WAP Sustainability's Comments to Workshop on Building Embodied Carbon March 13, 2025

WAP Sustainability LLC is pleased to submit comments to CARB as they develop an embodied carbon baseline and reporting regulation for covered projects and building material manufacturers.

Comments on Baseline Emissions Modeling:

WAP has 17 years of experience with greenhouse gas (GHG) emissions accounting and strongly recommends that CARB reconsiders the spend-based baseline approach using environmentally extended input-output (EEIO) accounting suggested during the March 13th Workshop. We recommend against a spend-based approach because it:

- Introduces very high levels of inherent inaccuracy and uncertainty.
- Opposes the goal of improving housing affordability and supply.
- Introduces a significant methodology change during ongoing tracking of reductions via manufacturer-submitted environmental product declarations (EPDs), decreasing the validity and credibility of reductions achieved.
- Is not actionable for developers of covered projects and hinders the potential to achieve intended reduction targets.
- Introduces dependencies on data that may no longer be maintained.

The narrative below provides further supporting evidence for reconsidering a spend-based EEIO baseline.

1. **Introduces High Levels of Inaccuracy and Uncertainty:** While EEIO-based emissions accounting is an acceptable approach under the Greenhouse Gas Protocol, the GHG Protocol Corporate Value Chain (Scope 3) Standard states, "EEIO data are often comprehensive, but the level of granularity is relatively low compared to other sources of data." The Standard also warns, "Spend and revenue may not correlate well with emissions." The World Resources Institute (WRI) published the Sector Supplement for Measuring Embodied Emissions in the Built Environment to support organizations in accurately accounting for product-level emissions as part of the GHG Protocols.[1] The

[1] Brightworks Sustainability, WAP Sustainability. (2021). *Sector Supplement for Measuring and Accounting for Embodied Emissions in the Built Environment*. World Resources Institute. https://ghgprotocol.org/sites/default/files/2022-12/Scope%203%20Detailed%20FAQ.pdf

supplement focuses primarily on vertical and horizontal infrastructure, which aligns with CARB's scope. In assessing data quality, the Sector Supplement denotes proxy data, which represents EEIO data, as "Poor."
The WRI methodology created a platform for LCA quality and uncertainty methodologies for evaluating LCA quality using a "good, better, best" structure. These rankings pertain to the specificity of data utilized in a product-specific assessment.

Assessment Type	Data Used	EC Uncertainty
GHG Spend Factor	Environmentally-extended input output (EEIO) data	Very high
Good	Screening level LCA	High
Better	Average of similar product EPDs	Medium
Best	Product specific EPD/ LCA	Low

WAP has worked with several corporate clients who have accounted for their scope 3 GHG emissions using both EEIO and WRI's Sector Supplement for Measuring Embodied Emissions in the built environment. Using WRI's Supplement, corporations have been able to illustrate a more accurate representation of their scope 3 GHG emissions. In the example below, following WRI's Supplement and incorporating product-specific, industry-wide, and similar product EPDs yielded results 22 percent less than EEIO-based accounting. While the WRI Supplement baseline cannot be compared to EEIO accounting to claim reductions because they use different methodologies, the WRI Supplement baseline became the company's baseline for future years to measure future reductions.

Example Product GHG Emissions Using Different Scope 3 Accounting Sources:

Data Source	$kgCO_2e$ per unit of product	% Difference compared to EEIO
GHG Spend Factor (EEIO)	1,500	--
Embodied Carbon Factor (WRI Supplement)	1,200	22%
Product-specific EPDs	1,050	35%

In addition to the example above, WAP also transitioned a client from spend-based, EEIO emissions accounting of steel and concrete purchases to primary unit data and region-specific LCA data, which resulted in 48 percent lower emissions results for the same year. Therefore, we have significant anecdotal evidence suggesting major

inaccuracies and uncertainty in EEIO-based accounting, supporting the concerns regarding EEIO and spend-based accounting written into the GHG Protocol Guidance. If CARB seeks to utilize EEIO-based emissions modeling for a rough estimate to help understand the scope of annual embodied emissions associated with new construction in California, EEIO is a viable option for that specific use case. However, as evidenced by the citations and examples above, EEIO-based modeling should not be used to perform accurate baselining or reduction measurements.

