

nbi new buildings
institute

Embodied Carbon Building Code

An overlay of model code language for limiting
the climate impact of building products

Version 1.0 | August 2023

Codes for
Climate[™]

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Acknowledgments

We gratefully acknowledge the following individuals and organizations for their contributions and insight in developing the “Embodied Carbon Building Code: An overlay of model code language for limiting the climate impact of building products.” This work was supported by Breakthrough Energy.

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Introduction and Background

Globally, the emissions associated with common building products and practices contribute to 15% of the energy-related greenhouse gas (GHG) and 28% of buildings' carbon dioxide (CO₂) impact.¹ However, efforts to decarbonize buildings have primarily focused on reducing operational carbon, neglecting the significant role of embodied carbon. As energy codes and regulations continue to drive down operational emissions, the proportion of building emissions stemming from the extraction and manufacturing of building products is expected to increase.

To address the emissions associated with building products, policymakers are utilizing existing policy mechanisms to meet their GHG goals outlined in climate action plans and legislation. For example, procurement policies, often called Buy Clean, have global warming potential (GWP) requirements (expressed as kgCO₂e/unit) for specified product categories used in government-funded building construction. In addition, embodied carbon policies are also written into climate action plans, zoning incentives and land use regulations, and reuse and demolition regulations.

To reach beyond government construction, jurisdictions are using existing mechanisms to address embodied carbon in the most common building products for all construction. Incorporating embodied carbon requirements into building codes is another effective strategy. The International Building Code (IBC) already regulates the use and performance of building materials. Each chapter includes provisions for various building materials, including concrete, aluminum, masonry, steel, wood, glass and glazing, gypsum board, plastic, and others.



26%-57%

upfront embodied carbon²

74%-100%

total lifecycle impacts
in net zero buildings²

Unlike operational emissions, the embodied carbon of installed products has minimal opportunity to be reduced during operations.

¹ IEA, [2022 Global Status Report](#), International Energy Agency (IEA) with the Global Alliance for Buildings and Construction, 2022.

² Chastas et al, Embodied Energy and Nearly Zero Energy Buildings: A Review in Residential Buildings, *Procedia Environmental Sciences*, Volume 38, 2017, Pages 554-561.

ASHRAE 189.1 Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential, adopted as the International Green Construction Code, has adopted one new prescriptive embodied carbon amendment: a requirement for a specific percentage of products (by total product cost on the projects) to collect environmental product declarations (EPDs). A second amendment is pending: a separate percentage of products to meet specific GWP limits (expressed as kgCO₂e/unit) at 125% of a product's industry-wide EPD (IW-EPD.)

Unlike Buy Clean policies, ASHRAE 189.1's EPD reporting amendments (adopted and pending) do not specifically name the products or product categories that must comply, like steel or mineral wool insulation, but indicate what product characteristics would trigger a mandatory product. For example, any product category with a value that exceeds 5% of the total cost of all products permanently installed in the project must comply. This approach allows project teams flexibility to select which products will meet kgCO₂e limits but with some limitations. In addition to the higher cost products, project teams must have EPDs for a minimum of 30 EPDs from at least 20 products from 10 different manufacturers, and together represent not less than 25% of the total estimated costs of all building products permanently installed in the building project.

The Embodied Carbon Building Code overlay introduces code solutions that incorporate prescriptive embodied carbon amendments for nearly 40 products, encompassing widely used and high carbon-emitting building materials. The products in the overlay already have performance specifications in the IBC.

The manufacturing industry is shifting towards a lower-embodied carbon future



80% of U.S. Steel makers have EPDs



Global Cement and Concrete Association carbon goals: 50% by 2030 & net zero by 2050³



~80,000 U.S. Concrete producers have EPDs

What is a “Product”?

The term, “product” is extensively used in the overlay and does not always pertain to a singular item such as a 2x4 or unit of 2x4s. Instead, the definition of a “product” is based on the corresponding product category rule (PCR) associated with it.⁴ For instance, when referring to a 2x4, the term “product” would encompass the broader category of softwood lumber, which includes dimensional lumber of various sizes. Therefore, all dimensional lumber used in the construction of the building, including softwood 2x4s, 2x6s, 2x12s, and so on, is regarded as a single product, even if multiple suppliers are involved. This approach allows for consistent treatment of different products within the same product category, ensuring uniform analysis and evaluation.

The overlays proposes the following definition:

Product: Any material or product procured for permanent installation in the building that has the same specification requirements and is classified by the same product category rule.

³ GCCA, [Concrete Future: The GCCA 2050 Cement and Concrete Industry Roadmap for Net Zero Concrete](#), Global Cement and Concrete Association (GCCA), 2021.

⁴ Note that there is no single overarching governing body for all PCRs. Instead, various organizations and associations take the lead in developing PCRs within their respective sectors such as International EPD® System, industry associations, and the American Center for Life Cycle Assessment (ACLCA).

Key Low Embodied Carbon Strategies for Lower Carbon Buildings

The overlay addresses lower carbon products, but there are several ways to reduce a building's embodied carbon.



BUILDING REUSE

The lowest carbon building is one that does not need to be built. Building reuse is a crucial embodied carbon strategy because it reduces the need for new materials and products to be produced, subsequently eliminating the associated emissions. Building reuse can also minimize the amount of construction materials going into landfills. Although the associated GHG impact may be small, it remains beneficial. Not all buildings can or should be reused. Contaminated building products such as lead and asbestos don't contribute to healthy buildings and require careful decommissioning.



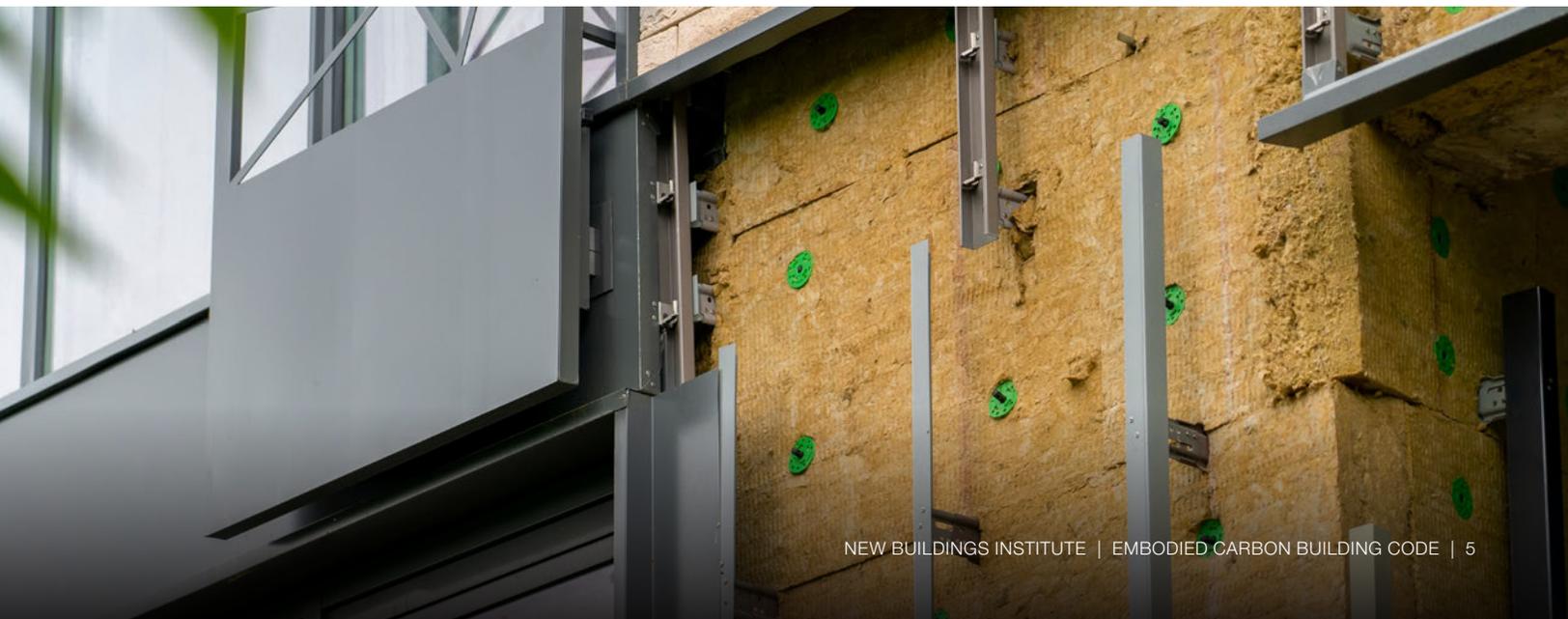
MATERIAL EFFICIENCY

As Mies Van der Rohe said during the modernist architecture movement, "less is more." Limiting the number of products used in a construction project effectively avoids emissions associated with new products. Strategies such as advanced framing techniques, consolidating hot water sources to minimize the need for extensive piping and insulation, and opting for polished concrete floors instead of additional flooring materials all contribute to minimizing the quantity of products utilized. As a benefit, material efficiency reduces upfront costs.



