific default emissions factors, conduct a study comparing LCIA results of available data against CARB Cap and Trade MMR defaults. LCI data may include more upstream processes and better represent full lifecycle emissions. Many PCRs now prescribe specific LCI data sets for different material and fuel inputs. For these PCRs, prescribing different default factors could therefore require EPDs submitted to CARB to violate existing PCR requirements.
- v. **PCR alignment:** We suggest a review of PCR requirements for the covered products before rulemaking to compare CARB's EPD criteria against existing PCR requirements. Many PCRs require the use of specific background datasets. EPDs have to conform to the PCR to pass 3rd-party review and get published. So CARB's EPD requirements (e.g., specifying certain background data) can be effective only if they don't conflict with the PCR's requirements. It's important to recognize that although PCRs last for five years, they can be updated at any time during their five-year validity period. Thus, CARB should consider specific requests of PCR committees to help align PCRs to CARB's program aspirations. Other programs (e.g., Colorado DOT) have made similar program alignment requests of PCR committees in the past.
- vi. Generally, CARB seems to have some concerns about data quality in EPDs.
 Some suggestions to improve data quality are as follows: Where possible,
 mirror or complement the US EPA C-MORE program's "<u>Improving Data Quality</u>"
 efforts and work plan. Major components include:
 - 1. Life Cycle Inventory Data Gap Assessment
 - 2. U.S. EPA C-MORE Draft EPD Criteria for Data Quality and Transparency (Draft—December 2024)
 - 3. Improvements to the Federal LCA Commons
 - 4. Update to TRACI 3.0



- 5. <u>A Vision and Plan to Improve Secondary Life Cycle Assessment Data</u> <u>Used in Environmental Product Declarations</u>
- vii. Consider phasing in the reporting of the "supply-chain-specificity score" over time. ACLCA just published a method for EPDs to calculate and report their *supply-chain specificity score* in its <u>PCR Open Standard</u> addendum on <u>EPD</u> <u>Types, Data Specificity, and Supply Chain Communication</u>.
 - Generally, CARB can advance more supply-chain-specific data requirements in key sectors while conforming to the PCRs. For example, the concrete PCR provides preference for supply-chain-specific cement data since cement comprises approximately 90% of the GWP impacts of concrete. However, the PCR does not currently require supply-chain-specific cement data and allows the use of industry-average data in concrete EPDs. CARB could require that concrete EPDs have supply-chain-specific cement data in program reporting, which is a similar approach to the Buy Clean MN law. Another precedent on this issue is California's Buy Clean program, which required mill-specific data for steel EPDs. These actions can advance data quality while staying in conformance to the PCRs.
- viii. See recommendations in CLF's "<u>Advancing the LCA Data Ecosystem</u>" report, including:
 - Strengthen PCRs "through supporting program operator funding and collaboration, diversifying stakeholder engagement on PCR committees, strengthening verification processes, and improving individual PCRs to be more detailed and prescriptive (background data prescriptions, standardized specificity requirements and definitions, uncertainty reporting, etc.)."
 - 2. Increase access to public EPD generator tools.
 - 3. Create or adopt PCR harmonization requirements such as the <u>ACLCA</u> <u>PCR Open Standard</u>, <u>US EPA PCR Criteria</u>, and <u>UN Industrial Deep</u> <u>Decarbonization Initiative (IDDI)'s Guidance for PCR Harmonization</u>.
 - ix. CARB should consider involvement in PCR development. Public agencies need more representation and PCRs can be updated anytime during their five-year period of validity.
- 4. How long do manufacturers expect it to take to meet any or all proposed EPD data submittal requirements discussed today?
 - No comment.