2. **Opposes Housing Affordability and Supply:** EEIO-based emissions modeling is based on the cost of building products and not actual product-specific emissions. Reducing emissions via procurement decisions to prefer lower embodied building products that represent more efficient or innovative means of production cannot be achieved by accepting economy-wide EEIO factors. Therefore, with EEIO, the only way to reduce emissions is to spend less (purchase less building material)[2], which would imply less construction activity in California and less available housing supply, which opposes housing affordability goals.

3. **Introduces Significant Methodology Change When Tracking Reductions:** Changing emissions modeling methodology from an EEIO-derived baseline to ongoing emissions tracking via manufacturer-submitted EPDs and developer-reported building life cycle assessments (WBLCAs) represents a significant methodology change. Such a significant methodology change decreases the validity and credibility of reductions achieved. How could CARB be certain that reductions are not just due to the high degree of uncertainty and inaccuracy associated with EEIO-based emissions modeling? As evidenced above, changing methodology from EEIO-based emissions modeling to a primary data approach may change results by greater than the AB 2446 required reductions of 20 percent and 40 percent without any actual change in real-world activity.

Furthermore, the **GHG Protocol Corporate Standard states, "The following cases shall trigger a recalculation of base year emissions…Changes in calculation methodology or improvements in the accuracy of emission factors or activity data that result in a significant impact on the base year emissions data."** Therefore, even if CARB utilizes an

[2] Environmentally-extended input output (EEIO) models estimate energy use and/or GHG emissions resulting from the production and upstream supply chain activities of different sectors and products in an economy. The output of EEIO models is typically a quantity of GHGs emitted per unit of revenue in a particular industry sector. For example, an EEIO model may estimate that the sector "paper mills" emits 1,520 tonnes CO2e per $1 million revenue, meaning that, on average, 1,520 tonnes of CO2e are emitted during all upstream supply chain activities associated with generating $1 million revenue from that sector. (GHG Protocol and Carbon Trust Team, 2013)

EEIO approach to baselining, CARB would need to recalculate the baseline using EPDs and WBLCA data in the future to maintain methodological consistency and enable credible tracking of reductions.

Additionally, LEED v4.1 BD+C: New Construction offers credit for using products with an EPD and demonstrates embodied carbon optimization (i.e., a reduction in global warming potential (GWP) vs. baseline). To prove these GWP reductions against the baseline, the product EPD and the baseline parameters need to be aligned. For instance, the EPD of the product claiming the reduction must follow the same product category rules as the baseline. This parameter alignment represents another example of the need for methodological consistency to achieve credible reductions. An EEIO baseline does not meet this condition.

4. **Is Not Actionable for Covered Project Developers:** An EEIO-derived baseline representing one total emissions number for all new construction in California is not actionable for developers of covered projects. When accounting for the impact of their individual covered projects, how will covered project developers contextualize their individual projects against the baseline? Additionally, since many different types of buildings are covered by AB 2446, how will covered project developers have a reference point for their project type?

   AB 2446 seeks the development of a "framework for measuring and then reducing the average **carbon intensity** of the materials used in the construction of new buildings." By utilizing EEIO and not measuring the embodied emissions baseline on an intensity basis, CARB is not allowing for the methodological consistency that covered project developers need to compare and track reductions in intensity against the baseline. If CARB creates an intensity baseline utilizing ISO 14040 series principles with a unique baseline for each building type, covered project developers can very easily evaluate the carbon intensity of their project against the baseline intensity and understand the required reductions they must achieve to reach the emission reduction targets laid out in AB 2446. Without a relatable, easily applicable baseline for developers to benchmark against, achieving the reduction targets laid out in AB 2446 will be much more difficult.