LOWER CARBON PRODUCTS

Lower carbon products are available in each product category and class. Choosing building products with lower embodied carbon, such as reclaimed or high recycled content, responsibly sourced products, or products created by renewable energy products can support informed decisions in areas of embodied carbon improvement. For instance, when it comes to aluminum window mullions, those created with recycled content and renewable energy sources have a lower carbon footprint compared to mullions made with virgin aluminum. While outside of the overlay's scope, designers should be mindful of considering not only the upfront GHG emissions, but the lifecycle carbon impact of the products chosen.



How to Use This Document

The Embodied Carbon Building Code overlay was created for policymakers and provides template IBC amendment language. The amendments presented are for codes that cover commercial new construction or major renovation.

Below are a few important considerations, meant to maximize the impact of this document.

1. The code language in this document is presented in Times New Roman. The code language can be used as-is, or adapted (as noted in this document) and used in ordinances, legislation, zoning codes, procurement policies, or even incentive programs. Users can copy and paste language directly into formal proposals or documents. See figure 1 below for guidance on how to decipher code language. As written, the authority having jurisdiction (AHJ) may use any section of the overlay in its entirety or use portions of these sections to amend the 2021 IBC. The amendment language can be customized to a different version of the IBC to meet the needs of their communities and support their climate goals.
2. The underline markup indicates new text.
u003cbr>
3. Amendment language is followed by narrative text (depicted in grey text) to explain the context, modifications, and relationship to code language. The narrative text should be removed for any formal proposal or repurposed as background information or a reason statement. See figure 1 below which demonstrates the use of grey narrative text which will be used throughout the document.

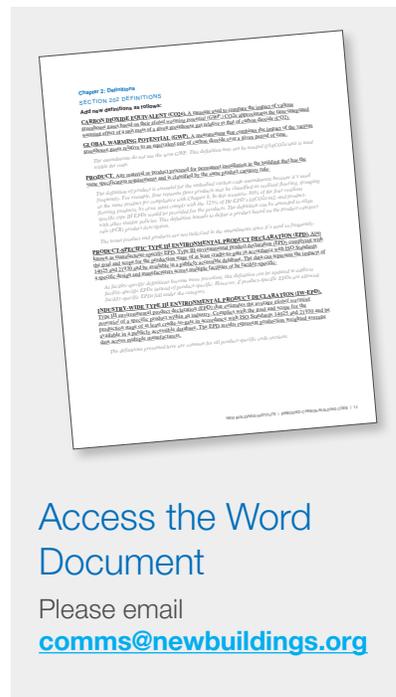


FIGURE 1. EXAMPLE CODE LANGUAGE KEY

Green indicates where AHJs may want to modify the text.

Red identifies and defines code meaning and origin or amendment markup meaning.

Product % to comply
(Adjust based on availability of manufacturers' EPD)

Product term per PCR/EPD
(Consider products that align with procurement policies)

IBC chapter — **Chapter 24: Glass and Glazing**
Product PCR name — **Products included in this section: flat glass**
IBC section and section name — **SECTION 2403 GENERAL REQUIREMENTS FOR GLASS**
IBC section number and product terminology — **2403.6 Embodied CO₂e of Glazing Products.**
New text is underlined — 50% of all flat glass used in window products installed in the building, based on cost or weight, shall not exceed 125% of IW-EPD's kgCO₂e/metric ton. Products shall meet the requirements in this section, and products used for compliance shall have a product-specific Type III EPD. Documentation of the product's kgCO₂e/metric ton and EPDs shall be verified by a registered design professional on the project, and a summary shall be made available to the code official that includes a list of each product and associated kgCO₂e/metric ton, per the EPD.
Responsible party for confirming compliance — registered design professional
Excluded products, or scenarios — **Exceptions:**
 1. Plastic glazing
 2. Fire-rated glazing
 3. Interior partition walls
 4. Skylights
 5. Guards and railings
 6. Glazing in athletic facilities
 7. Floor/ceiling walking surfaces
 8. Elevator hoistway glazing
Italic text is defined by the code — *Guards and railings*
Narrative text — *Product percentage options: Flat glass isn't specified for projects, but manufacturers use it in their final product. The number of EPDs is growing, so not all project teams can procure the product.*

GWP limit (Consider IW-EPD GWP for green code)
Products required to comply
Documentation requirements
EPD type (Select product or Facility-specific EPDs)
AHJ to define summary. Example provided in Appendix C

Modifying the Amendments for Specific Applications

The amendments can be modified to suit jurisdictional goals. Local code adoption may only include a handful of products, or require EPD reporting, or set different GWP limits.

The amendments are presented per product category, based on the code chapter in which the product category is regulated. The product-focused prescriptive approach sets GWP limits for each target product and requires verification through an EPD. GWP limits (listed as kgCO₂e/unit) could be a static value, similar to many Buy Clean policies, or pegging to a percentile of IW-EPD, or average, values, as done in ASHRAE's 189.1.

AHJs can adjust aspects of the code amendment to suit climate action plans or other goals and directives, priority products, and available product data. Edits may include those in the following sections.

Choosing Materials and Products

To avoid carbon emissions, it's not necessary to adopt the entire set of code amendments, nor the nearly 40 products. AHJs can choose to adopt all or part of the amendments for the most common products used. For example, concrete and steel amendments are recommended as the first products incorporated into the building code. Other first-adopted products may align with products required in state or local procurement policies. Additionally, Chapter 7 includes four insulation products, but AHJs can choose only to adopt the language for one product.



Common Building Products in Buy Clean Policies

- Structural Steel
- Rebar
- Flat Glass
- Mineral Wool Insulation
- Engineered Wood
- Concrete
- Asphalt

Industrial Decarbonization

Building product manufacturers have seen the need to reduce GHG emissions in their products. As demand for low carbon products increases, they will continue to invest in a low carbon future to stay competitive. Several product design and manufacturing opportunities will reduce the CO₂e of products over time. Many common building products and strategies are ready today, like material efficiency. Others will require deep investments to update manufacturing plants. The following are listed in order of likelihood of being adopted over the next 30 years:

- 1.** Material substitution or efficiency—incorporating lower carbon materials into the product design, e.g., thinner metal finish on a panel product.
- 2.** Optimized production—improved quality controls on-site and less manufacturing waste—e.g., less fuel is used to create a product.
- 3.** Decarbonized energy sources—using lower carbon fuel sources—e.g., cleaner electric grid or on/off-site renewable energy.
- 4.** Increased circularity—increased opportunities for products at the end of life—e.g., increased material reuse and recycled content.
- 5.** Lower carbon fuel—increase thermal efficiency—e.g., green hydrogen or alternative fuels.
- 6.** Carbon capture and use/storage—on-site carbon capture and sequestration.

Specifying the Percentage of Complying Products

For the percentage of products that comply, the value can be between 5% to 100%. An 80-90% threshold is generally recommended for common building products like concrete and steel that have mature EPD development in major construction markets. While achieving 100% compliance may be possible, setting a slightly lower target allows project teams the flexibility to use an alternative product, as needed, for a small percentage of the products without slowing down the construction process.

Some products, like flat glass or concrete masonry units may have fewer EPDs, at the time of publication, limiting the available products. Additionally, projects may need flexibility to purchase windows, doors, skylights, etc. from manufacturers that do not yet have EPDs for their products. As more EPDs are available, the percentage of complying products can rise.

Selecting GWP Limits and/or EPD Reporting

The code amendments are provided for setting GWP limits and requiring EPD reporting for products in the base code. AHJs may only accept the EPD reporting to introduce the topic to the community before adopting the kgCO₂e/unit limits and EPD reporting in the subsequent code cycle. If only incorporating EPD reporting, use the charging language about reporting. Another option may be to require 50% of the products in each category to comply with the kgCO₂e/unit value, but 100% of the products provide EPDs.