5. Is an alternative reporting pathway to EPD data submission desirable?

- CLF thinks the alternative compliance pathway should only be a short-term solution towards the longer-term goal of product- and facility-specific EPD requirements for all covered products. CARB should structure this compliance pathway to help collect the data toward product- and facility-specific EPDs.
- CARB should phase out the alternative compliance path over time and phase in product- and facility-specific EPD requirements.
- We encourage the use of EPDs because they are publicly accessible documents that have utility beyond CARB's regulatory reporting requirements and will undoubtedly help facilitate sector-specific reduction strategies that may rely on a combination of supply- and demand-side policy solutions. In other words, an EPD is a reporting strategy that has utility well beyond the CARB policy — further expanding the impact of CARB's industrial decarbonization efforts.
- Potential options for alternative compliance include:
 - i. *Most stringent:* Require that manufacturers report "a facility-level material and energy balance that clearly delineates commodity inputs, outputs, and quantities" and the other requirements from CARB's March 13, 2025 webinar slide titled: "Alternative Compliance: Facility Level Reporting."
 - ii. *Medium stringent:* Similar to "most stringent" option above, except CARB provides a list of key inputs and outputs by product type, and requires manufacturers to report material and energy balance related to those key inputs and outputs only. For the purposes of estimating total emissions, CARB could fill in the gaps for the non-key inputs using default industry-average data.

(For example, if existing data/literature shows that for Product Type A, inputs/processes X, Y, and Z typically account for 90% of Product Type A's total emissions, then CARB could require manufacturer-specific data for those three key inputs/processes only. And CARB could account for the remaining estimated 10% of the emissions using estimates based on industry-average data.)

iii. Least stringent: Require that manufacturers report quantities by product type. For the purposes of estimating total emissions, CARB can use industry-average EPD (or other industry-average) emissions data as a short-term stand-in for facility-specific emissions data. For concrete products in this scenario, manufacturers would still need to provide data on mix to understand the contribution of Ordinary Portland Cement and other components. Once the manufacturer publishes their own EPD(s), CARB could retroactively replace the stand-in industry-average data from previous accounting with facility-specific



data from the EPD(s). [Especially for this least stringent option, CLF considers it appropriate only if used as a stepwise approach to the end goal of requiring product- and facility-specific EPDs.]

- 6. Do manufacturers have concerns about reporting timelines and phase-in approaches outlined in the presentation?
 - As noted in CLF's first letter, we suggest adding gypsum wallboard (AKA "gypsum board" or "drywall"). (If CARB already intends to include gypsum wallboard within the "lime and gypsum products" manufacturing sector noted in the March 13, 2025 webinar "Concept for Phase-in of Manufacturer Reporting" slide, then CLF recommends that CARB makes that more explicit.) The impact of gypsum board is significant in WBLCA studies. The results of CLF's Benchmarking v2 Study found that gypsum board had a similar impact to aluminum in terms of contribution to the overall embodied carbon intensity of a building. Additionally, consider moving gypsum wallboard into the 2026 reporting period due to its contribution to building-scale impacts and availability of EPDs.
- 7. What other data sources and programs administered by the state should be leveraged for reporting needs under this program (MRR, SB 253, other)?
 - \circ No comment

Responses to Requests for Feedback - PROJECT REPORTING APPROACH

- 1. Staff are requesting feedback on the initial concept for delegating reporting responsibility.
 - CLF agrees with the owner's ability to delegate reporting responsibility in principle but recommends that CARB tie this consideration to the "at what stage question":
 - Architects or engineers may be more appropriate delegates if the reporting stage is at building permit application. This is likely to lower modeling costs for projects complying but does not ensure embodied carbon reductions are actually achieved using as-built material types and quantities.
 - Contractors may be more appropriate if the reporting stage is during construction or before occupancy. This is more likely to be useful for reporting actual embodied carbon reductions using verified quantities and actual products installed.
 - If CARB delegates, we suggest that CARB should make it clear that the burden of compliance is on the owner, but the reporting can be delegated.



- 2. What concerns are there with the initial concept presented for inclusion considerations for residential and non-residential projects?
 - We appreciate the clear delineation of projects that are covered by the guidance by project type and size, but we recommend providing more clarity on what project types are covered. Based on statutory requirements, we believe the intent is new construction, but CARB should clearly define whether covered projects include additions, alterations, and renovations.
 - We suggest providing more clarity on how enforcement works, at what point in the process it takes place, how it interacts with other regulations, and what penalties or trading systems might be in place to address noncompliance.
- 3. What are the barriers to producing WBLCAs for more projects?