5. **Introduces Dependencies on Data That May No Longer Be Maintained:** Since EEIO data is based on EPA's sustainable materials management program, there is concern that the current or future federal administration/s will dismantle or delay reporting this data. Even if every future administration agreed to publish the data

year over year, the assumptions may change from year to year due to changing politics. It is recommended that CARB uses CARB-derived data from manufacturers, even if using an EEIO-based approach, and sets its baseline to ensure consistency in accounting.
Due to the public's newer understanding and acceptance of GHG emissions accounting, it is important to gain trust in it with minimal disruption. The more consistency in the baseline and future years' accounting and changes in calculation methodology, the more accepted this approach will be, and it will become an efficient use of taxpayers' funding.

Instead of a baseline developed using EEIO-based emissions modeling, WAP Sustainability recommends that CARB develops an embodied emissions baseline for new construction that includes the following attributes:

- Application of ISO 14040 series life cycle assessment (LCA) principles
- Utilizes EPDs
- Normalizes absolute emissions to square footage (i.e., kg-CO2e/sf)
- Provides normalized carbon intensity values for each unique building type (e.g., commercial, multi-family, single-family)

WAP believes a building LCA baseline with these attributes will facilitate:

- Credible reduction claims by applying consistency in methodology between the baseline and reduction tracking.
- Alignment with AB 2446's references to carbon intensity, LCA standards, and EPDs.
- Actionable baseline comparisons enable covered project developers to clearly understand their carbon intensity vs. required reductions in carbon intensity.

Co-existence with goals of improving housing affordability and supply.

WAP remains available to provide further input to CARB regarding the baseline attributes described above.

Implementing a baseline aligned with ISO 14040 series LCA principles utilizing EPDs is feasible. Product-level LCA data is much more reliable than EEIO-based data, as evidenced above, and the number of EPDs on the market is growing daily. EPDs are the industry standard for reporting product-level GHG emissions since they are considered the best third-party verification tool for a product's LCA reporting. Given that other California state agencies (DGS, BCD) are moving toward EPDs as the preferred reporting tool for Buy

Clean California and the CALGreen embodied carbon requirements, we believe CARB should integrate EPDs into its baseline calculation methodology to ensure consistency.

Comments on Building Product Manufacturer Reporting Regulations:

As mentioned above, EPDs are the industry standard for reporting product-level GHG emissions and have been adopted by other California State agencies (DGS, BCD) as the preferred reporting tool for Buy Clean California and the CALGreen embodied carbon requirements. CARB should adopt this reporting mechanism to ensure consistency in the marketplace and avoid confusion when introducing an alternative compliance pathway. Building product manufacturers are developing EPDs for their products to stay competitive in the California market and to learn how to reduce the GHG emissions associated with their products through meaningful improvements in design and efficiency. Requiring product manufacturers to develop EPDs for other CA policies and then introducing alternative data formats for AB 2446 compliance may lead to a lack of data consistency and comparability, harming the utility of the data. Additionally, this can lead to market confusion and fatigue.

CARB should utilize and not deviate from EPD and PCR requirements. When setting data age requirements, CARB should follow the same rules set by PCRs and EPDs. Doing so aligns with industry best practices and reduces the burden on manufacturers. Additionally, aligning CARB data requirements with existing standards allows CARB more data sources instead of sorting industry-standard data (EPDs) into those that comply and those that do not.

By allowing only two-year-old primary and background data to be reported, EPDs would frequently become invalid for AB 2446 within one year of publishing. Manufacturers often use full-year data from the previous year's business activity when developing an EPD. If a manufacturer started their EPD process in March, utilizing data from the previous year, and the EPD development process took the manufacturer 9 months to complete, which is not uncommon, the data will be 12 months old by the time the EPD is published, meaning the data would become invalid within one year, according to suggested CARB requirements. This approach would lead to a significant compliance burden for building material manufacturers. Instead, CARB should default to EPD and PCR requirements on the validity period. Furthermore, many manufacturers actively maintain their EPDs annually to reflect changes in operations during the EPD's validity period to support temporal representativeness.

CARB should gradually require EPD reporting for all products. Since EPDs are the industry standard for reporting product LCA data, CARB should plan to phase out program compliance pathways that do not focus on product-specific EPDs.