Setting Product GWP Limits

Each product's GWP limit can be based on the progressive nature of the code. Base codes may choose a higher GWP threshold. When using the amendments for incentive programs, green codes, or regulations, the kgCO₂e/unit limits should be at or below the IW-EPD kgCO₂e/unit value; NBI recommends a target of the IW-EPD or lower. Appendix A lists the North American IW-EPDs for the most common building products. The table includes the product, publisher, IW-EPD GWP as well as GWP values above and below the IW-EPD GWP. AHJs can use the chart to insert the target value into the code instead of stating a percent-better-than IW-EPD.

Identifying EPD Type

The type of Type III EPD can be adjusted based on stringency and data availability. Product-specific or facility-specific Type III EPD can be required. At the time of publishing, product-specific EPDs are the more prevalent EPD type, but facility-specific (and even supply-chain specific) provide more accurate data from upstream processes and are increasing in development. For additional EPD verification, the following can be incorporated to require the EPDs, be verified by a Program Operator.

Applying a Product Quantity Metric

Identifying the quantity of product is best suited to align with the metric on the EPD (kgCO₂e/unit.) However, the metric can be cost-based, if cost is a commonly indicated component. For example, most insulation is measured as kgCO₂ eq/m²-RSI. The unit is flexible to consider the amount of insulation used depending on the building design and climate. Project teams can calculate a comparison between two products when the functional unit is known; see Product Quantities. The U.S. General Services Administration Interim IRA Low Embodied Carbon Material Requirements allow compliance based on cost or weight.⁵

The Carbon Cost of Partial Compliance

Consider a hypothetical example where a project uses 1000 tons of steel, but 20% of that steel comes from a market where the carbon content in the same product is three times higher. This will result in having 30% more total carbon per product overall.

Example: 20% of steel doesn't comply

Lower carbon steel: 800 tons x 0.9 tCO₂e/t = 720 tons of CO₂e

Higher carbon steel: 200 tons x 3.0 tCO₂e/t = 600 tons of CO₂e

Total = 1,320 tons of CO₂e

Example: 100% steel compliance

100% compliance: 1000 tons * 0.9 tCO₂e/t =

Total: 900 tons of CO₂e

Potential savings: 420 tons of CO₂e or 32% more carbon.

⁵ U.S. GSA, [U.S. General Services Administration Interim IRA Low Embodied Carbon Material Requirements](#), United States General Services Administration (U.S. GSA), 2023.

Exceptions

Projects that reuse a specific amount of an existing structure, small buildings, buildings located in specific locations, or those that use a minimum amount of a specific building product, may not need to meet the requirements. For instance, the condition could exclude projects smaller than 50,000 square feet, or those that use fewer than 100 cubic yards of concrete. On a case-by-case basis, AHJs can excuse any project from complying with any code requirement.

Requiring Product Quantities

For AHJs that want to calculate the result of the code's avoided emissions, the quantity of the products should be provided within the requirements. However, this may require more data collection, storage, and processing. Requirements that include product quantity reporting support a process to move toward whole building life cycle assessment. The enclosed code language does not require disclosing product quantities but can easily be amended. For example:

Embodied CO₂e of Products. 75% of [PRODUCT], based on [cost, area, or weight] shall not exceed [125% of IW-EPD's kgCO₂e/[UNIT]]. Products shall have a *product-specific Type III EPD*. Report the product's global warming potential by multiplying the GWP and the declared or functional units. Documentation of products' kgCO₂e/unit and EPDs and declared or functional unit shall be verified by a registered design professional on the project, and a summary shall be made available to the code official that includes a list of each product and associated kgCO₂e/unit, per the EPD.

Highlighted text shows how to amend code language to require disclosing product quantities.

Using a Weighted Average per Product Approach

Also referred to as a carbon budget per product. Instead of each product meeting the kgCO₂e/unit by itself, AHJs can allow a weighted average GWP for all products. Concrete is the most common use of this approach—some concrete mixes come in over the GWP limit while the majority are under the GWP limit, and a calculation will show compliance. For example, the following equation is from the ready mix concrete amendment that can be used for any product category:

Equation.

$$CO_2e_{proj} < CO_2e_{max}$$

$$\text{where: } CO_2e_{proj} = \Sigma(CO_2e_n) (v_n) \text{ and } CO_2e_{max} = \Sigma(CO_2e_{lim}) (v_n)$$

and

n = the total number of products in the project

CO_2e_n = the global warming potential for each product n per EPD, kgCO₂e/unit

CO_2e_{lim} = the global warming potential limit for product n

v_n = the [weight, area, volume, length] n product installed in the project, in the unit per EPD

Example Industry Average Percentage vs. Percentile

Percent of Average	Estimated Percentile
200%	100th
190%	95th
180%	90th
160%	80th
150%	75th
140%	70th
135%	68th
125%	63th
120%	60th
100% (Industry-Wide EPD)	50th
80%	40th
75%	38th
70%	35th
60%	30th
40%	20th
20%	10th

This chart represents a general comparison of the percentage of the industry average to a percentile in an ideal scenario. The CLF Materials Baseline Report⁶ illustrates the GWP spread of manufacturer EPDs for products with IW-EPD for accurate representation per product.

⁶ Waldman, B., et al, 2023 Carbon Leadership Forum North American Material Baselines, Baseline Report. Carbon Leadership Forum, University of Washington. Seattle, WA, 2023.

Documentation Compliance

Use the project's submittal review process to confirm the proper documentation is used. Documentation of the product's GWP and EPDs can be verified by a registered design professional on the project and make a summary available to the code official before the certificate of occupancy. The summary document should include a list of each product and associated kgCO₂e/unit, per the EPD. Appendix C provides an example of what this table may look like. Alternative options may be to require a third-party review or that all documentation be provided to the jurisdiction. Jurisdictions may make the documentation available to the AHJ on request and not make the certificate of occupancy contingent on the certificate of occupancy.



Why Not Include Whole Building Lifecycle Analysis?

The Embodied Carbon Building Code overlay takes a product-by-product approach instead of a whole building lifecycle analysis (WB LCA). This approach is influenced by the code's structure and the current market readiness state. The overlay leverages the existing code structure, which is organized around product and material chapters. While other measures could be incorporated into the building code, such as allowing reused wood or advanced framing techniques, the focus of this overlay remains on product categories.

WB LCA is a valuable tool for evaluating strategies to reduce embodied carbon emissions throughout the entire building lifecycle. It enables the identification of carbon savings from multiple products through an interactive approach. However, due to the current market maturity, certain products, like mechanical, electrical, and plumbing systems, lack the necessary data for conducting a comprehensive WB LCA. As a result, many WB LCAs tend to concentrate on the building structure, envelope, and occasionally interior finishes.

It is worth noting that WB LCA is primarily a design-based tool and is typically not reconciled with the actual materials procured during construction.

The key reason why WB LCA is not ready for the building code is the limited availability of industry research, market expertise, and standards required to implement WB LCAs as a mandatory code requirement. To instill confidence in designers and building officials, it is essential to establish consistent scopes, define requirements for comparing baseline and design modules, and set total GWP limits specific to different building types.

In contrast, product-specific regulations with GWP limits are relatively easier to formulate and enforce. Therefore, a materials-based policy offers a practical and market-ready option for achieving meaningful reductions in embodied carbon within building codes today.

Overall, while WB LCA is a valuable long-term goal, the current industry landscape and lack of sufficient resources make a product-focused approach more feasible and effective in driving immediate change.

A tall building under construction, featuring a grid of concrete columns and beams. The building is partially finished with red brickwork and large windows. Several workers are visible on scaffolding platforms at different levels. The sky is clear and blue.

International Building Code Amendments

Chapter 2: Definitions

SECTION 202 DEFINITIONS

Add new definitions as follows:

CARBON DIOXIDE EQUIVALENT (CO₂e). A measure used to compare the impact of various greenhouse gases based on their *global warming potential (GWP)*. CO₂e approximates the time-integrated warming effect of a unit mass of a given greenhouse gas relative to that of carbon dioxide (CO₂).

GLOBAL WARMING POTENTIAL (GWP). A measurement that combines the impact of the various greenhouse gases relative to an equivalent unit of carbon dioxide over a given period of time.

The amendments do not use the term GWP. This definition may not be needed if kgCO₂e/unit is used within the code.

PRODUCT. Any material or product procured for permanent installation in the building that has the same specification requirements and is classified by the same product category rule.