We are strongly in support of CARB's adoption of cradle-to-grave WBLCA scope as the primary project reporting method and the physical elements covered by the assessment. To this end we have a few suggestions:

- Life Cycle Stages. We fully support CARB's adoption of A-C life cycle stages, and the opportunity to address a broader range of project life cycle impacts. However, we suggest making it optional to report operational energy and water reporting (B6/B7) as we understand this to be covered by other codes and policies such as Title 24 in California and including it may increase the compliance burden by requiring energy modeling. If optionally collecting B6-B7 we suggest excluding it from the reduction reporting boundary for meeting the statutory reduction in embodied carbon.
- Covered Projects. Current WBLCA requirements are projected to expand to all covered projects by 2030. We suggest that a "Medium Reporting" track may be suitable for smaller project typologies (especially single-family housing), where a prescriptive or checklist method may reveal the same reduction opportunities. See the response to the question in the next section "Are there specific occupancy types that face unique reporting challenges?" for more related discussion. If taking this route, CARB could consider incentives for WBLCA reporting of these typologies but not make it mandatory.
- **Reporting Requirements.** The reporting requirements should provide detail on key aspects of WBLCA:
 - Describe project types covered in more detail (addition, alteration, renovation, new construction, etc)
 - Describe the stage of assessment (permit, certification of occupancy)
 - Describe the compliance method (for future demonstration of reductions)
 - Describe life cycle stage modules required between A-C in more detail, suggest at minimum aligning with what LCA tools typically cover (A1-A3, A4, B4-B5, and C2-C4) as well as A5.



- Describe applicable standards and requirements for tools and data
- Provide modeling guidance for salvage, reuse and biogenic carbon
- Describe the documentation required to submit. CLF suggests submission of raw tabular results from LCA tools.
- Describe the units, level of detail and normalization of the results
 - Request that teams separate building GWP from sitework GWP in reporting. We caution not to make this required, particularly if the compliance point is during construction and requires as-built quantities, which are rarely easy to break out in this way.
- Consider reciprocity between WBLCAs conducted for CALGreen and CARB if they are at the same stage of assessment and implications of aligning the physical scope between the two programs.
- 4. How could the proposed reporting requirements impact the cost, timeline, or feasibility of projects you conduct?
 - WBLCA in general shouldn't impact project timeline or feasibility, but the cost on small projects < 20,000 sf is more significant to the overall budget in a relative sense. See the next answer for additional explanation to this end.
 - We suggest exploring other approaches like introducing a prescriptive checklist as a "Medium Reporting".
- 5. Are there specific occupancy types that face unique reporting challenges?
 - Occupancy type should be less of a concern for reporting challenges. There are, however, types of projects where the cost-benefit ratio of conducting WBLCA models tends to decrease- where the amount of time spent performing the LCA, identifying potential reductions, and implementing reduction strategies leads to only minimal decarbonization on a per project basis. Particularly for smaller low-rise projects using light-wood frame construction, we would suggest including a "Medium reporting" pathway structured as a checklist or prescriptive reduction pathway, or some other simplified compliance method. This kind of checklist approach could help implement reduction strategies across these many smaller material categories that characterize these kinds of projects.
 - To this end, we are strongly in support of CARB's adoption of a "Basic reporting" method, providing an onramp for projects to engage with embodied carbon over the short term.
 - However, CLF notes that asking for bill of materials (BOM) and materials suppliers starts to approach the same amount of work as doing a WBLCA. We suggest right-sizing the "Basic reporting" approach to make it less work in the short term than a full WBLCA.
 - CLF suggests considering one of the following approaches to "Basic reporting":