CARB should get involved in product category rule (PCR) development. It's important to be engaged in the process when aligning with industry standards. The PCR development process could benefit from public agency involvement by involving additional stakeholders in the data and documentation needs.

CARB should clarify and expand the list of covered building materials and products required in manufacturer sector reporting. CARB's use of broad sectors and guidance of "additional sectors not currently part of state or federal buy clean programs" creates confusion over which products are covered. To provide clarity, the required reporting sectors should be restructured to categorization by building element or CSI division with guidance on products included within those elements/divisions. With this approach, manufacturers clearly understand whether their product is covered and when. The RESNET 1550 Standard follows this structure. In addition, CARB should seek to ensure scope consistency between the product reporting requirements and products included in the scope of the requirement: "Bill of materials must include all elements of the project's structure, enclosure, interior construction and finishes, site hardscape and walls at a level of detail equivalent to OmniClass Level 3 or higher," which is CARB's proposed requirement for project Basic Reporting reporting.

Additionally, required manufacturer sector reporting should be expanded to capture the most commonly used commercial and residential building products, including gypsum board, paint, HVAC equipment, etc. The suggested sectors for required reporting appear focused on commercial construction. Residential building products should be prioritized as well. Residential construction represents a significant portion of new construction in the State, particularly as the state seeks to improve housing supply and affordability, and should be well-represented by these reporting requirements if CARB plans to achieve the reductions laid out in AB 2446. As cited above, the RESNET 1550 Standard represents a great starting point for considering which building products should be considered in residential construction.

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Comments on Project Reporting Regulations:

While we support CARB's strategy to move toward WBLCA and offer an approachable "Basic Reporting" entry point, we believe some of the Basic Reporting requirements are unnecessary and burdensome. The requirement to disclose "project costs" is unnecessary. If this framework is for determining the carbon intensity does utilize EPDs and is aligned with the ISO 14040 series, as noted in AB 2446, spend data should not be needed for ongoing emissions quantification. Additionally, while we agree with the value of this information, CARB could seek to include a phase-in for reporting "material suppliers "as many project developers, particularly in the residential market, may not have visibility to all material suppliers due to contractor relationships.

For the WBLCA requirements, while we are supportive of an effort to align with international LCA standards and include an A-C system boundary, what is CARB's reasoning for expanding the scope beyond "a focus on the Product Stage phases (A1-A3)" as written in AB 2446? Furthermore, does CARB's suggested WBLCA scope of "all elements of the project's structure, enclosure, interior construction and finishes, site hardscape and walls" align with the BOM requirements in Basic Reporting scope of "project's structure, enclosure, interior construction and finishes, site hardscape and walls at a level of detail equivalent to OmniClass Level 3 or higher"? We would suggest making these scopes identical, so Basic Reporting is a preparation for WBLCA reporting. Regarding the reference study period, why did CARB select 60 years? UL Part A: Product Category Rules for Building Related Products and Services states a 75-year building service life.

For single-family residential WBLCA reporting, will CARB allow developers to report "building prototype" WBLCAs within a covered project – i.e., WBLCAs for each floor plan type built in a given community (project) – rather than needing to produce a WBLCA for every single unit (single-family home)?

Lastly, can CARB clarify whether WBLCA reporting will be required starting in 2026 for "Projects of more than 30 residential units or more than 100,000 square feet of non-residential building space?" The phase-in for all projects in 2030 is the only date specified. Will "Basic Reporting" be required to start in 2026? This date is also not specified, unlike the Manufacturer Reporting, which is specified to start in 2026.

Reference Standards: While CARB defines WBLCA reporting requirements, it should seek to align with the state's existing best practices and policies. CARB should review the CALGreen building LCA requirements and the WRI Sector Supplement for Measuring Embodied Emissions in the Built Environment. Both documents reference other international LCA standards and set the requirements for building LCA modeling. WRI's documents clarify scope 3 GHG emissions reporting methodology to address LCA quality and uncertainty methodologies for evaluating LCA.

WAP remains available to provide more guidance on CARB's approach to WBLCA reporting as CARB releases more detail on specific projects and building components covered, reporting mechanisms, compliance, enforcement, and fines.