The definition of product is essential for the embodied carbon code amendments because it's used frequently. For example, four separate floor products may be classified as resilient flooring, grouping as the same product for compliance with Chapter 8. In this scenario, 80% of the four resilient flooring products, by area, must comply with the 125% of IW-EPD's kgCO₂e/m², and product-specific type III EPDs would be provided for the products. The definition can be amended to align with other similar policies. This definition intends to define a product based on the product category rule (PCR) product description.

The terms product and products are not italicized in the amendments since it's used so frequently.

PRODUCT-SPECIFIC TYPE III ENVIRONMENTAL PRODUCT DECLARATION (EPD). Also known as manufacturer-specific EPD. Type III environmental product declaration (EPD) complying with the goal and scope for the production stage of at least cradle-to-gate in accordance with ISO Standards 14025 and 21930 and be available in a publicly accessible database. The data can represent the impacts of a specific design and manufacturers across multiple facilities or be facility-specific.

As facility-specific definitions become more prevalent, this definition can be updated to address facility-specific EPDs instead of product-specific. However, if product-specific EPDs are allowed, facility-specific EPDs fall under the category.

INDUSTRY-WIDE TYPE III ENVIRONMENTAL PRODUCT DECLARATION (IW-EPD). Type III environmental product declaration (EPD) that estimates the average *global warming potential* of a specific product within an industry. Complies with the goal and scope for the production stage of at least cradle-to-gate in accordance with ISO Standards 14025 and 21930 and be available in a publicly accessible database. The EPD results represent production weighted average data across multiple manufacturers.

The definitions presented here are common for all product-specific code sections.

Chapter 7: Fire and Smoke Protection Features

Products included in this section: insulation—mineral wool board (heavy density, light, and loose-fill), and cellulose

SECTION 720 THERMAL- AND SOUND-INSULATING MATERIALS

Add new text as follows:

720.1.1 Embodied CO₂e of Insulation Products. 75% of mineral wool (heavy density, light, and loose-fill), and cellulose insulation products used in the building, based on product cost or area, shall not exceed 125% of IW-EPD's kgCO₂e/m²-RSI. Products shall have a product-specific Type III EPD. Documentation of the product's kgCO₂e/m²-RSI and EPDs shall be verified by a registered design professional on the project, and a summary shall be made available to the code official that includes a list of each product and associated kgCO₂e/m²-RSI, per the EPD.

Product percentage options: With a growing number of insulation products with EPDs, project teams can select the majority of the project's insulation from manufacturers that meet the requirements. Unique insulation scenarios may not meet the criteria, allowing a buffer for non-compliance.

Mineral wool insulation is a product included in Buy Clean procurement policies. However, as more insulation manufacturers develop EPDs, the percentage of project insulation that meets the requirements can increase.

Insulation may be referred to differently per region. Therefore, it's important to compare the insulation type on the PCR or EPD. Other terms for mineral wool include wool batt, rock wool, slag wool, mineral fiber, and mineral cotton. Additional terms for cellulose include loose-fill, dense-packed, and blown-in.

Plastic-based insulation (expanded polystyrene (EPS), and polyurethane foam insulation (HFC and HFO)) code amendments are located in Chapter 26 Plastics.

Insulation is an essential component of energy efficiency. However, not all insulation is the same; comparing products' upfront and lifecycle kgCO₂e/m²-RSI, some insulation is more carbon intensive, based on the raw ingredients and manufacturing methods. Projects will need to balance operational carbon and embodied carbon requirements. Specifying the right insulation for the application will support a carbon-balanced project.

AHJs can address the lifecycle of the material as PCRs are updated to report all stages of a product's lifecycle emissions consistently.

Chapter 8: Interior Finishes

Products included in this section: solid wood flooring, engineered wood flooring, ceramic tile, natural stone flooring, resilient flooring (homogeneous and heterogeneous vinyl, and rigid core), natural stone countertops, steel and aluminum ceiling panel grids

SECTION 804 INTERIOR FLOOR FINISH

Add new text as follows:

802.8 Embodied CO₂e of Interior Finishes. The CO₂e of *interior finishes* shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product's kgCO₂e/unit and EPDs shall be verified by a *registered design professional* on the project, and a summary shall be made available to the *code official* that includes a list of each product and associated kgCO₂e/unit, per the EPD.

802.8.1 Embodied CO₂e of Interior Floor Covering Products. 80% of solid and engineered flooring, ceramic tile, natural stone floor, and resilient flooring (homogeneous and heterogeneous vinyl, and rigid core) used in the *building*, based on cost or area, shall not exceed 125% of IW-EPD's kgCO₂e/m².

802.8.2 Embodied CO₂e of Acoustical Ceiling Systems. 80% of all acoustical ceiling products used in the *building*, based on cost or weight, shall not exceed 125% of IW-EPD's kgCO₂e/kg.

Product percentage options: With a growing number of flooring and acoustical ceiling tile products with EPDs, project teams can select the majority of the project's interior finishes from manufacturers that meet the requirements. Flooring may be procured from different brands, so consider a lower percentage of complying products for flooring. As such, unique scenarios may not meet the GWP requirements, allowing a buffer for non-compliance. Separate percentages can be set for each product.

Several products fall into the interior finishes category. Over the life of a project, the interior finishes are replaced more frequently than any other product. Studies have indicated that the embodied carbon of interior finishes could be up to 50% of all upfront embodied carbon. While many interior finish manufacturers were quick to create health product declarations to disclose the ingredients in their products, the number of product EPDs is still growing.

Solid wood flooring and engineered wood flooring could be incorporated into the Chapter 23 requirement.

Chapter 14: Exterior Walls

Products included in this section: insulated metal panel siding and panels

Add new text as follows:

Section 1401 General

1401.2 Embodied CO₂e of Insulated Metal Panels Products. 80% of all insulated metal panel siding used in the *building*, based on cost or area, shall not exceed 125% of IW-EPD's kgCO₂e/m², and products shall have a *product-specific Type III EPD*. Documentation of the product's kgCO₂e/unit and EPDs shall be verified by a *registered design professional* on the project, and a summary shall be made available to the *code official* that includes a list of each product and associated kgCO₂e/m², per the EPD.

Product percentage options: At the time of publishing, only a handful of panel product manufacturers have EPDs. However, when a system is selected, teams will likely procure the majority of the product from one manufacturer, making a higher percentage of product category compliance more achievable. Unique scenarios may not meet the requirements, allowing a buffer for non-compliance.

Insulated metal panels can be used in interior or exterior walls, partition walls, and roof assemblies. The product comprises a polyurethane core sandwiched between two pre-finished steel sheets forming a single, all-in-one insulated metal panel.

Chapter 15: Roof Assemblies and Rooftop Structures

Products included in this section: asphalt roofing, insulated metal panels

SECTION 1501 GENERAL

Add new text as follows:

1501.2 Embodied CO₂e of Roof Assemblies and Rooftop Structures Products. The CO₂e of roofing assemblies shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product's kgCO₂e/m² and EPDs shall be verified by a *registered design professional* on the project, and a summary shall be made available to the *code official* that includes a list of each product and associated kgCO₂e/m², per the EPD.

1501.2.1 Embodied CO₂e of Roofing Products. 80% of all built-up, PVC, and asphalt roofing products used in the *building*, based on product cost or area, shall not exceed 125% of IW-EPD's kgCO₂e/m².

1501.2.2 Embodied CO₂e of Insulated Metal Panels Products. 80% of insulated metal panel products used in the *building*, based on product cost or area, shall not exceed 125% of IW-EPD's kgCO₂e/m².

Product percentage options: At the time of publishing, only a handful of roof assemblies and panel product manufacturers have EPDs. However, when products are selected, nearly all of the product would come from one or two manufacturers, making a higher percentage of product category compliance more achievable. Unique scenarios may not meet the requirements, allowing a buffer for non-compliance.

Insulated metal panels can be used in interior or exterior walls, partition walls, and roof assemblies. The product comprises a polyurethane core sandwiched between two pre-finished steel sheets forming a single, all-in-one insulated metal panel.

Several products are classified under roofing products, including PVC roofing membrane, modified bitumen roofing membrane (torch or self-adhering), Non reinforced and reinforced EPDM single-ply membrane. All of these products have different thicknesses.

Chapter 19: Concrete

Products included in this section: ready-mixed and precast concrete

SECTION 1901 GENERAL

Add new text as follows:

1901.7 Embodied CO₂e in Concrete Products. The CO₂e of ready-mix and precast concrete shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product’s kgCO₂e/unit and EPDs shall be verified by a *registered design professional* on the project, and a summary shall be made available to the *code official* that includes a list of each product and associated kgCO₂e/unit, per the EPD.