- Most stringent. <u>Maintain</u> requirement for OmniClass Level 3 BOM. <u>Remove</u> ask for material suppliers.
- Medium stringent. <u>Maintain</u> requirement for BOM but permit coarser takeoffs and estimates rather than OmniClass Level 3 BOM. <u>Remove</u> ask for material suppliers.
- Least stringent. Use project properties collected (project type, occupancy, floor area, etc) to estimate embodied carbon intensity (ECI) benchmark from project data in the short term. <u>Remove</u> ask for BOM and material suppliers. Phase this out over a few year timeline to a "Medium reporting" level.
- We recommend that CARB allow WBLCA reporting to also be able to satisfy the "Basic Reporting" requirement.
- We suggest reading through and connecting with the team developing the <u>RESNET</u> <u>1550</u> standard that is working to create a simplified embodied carbon reporting method for low-rise residential.
- We recommend that definitions and methodologies for the quantification and reporting of all "Basic Reporting" requirements be well-defined and standardized wherever possible, including terms like: Material Suppliers, Project Costs, etc
 - For example, what level of cost data is being requested? Total project costs or itemized costs per material/system? We suggest total costs seems more feasible for the "Basic Reporting" level.
- Refer to <u>ECHO Recommendations for Alignment and Reporting Schema</u> for more suggestions on data collection and consistent key metrics.
- 6. At what stage of the project schedule should covered projects report? Planning permit? Building Permit Issuance? Obtaining certificate of occupancy? Other milestones?
 - We recommend that project reporting (both for Basic reporting and WBLCA) be required during the construction phase before issuing certificate of occupancy for the following reasons:
 - Construction phase allows the documentation of *actual* reductions to support CARB's goal, rather than basing compliance on reductions intended during design phase.
 - Tying CARB's project reporting to construction complements CALGreen's embodied carbon requirements without competing or duplicating its approach. In this way, CARB's project reporting approach almost acts as a supplementary enforcement requirement to CALGreen during construction for projects that are subject to both programs.
 - Certificate of occupancy stage reporting is also consistent with the inclusion of material suppliers in the "Basic Reporting" list that illustrates CARB's intentions to understand actual installed products. While products may be



suggested in specifications or drawings, there is no guarantee of reduction until after substitutions have been made in construction administration.

- Other considerations for reporting:
 - If using a certificate of occupancy compliance point, we suggest that a subset of material categories may be designated to submit as-built quantities and material supplier documentation in the form of PS-EPDs, and allowing as-designed quantities and industry-average data for all other material categories. This would reduce compliance burden by acknowledging that many minor materials are hard to track and may not have available EPDs, and could be sufficiently modeled with industry-average data.
 - For consideration, the list of "material groups" identified as contributing 90% or more of the structural, enclosure, and interior impacts of projects from the CLF WBLCA Benchmark Study v2 included: concrete, steel, insulation, gypsum, wood, aluminum, coatings, flooring/tile, glazing, and cladding. While each of these groups would contain some minor materials that would likely not be high priorities, they indicate starting points for creating a minimum material reporting list. Mandatory as-built reporting requirements could also be refined during CARB's baseline development phase based on data collection in early stages.
- CARB might also consider a variation of the above approach, including two points of submission:
 - <u>Design Stage WBLCA:</u> ideally full cradle to grave WBLCA analysis aligned with CALGreen requirements with an additional required output in the form of a checklist of top 10-20 materials to track during construction.
 - <u>Construction Stage verification</u>: To simplify and reduce the effort from construction stage tracking, require teams to track a small number of critical path materials through construction, but not all materials.

7. Are there specific WBLCA standards and methodologies staff should review?

- Recommend that CARB review:
 - ASHRAE 240p DRAFT. Recommend adopting calculation methods for A4-C.
 - Vancouver City By Laws Embodied Carbon Guidance. Recommend adopting the compliance methods and framework for reduction claims (baseline definition tables).
 - ECHO Recommendations for Alignment and Reporting Schema

Other comments/questions

• How will WBLCA results be used to determine compliance with a reduction requirement?