1901.7.1 Embodied CO₂e in Ready-mix Concrete Products. 90% of all ready-mix concrete mixes used in the *building’s primary structural frame, secondary members, seismic force-resisting system*, and foundations shall not exceed the project limit (CO₂E_{max}) determined by 125% of IW-EPD’s kgCO₂e/y³.

Exceptions:

1. Precast, shotcrete, or auger cast concrete.
2. Buildings less than 50,000 gross floor area.
3. Buildings where the total volume of concrete is less than 50 cubic yards.

Appendix B includes a table format that could incorporate the kgCO₂e/cubic yard (cy) per mix strength. Pay attention to whether the base code being amended includes cubic yards or cubic meters, and align accordingly. EPDs include both units.

Other exceptions may include projects where the total cost of the concrete is less than 5% of the total project value. Or, the scope could include site and other flatwork.

Justifications can provide recommendations for mixes that do not have a product-specific EPD and can assume 200% of IW-EPD kgCO₂e/cy. Additionally, a 130% GWP allowance for high-early strength concrete can be allowed, as in the Marin County code. High-early strength concrete is assumed to achieve a compressive strength quality within 24 hours to seven days.

An additional exception may include, “Concrete mixes where the cement can be documented to have come from a plant with an ENERGY STAR® Energy Performance Score.” While cement from ENERGY STAR® plants may not result in the lowest emissions, it illustrates a manufacturer commitment to reducing emissions over time.

Equation 1901.7.1.1

$$\text{CO}_2\text{e}_{\text{proj}} < \text{CO}_2\text{e}_{\text{max}}$$

$$\text{where: } \text{CO}_2\text{e}_{\text{proj}} = \sum(\text{CO}_2\text{e}_n) (v_n) \text{ and } \text{CO}_2\text{e}_{\text{max}} = \sum(\text{CO}_2\text{e}_{\text{lim}}) (v_n)$$

and

n = the total number of concrete mixtures for the project

CO₂e_n = the global warming potential for mixture n per mixture EPD, kgCO₂e/y³

CO₂e_{lim} = the global warming potential limit for mixture n per 125% of IW-EPD’s kgCO₂e/y³

v_n = the volume of mixture n concrete to be placed in the project, in y³

Chapter 19: Concrete (continued)

A table like the following may be used to show compliance:

Product	GWP Limit (from table)	Mix Volume		Actual GWP (from EPD)		Product GWP
Concrete Mix 1			x		=	
Concrete Mix 2			x		=	

Product percentage options: With over 70,000 concrete EPDs, the concrete industry is at the forefront of providing EPDs to project teams. Additionally, concrete has many paths to reduce embodied carbon. However, the 90% threshold allows unique scenarios where an immediate mix was needed that were unable to meet the requirements, allowing a buffer for non-compliance.

1901.7.2 Embodied CO₂e in Precast Concrete Products. 75% of all precast used as ordinary precast structural walls and foundations, based on cost or weight, shall not exceed 125% of IW-EPD's kg-CO₂e/metric ton.

Product percentage options: The number of precast concrete manufacturers with EPDs is growing on the East Coast. Since a project will likely procure most precast concrete from the same source, the required percentage of complying products can be higher. Unique scenarios may not meet the requirements, allowing a higher buffer for non-compliance.

Precast concrete used as cladding or other products can be incorporated into the code. Precast concrete often has higher cement content than ready-mix concrete due to the fast-paced manufacturing process.

Concrete is one of the most widely used materials in building construction and a primary contributor to embodied carbon in buildings. A recent case study analysis by RMI shows that simply by specifying concrete products with lower CO₂e content, a commercial construction project's embodied carbon can be reduced up to 33%.

If AHJs only adopt two amendments, concrete should be one (steel is the other.)

The Denver Green Code has adopted a similar approach using Appendix B. The approach allows each mix to comply with the GWP limits in the table or the weighted average. The Marin County code includes an option to comply with cement limits, which is not included here since this is a hyper-local approach.

In May 2023, the U.S. General Services Administration issued the Interim IRA Low Embodied Carbon Material Requirements, which includes a concrete approach similar to Marin County, setting limits for each strength class but not allowing a weighted average. The requirements also allow cement products that are produced in an ENERGY STAR® Plant when the Energy Performance Score and other data are provided.

The National Ready-Mixed Concrete Association, the organization that organizes and publishes the IW-EPD, also publishes a regional LCA report that provides GWP limits for different geographic regions in the U.S. While this is not technically an IW-EPD, the LCA is third-party reviewed and can be used in place of the IW-EPD values for regionally sensitive GWP values.

The American Concrete Institute (ACI) is currently developing Standard 323, Low-Carbon Concrete Code. This pending standard will likely offer GWP limits per concrete application (column, beam, slab on grade, etc.)

Chapter 21: Masonry

Products included in this section: clay bricks, masonry cement

SECTION 2103 MASONRY CONSTRUCTION MATERIALS

Add new text as follows:

2103.1.2 Embodied CO₂e in Masonry Construction Products. The CO₂e of clay bricks and cement products shall meet the requirements in this section, and products used for compliance shall have a product-specific Type III EPD. Documentation of the product's kgCO₂e/unit and EPDs shall be verified by a registered design professional on the project, and a summary shall be made available to the code official that includes a list of each product and associated kgCO₂e/unit, per the EPD.

2103.1.2.1 Embodied CO₂e of Clay Bricks. 50% of all clay brick products used in the building, based on cost or volume, shall not exceed 125% of IW-EPD's kgCO₂e/m³.

2103.1.2.2 Embodied CO₂e of Masonry Cement. 50% of all masonry cement used in the building, based on cost or weight, shall not exceed 125% of IW-EPD's kgCO₂e/metric ton.

Product percentage options: Few masonry manufacturers have EPDs, at the time of publication. However, project teams are likely to procure the majority of the product from the same source; the required percentage of complying products could account for half of the masonry. Unique scenarios may not meet the requirements, allowing a much higher non-compliance buffer.

Masonry units are recognized in the Clean Future Act as a product on the secondary materials list. There are a growing number of EPDs for these products, and as more manufacturers provide EPDs, the percentage of complying products can be increased.

In May 2023, the U.S. General Services Administration issued the Interim IRA Low Embodied Carbon Material Requirements, which includes GWP ranges for concrete masonry units, similar to this approach. The requirements also allow cement products to be produced in an ENERGY STAR® Plant when provided with the Energy Performance Score and other data.

Chapter 22: Steel

Products included in this section: hollow structural steel sections, hot rolled structural steel sections, steel plate, concrete reinforcing steel bars, open web steel joists and girders, steel decking, and secondary cold-formed steel framing

SECTION 2201 GENERAL

Add new text as follows:

2201.2 Embodied CO₂e in Steel Products. The CO₂e of primary structural steel and secondary steel products shall meet the requirements in this section, and products shall have a *product-specific Type III EPD*. Documentation of the product's kgCO₂e/metric ton and EPDs shall be verified by a *registered design professional* on the project, and a summary shall be made available to the *code official* that includes a list of each product and associated kgCO₂e/metric ton, per the EPD.

Exceptions:

When a minimum of 90% of steel products listed in this section, based on cost or weight, shall be produced in a facility or facilities that comply with one of the following and provide third-party documentation indicating:

1. On the date of procurement is independently, or as part of an aggregation of facilities, a Green Power Partner in the United States Environmental Protection Agency (U.S. EPA) Green Power Partnership program, or an equivalent renewable power procurement registry, as approved by the AHJ.
2. Not less than 50% of the energy sourced for production at the facility is a renewable energy resource as documented by one or more of the following:
 - 2.1. On-site renewable energy system
 - 2.2. Off-site renewable energy system owned by the production facility owner
 - 2.3. Community renewable energy facility
 - 2.4. Physical Renewable Energy Power Purchase Agreement (PPA)
 - 2.5. Financial Renewable Energy PPA

2201.2.1 Embodied CO₂e of Structural Steel Products. 90% of all hollow structural steel sections, hot rolled structural steel sections, and steel plate products used in the *building's primary structural frame, secondary members, seismic force-resisting system, and foundations, steel decking, and roll-formed cladding* shall not exceed 125% of IW-EPD's kgCO₂e/metric ton.

2201.2.2 Embodied CO₂e of Steel Reinforcing Bar Products. 90% of all concrete reinforcing bars used in the *building* shall not exceed 125% of IW-EPD's kgCO₂e/metric ton.

2201.2.3 Embodied CO₂e of Steel Joist Products. 50% of all open web *steel joists* and joist girder products used in the *building* shall not exceed 125% of IW-EPD's kgCO₂e/metric ton.

2201.2.4 Embodied CO₂e of Cold Formed Steel Products. 50% of all *cold formed steel construction decking, secondary structural steel frame components, and nonstructural framing components for walls, floors, ceilings, and roofs* used in the *building* shall not exceed 125% of IW-EPD's kgCO₂e/metric ton.

Chapter 22: Steel (continued)

Product percentage options: 80% of North American structural has product EPDs, and with the industry's innovation interest, the percentage of complying steel can be higher than other projects. Unique last-minute procurement scenarios may not allow project teams time to ensure that requirements are met; therefore, the 10% non-compliance, provides a small buffer.

The steel products are separated into different sections for jurisdictions to adopt sections based on different steel products, and separate limits can be set based on regional availability. For instance, those near a mill that produces lower carbon steel may want to set the value higher.

The GWP limit can be based on the mill or fabrication values. Mill values typically capture the majority of the carbon associated with product development and are the recommended path.

Steel is the second most widely used material in building construction and a primary contributor to embodied carbon in buildings. Buy Clean policies address steel because of its prevalence in construction. If AHJs only adopt two amendments, structural steel should be one (concrete is the other).

A public version of this has been adopted by the Denver Green Code and within the Marin County Code. The Denver Green Code approach allows each mix to comply with the GWP limits in the table or the weighted average. The Marin County code includes an option to comply with cement limits, which is not included here since this is a hyper-local approach.

Similar to section 2201.2.5 Steel Production, the U.S. General Services Administration issued the Interim IRA Low Embodied Carbon Material Requirements, which includes a similar approach for steel products, including rebar. The GSA also allows compliance for steel originating from an integrated steel mill with an ENERGY STAR® Energy Performance Score. The GSA requirements include additional GWP limits based on primary steel manufacturing process. For instance, primary steel includes compliance with integrated blast oxygen furnace mills and secondary electric arc furnace mills. Another option may consist of a sliding scale based on the percentage of scrap steel used in the final product.

Chapter 23: Wood

Products included in this section: softwood and redwood lumber, prefabricated wood i-joists, glued laminated timber, soft plywood, oriented strand board (OSB), laminated veneer lumber, laminated strand lumber, medium density fiberboard and particleboard, cellulosic fiberboard, and glass mat gypsum.

SECTION 2303 MINIMUM STANDARDS AND QUALITY

Add new text as follows:

2303.8 Embodied CO₂e of Wood Products. The CO₂e of wood products shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product's kgCO₂e/unit and EPDs shall be verified by a *registered design professional* on the project, and a summary shall be made available to the *code official* that includes a list of each product and associated kgCO₂e/unit, per the EPD.

Exceptions:

1. Fire-retardant-treated wood
2. Preservative-treated wood
3. Furniture and cabinetry

2303.8.1 Embodied CO₂e of Grade Lumber Products. 10% of all softwood and redwood lumber products used in the *building*, based on cost or volume, shall not exceed 125% of IW-EPD's kg-CO₂e /m³.

2303.8.2 Embodied CO₂e of Prefabricated Joist Products. 50% of all *prefabricated wood i-joist* products used in the *building*, based on cost or length, shall not exceed 125% of IW-EPD's kgCO₂e/m.

2303.8.3 Embodied CO₂e of Glued Cross-laminated Timber Products. 90% of all *glued laminated timber* products used in the *building*, based on cost or volume, shall not exceed 125% of IW-EPD's kgCO₂e/m³.

2303.8.4 Embodied CO₂e of Wood Structural Panel Products. 50% of all soft plywood, oriented strand board products used in the *building*, based on cost or volume, shall not exceed 125% of IW-EPD's kgCO₂e/m³.

2303.8.5 Embodied CO₂e of Structural Composite Lumber Products. 50% of all *laminated veneer lumber* and *laminated strand lumber* products used in the *building*, based on cost or volume, shall not exceed 125% of IW-EPD's kgCO₂e/m³.

2303.8.6 Embodied CO₂e of Particleboard and Fiberboard Products. 50% of all medium density *fiberboard*, cellulosic fiberboard, and *particleboard* products used in the *building*, based on cost or volume, shall not exceed 125% of IW-EPD's kgCO₂e/m³.

Chapter 23: Wood (continued)

Product percentage options: Few North American wood product manufacturers have product EPDs. Therefore, project teams may only be able to procure a portion of the products that meet the requirements. With policies such as Buy Clean Colorado⁷ requiring EPDs for wood structural elements, the number of EPDs is expected to grow.

The language in this section recognizes the limited EPDs for wood products. There are few products or facility-specific EPDs, mainly IW-EPDs, for these products. Wood products from different manufacturers in the same region often have a smaller range of GWP. However, wood products' GWP can alter based on sourcing, processing, and final product. Energy-intensive manufacturing processes like converting wood into engineered products or applying finishes can increase carbon emissions during production.

kgCO₂e/MSF is the unit for kgCO₂e/1000 square feet of wood; Equivalent to kgCO₂e/92.9 meters squared.

Wood is often a lower carbon product than more processed products, and GWP may not be the only consideration. Therefore, additional wood code considerations maybe include reused wood and forestry practices. Reclaimed wood removes the need for new material extractions. Improved forestry practices can greatly affect the amount of claimed sequestered carbon from wood products. As EPDs provide transparency for most products, additional certifications, like Forest Stewardship Council, provide additional transparency and assurance in wood product sustainability.

Buy Clean, Buy Fair, the Washington State procurement policy, included engineered wood where compliance required a chain-of-custody certification, percent volume sourced with forest management certification, percent volume by state/province and country, and the percent volume by owner type (federal, state, private, other.) While Buy Clean Buy Fair did not move forward, the structure provides an alternative to GWP product compliance.⁸

⁷ Buy Clean Colorado, Colorado Section 24-92-117 - [Maximum global warming potential for materials used in eligible projects](#).

⁸ Washington State Department of Commerce, [Buy Clean Buy Fair Washington Pilot Study](#), 2022.

Chapter 24: Glass and Glazing

Products included in this section: flat glass

SECTION 2403 GENERAL REQUIREMENTS FOR GLASS

Add new text as follows:

2403.6 Embodied CO₂e of Glazing Products. 50% of all flat glass used in window products installed in the building, based on cost or weight, shall not exceed 125% of IW-EPD's kgCO₂e/metric ton. Products shall meet the requirements in this section, and products used for compliance shall have a *product-specific Type III EPD*. Documentation of the product's kgCO₂e/metric ton and EPDs shall be verified by a *registered design professional* on the project, and a summary shall be made available to the *code official* that includes a list of each product and associated kgCO₂e/metric ton, per the EPD.

Exceptions:

1. Plastic glazing
2. Fire-rated glazing
3. Interior partition walls
4. Skylights
5. Guards and railings
6. Glazing in athletic facilities
7. Floor/ceiling walking surfaces
8. Elevator hoistway glazing

Product percentage options: Flat glass isn't specified for projects, but manufacturers use it in their final product. The number of EPDs is growing, so not all project teams can procure the product. However, when glazing systems are selected, teams will likely procure the majority of the product from one manufacturer, making a higher percentage of product category compliance more achievable. Unique scenarios may not meet the requirements, allowing a buffer for non-compliance.

The scope of the complying products can be expanded to include glazing in more than window products. The flat glass used in doors, skylights, guards and rails, and others are listed on the exceptions list.

Buy Clean policies, including the Federal Buy Clean Initiative, incorporates flat glass due to its prominence in buildings.

Flat glass is sometimes called sheet, plate, float, or clear glass. While flat glass is not commonly specified in a building, flat glass is the basis of processed glass or is created into assemblies such as insulating glass units (IGUs), laminated glazing units, and vacuum insulating glazing. In addition, flat glass assemblies are often part of curtain walls, storefronts, windows and doors, skylights, and canopies.

The emissions from glass manufacturing primarily come from the energy source used to heat the raw ingredients to high temperatures. The environmental impact can be reduced by using recycled glass and lower carbon fuel sources.

Chapter 25: Gypsum Board, Gypsum Panel Products, and Plaster

Products included in this section: gypsum board, gypsum sheathing, glass-mat gypsum board

SECTION 2501 GENERAL

Add new text as follows:

2501.3 Embodied CO₂e of Gypsum Products. 80% of all gypsum board, gypsum sheathing, and glass-mat gypsum board products used in the building, based on cost or area, shall not exceed 125% of IW-EPD's kgCO₂e/m². Products shall have a product-specific Type III EPD. Confirmation of the product's kgCO₂e/m² and EPDs shall be verified by a registered design professional on the project, and a summary shall be made available to the code official that includes a list of each product and associated kgCO₂e/m², per the EPD.

Product percentage options: EPDs for gypsum panel products are rapidly growing, allowing more teams to procure lower carbon products. Often larger amounts of products are procured from the same manufacturer, making a higher percentage of product category to comply.

Gypsum board may include drywall, plaster board, or other panel product created with calcium sulfate dihydrate. Glass-mat gypsum boards are designed to be used as an exterior substrate or sheathing for weather barriers. The product consists of a non-combustible water-resistant gypsum core, surfaced with glass mat partially or completely embedded in the core.

Similar to other interior finishes, gypsum board often has a lower GWP compared to other products, but it's used in high quantities in many commercial buildings it's frequently replaced. Lightweight gypsum board often has a lower GWP and a higher upfront cost.

Chapter 26: Plastic

Products included in this section: insulation: Expanded polystyrene (EPS), and Polyurethane Foam Insulation (HFC and HFO)

SECTION 2603 FOAM PLASTIC INSULATION

Add new text as follows:

2603.2 Embodied CO₂e of Foam Plastic Insulation Products. 50% of all insulation products, including expanded polystyrene (EPS) and polyurethane foam insulation (HFC or HFO) used in the building, based on cost and area, shall not exceed 125% of IW-EPD's kgCO₂e/m²-RSI. Products shall have a *product-specific Type III EPD*. Documentation of the product's kgCO₂e/m²-RSI and EPDs shall be verified by a *registered design professional* on the project, and a summary shall be made available to the *code official* that includes a list of each product and associated kgCO₂e/ m²-RSI., per the EPD.

Exception:

1. Reflective plastic core insulation

Product percentage options: Foam plastic insulation EPDs have room for growth, meaning it may be hard to find complying products for all applications. However, since the majority of products are procured from the same manufacturer, a higher percentage of product categories can comply, when the products are available.

Insulation may be referred to differently per region. Other terms for rigid insulation include board, foam board, rigid, Styrofoam, or closed-cell. Other common terms for spray polyurethane foam insulation include SPF, spray foam, low or medium-density spray foam, open-cell, closed-cell, or expanding foam. These foams are only related to those with blowing agents with hydrofluorocarbons (HFC) or those with hydrofluoroolefins (HFO). Products using both blowing agents are indicated in Appendix A.

Mineral wool insulation and cellulose insulations are included in Chapter 7, Fire and Smoke Protection Features.

Insulation is an essential component of energy efficiency. However, not all insulation is the same; comparing products' upfront and lifecycle kgCO₂e/m²-RSI, some insulation is more carbon intensive, based on the raw ingredients and manufacturing methods. Projects will need to balance operational carbon and embodied carbon requirements. Specifying the right insulation for the application will support a carbon-balanced project.

Appendices

Appendix A: Industry Average Global Warming Potential per Product

This list includes North American industry-wide environmental product declaration (IW-EPD) owners and the indicated industry average GWP and percentages above and below. The list contains additional products than are listed in the amendments. Environmental product declaration (EPD) owners and EPD expiration dates are provided to support identifying the latest IW-EPD.

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO ₂ e/unit	75% of IW kgCO ₂ e/unit	IW kg kgCO ₂ e/unit	125% IW kgCO ₂ e/unit	150% IW kgCO ₂ e/unit
Redwood Lumber <i>American Wood Council. "Environmental Product Declaration: Redwood Lumber." 2020.</i>	7/1/2025	kgCO ₂ e/m ³	19	28	38	47	57
Softwood Lumber <i>American Wood Council, Canadian Wood Council. "Environmental Product Declaration: Softwood Lumber." 2020.</i>	7/1/2025	kgCO ₂ e/m ³	32	47	63	79	95
Prefabricated Wood I-joists <i>American Wood Council, Canadian Wood Council. "Environmental Product Declaration: North American Wood I-Joists." 2020.</i>	7/1/2025	kgCO ₂ e/m	0.99	1.48	1.97	2.46	2.96
Mass Timber GLT <i>American Wood Council, Canadian Wood Council. "Environmental Product Declaration: North American Glued Laminated Timber." 2020.</i>	7/1/2025	kgCO ₂ e/m ³	69	103	137	171	206
Softwood Plywood <i>American Wood Council, Canadian Wood Council. "Environmental Product Declaration: North American Softwood Plywood." 2020.</i>	7/1/2025	kgCO ₂ e/m ³	110	164	219	274	329
Oriented Strand Board <i>American Wood Council, Canadian Wood Council. "Environmental Product Declaration: North American Oriented Strand Board." 2020.</i>	7/1/2025	kgCO ₂ e/m ³	121	182	243	303	364
Composite Lumber LSL <i>American Wood Council, Canadian Wood Council. "Environmental Product Declaration: North American Laminated Strand Lumber (LSL)." 2021.</i>	4/1/2026	kgCO ₂ e/m ³	137	206	275	344	412
Composite Lumber LVL <i>American Wood Council, Canadian Wood Council. "Environmental Product Declaration: North American Laminated Veneer Lumber." 2020.</i>	7/1/2025	kgCO ₂ e/m ³	181	271	361	452	542

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg CO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
Medium Density Fiberboard Composite Panel Association. "Environmental Product Declaration: Medium Density Fiberboard." 2018.	12/31/2023	kgCO2e/m3	380	569	759	949	1139
Particleboard Composite Panel Association. "Environmental Product Declaration: Particleboard." 2018.	12/31/2023	kgCO2e/m3	201	302	403	503	604
Cellulosic Fiberboard North American Fiberboard Association. "Environmental Product Declaration: North American Cellulosic Fiberboard." 2021.	1/1/2026	kgCO2e/m3	98	147	196	245	294
1/2" Glass Mat Gypsum Sheathing Gypsum Association. "An industry-wide cradle-to-gate EPD for 1/2" and 5/8" Glass-mat Gypsum Boards." 2021.	5/1/2026	kgCO2e/ 92.9 m2 (1 MSF)	219	328	437	547	656
5/8" Glass Mat Gypsum Sheathing Gypsum Association. "An industry-wide cradle-to-gate EPD for 1/2" and 5/8" Glass-mat Gypsum Boards." 2021.	5/1/2026	kgCO2e/ 92.9 m2 (1 MSF)	252	378	504	630	756
Cold-Formed Steel Framing Steel Framing Industry Association. "Environmental Product Declaration: Cold-Formed Steel Framing." 2021.	5/27/2026	kgCO2e/ metric ton	1220	1830	2440	3050	3660
Hot-dip Galvanized Steel After Fabrication American Galvanizers Association. "Environmental Product Declaration Hot-Dip Galvanized Steel After Fabrication: Galvanized Hot-Rolled Sections, Plate, and Hollow Structural Sections." 2022.	4/1/2027	kgCO2e/ metric ton	855	1283	1710	2138	2565
Primary Structural Steel Frame Components Metal Building Manufacturers Association. "Environmental Product Declaration: Primary Structural Steel Frame Components." 2021.	4/1/2026	kgCO2e/ metric ton	734	1101	1468	1835	2202
Secondary Structural Steel Frame Components Metal Building Manufacturers Association. "Environmental Product Declaration: Secondary Structural Steel Frame Components." 2021.	4/1/2026	kgCO2e/ metric ton	965	1447	1929	2411	2894
Fabricated Hot Rolled Structural Steel Sections American Institute of Steel Construction. "Environmental Product Declaration: Fabricated Hot-Rolled Structural Sections." 2021.	1/1/2026	KgCO2e/ metric ton	610	915	1220	1525	1830

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO ₂ e/unit	75% of IW kgCO ₂ e/unit	IW kg CO ₂ e/unit	125% IW kgCO ₂ e/unit	150% IW kgCO ₂ e/unit
Hollow Structural Steel Sections (Mill) <i>American Institute of Steel Construction, Steel Tube Institute. "Environmental Product Declaration: Fabricated Hollow Structural Sections." 2022.</i>	2/3/2027	kgCO ₂ e/metric ton	995	1493	1990	2488	2985
Steel Plate (Mill) <i>American Institute of Steel Construction. "Environmental Product Declaration: Fabricated Steel Plate." 2022.</i>	1/1/2026	kgCO ₂ e/metric ton	865	1298	1730	2163	2595
Reinforcing Concrete Bars <i>Concrete Reinforcing Steel Institute. "Environmental Product Declaration: Steel Reinforcement Bar." 2022.</i>	9/19/2027	kgCO ₂ e/metric ton	427	641	854	1,068	1,281
Steel Decking <i>Steel Deck Institute. "Environmental Product Declaration: Steel Roof and Floor Deck." 2022.</i>	1/21/2027	kgCO ₂ e/metric ton	1,160	1,740	2,320	2,900	3,480
Open Web Steel Joist and Joist Girders <i>Steel Joist Institute. "Environmental Product Declaration: Open Web Steel Joists and Joist Girders." 2022.</i>	1/21/2027	kgCO ₂ e/metric ton	715	1,073	1,430	1,788	2,145
Composite Masonry Unit (CMU) <i>Canadian Concrete Masonry Producers Association (CCMPA). "Environmental Product Declaration: Normal Weight and Lightweight Concrete Block Masonry Units as Manufactured by Members of the Canadian Concrete Masonry Producers Association (CCMPA)." 2022.</i>	9/6/2027	kgCO ₂ e/m ³	88	132	177	221	265
Clay Brick <i>Brick Industry Association. "Environmental Product Declaration: U.S.–Canada Industrywide Clay Brick." 2020.</i>	10/7/2025	kgCO ₂ e/m ³	252	377	503	629	755
Aluminum Extrusions - Mill Finish <i>Aluminum Extruders Council. "Environmental Product Declaration: Aluminum Extrusions; Mill Finished, Painted, and Anodized." 2022.</i>	11/1/2027	kgCO ₂ e/metric ton	5,126	7,690	10,253	12,816	15,379
Aluminum Extrusions – Anodized <i>Aluminum Extruders Council. "Environmental Product Declaration: Aluminum Extrusions; Mill Finished, Painted, and Anodized." 2022.</i>	11/1/2027	kgCO ₂ e/metric ton	5,381	8,072	10,763	13,454	16,144

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg CO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
Aluminum Extrusions – Painted Aluminum Extruders Council. “Environmental Product Declaration: Aluminum Extrusions; Mill Finished, Painted, and Anodized.” 2022.	11/1/2027	kgCO2e/metric ton	5,837	8,755	11,673	14,591	17,510
Thermally Improved Aluminum Extrusions – Anodized Aluminum Extruders Council. “Environmental Product Declaration: Thermally Improved Aluminum Extrusions; Painted and Anodized.” 2022.	11/1/2027	kgCO2e/metric ton	5,898	8,847	11,797	14,746	17,695
Thermally Improved Aluminum Extrusions – Painted Aluminum Extruders Council. “Environmental Product Declaration: Thermally Improved Aluminum Extrusions; Painted and Anodized.” 2022.	11/1/2027	kgCO2e/metric ton	6,348	9,522	12,697	15,871	19,045
Expanded polystyrene (EPS) Type XI EPS Industry Alliance. “Environmental Product Declaration: Expanded Polystyrene Insulation; Molded, Closed-Cell Foam Plastic Insulation.” 2023.	3/1/2028	kgCO2e/m2-RSI	1.14	1.71	2.28	2.85	3.42
EPS Type I EPS Industry Alliance. “Environmental Product Declaration: Expanded Polystyrene Insulation; Molded, Closed-Cell Foam Plastic Insulation.” 2023.	3/1/2028	kgCO2e/m2-RSI	1.27	1.90	2.53	3.16	3.80
EPS Type VIII EPS Industry Alliance. “Environmental Product Declaration: Expanded Polystyrene Insulation; Molded, Closed-Cell Foam Plastic Insulation.” 2023.	3/1/2028	kgCO2e/m2-RSI	1.53	2.30	3.06	3.83	4.59
EPS Type II EPS Industry Alliance. “Environmental Product Declaration: Expanded Polystyrene Insulation; Molded, Closed-Cell Foam Plastic Insulation.” 2023.	3/1/2028	kgCO2e/m2-RSI	1.71	2.56	3.42	4.27	5.12
EPS Type IX EPS Industry Alliance. “Environmental Product Declaration: Expanded Polystyrene Insulation; Molded, Closed-Cell Foam Plastic Insulation.” 2023.	3/1/2028	kgCO2e/m2-RSI	2.16	3.24	4.33	5.41	6.49

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg CO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
EPS Type XIV EPS Industry Alliance. "Environmental Product Declaration: Expanded Polystyrene Insulation; Molded, Closed-Cell Foam Plastic Insulation." 2023.	3/1/2028	kgCO2e/m2-RSI	2.90	4.35	5.79	7.24	8.69
EPS Type XV EPS Industry Alliance. "Environmental Product Declaration: Expanded Polystyrene Insulation; Molded, Closed-Cell Foam Plastic Insulation." 2023.	3/1/2028	kgCO2e/m2-RSI	3.53	5.29	7.06	8.82	10.59
Mineral Wool Board - Light Density North American Insulation Manufacturers Association. "Environmental Product Declaration: Mineral Wool Board." 2018.	11/7/2023	kgCO2e/m2-RSI	1.67	2.50	3.33	4.16	5.00
Mineral Wool Board - Heavy Density North American Insulation Manufacturers Association. "Environmental Product Declaration: Mineral Wool Board." 2018.	11/7/2023	kgCO2e/m2-RSI	4.08	6.12	8.16	10.20	12.24
Mineral Wool Loose Fill North American Insulation Manufacturers Association. "EPD Transparency Summary: Mineral Wool Loose Fill." 2018.	11/7/2023	kgCO2e/m2-RSI	0.78	1.17	1.56	1.95	2.34
Spray Polyurethane Foam Insulation - Roofing, HFC Spray Polyurethane Foam Association (SPFA). "Environmental Product Declaration: Spray Polyurethane Foam Insulation (HFC)." 2018.	10/29/2023	kgCO2e/m2-RSI	1.92	2.87	3.83	4.79	5.75
Spray Polyurethane Foam Insulation - 2K-LP, HFC Spray Polyurethane Foam Association (SPFA). "Environmental Product Declaration: Spray Polyurethane Foam Insulation (HFC)." 2018.	10/29/2023	kgCO2e/m2-RSI	1.61	2.41	3.21	4.01	4.82
Spray Polyurethane Foam Insulation - Closed Cell, HFC Spray Polyurethane Foam Association (SPFA). "Environmental Product Declaration: Spray Polyurethane Foam Insulation (HFC)." 2018.	10/29/2023	kgCO2e/m2-RSI	1.66	2.48	3.31	4.14	4.97

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg CO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
Spray Polyurethane Foam Insulation - Open Cell, HFC <i>Spray Polyurethane Foam Association (SPFA). "Environmental Product Declaration: Spray Polyurethane Foam Insulation (HFC)." 2018.</i>	10/29/2023	kgCO2e/m2-RSI	0.71	1.07	1.42	1.78	2.13
Spray Polyurethane Foam Roofing, HFO <i>Spray Polyurethane Foam Association (SPFA). "Environmental Product Declaration: Spray Polyurethane Foam Insulation (HFO)." 2022.</i>	1/24/2027	kgCO2e/m2-RSI	2.05	3.08	4.10	5.13	6.15
Spray Polyurethane Foam 2K-LP, HFO <i>Spray Polyurethane Foam Association (SPFA). "Environmental Product Declaration: Spray Polyurethane Foam Insulation (HFO)." 2022.</i>	1/24/2027	kgCO2e/m2-RSI	1.58	2.37	3.16	3.95	4.74
Spray Polyurethane Foam Closed Cell, HFO <i>Spray Polyurethane Foam Association (SPFA). "Environmental Product Declaration: Spray Polyurethane Foam Insulation (HFO)." 2022.</i>	1/24/2027	kgCO2e/m2-RSI	1.76	2.64	3.52	4.40	5.28
Spray Polyurethane Foam Open Cell <i>Spray Polyurethane Foam Association (SPFA). "Environmental Product Declaration: Spray Polyurethane Foam Insulation (HFO)." 2022.</i>	1/24/2027	kgCO2e/m2-RSI	0.72	1.08	1.44	1.80	2.16
Blown insulation – Cellulose <i>Cellulose Insulation Manufacturers Association. "Industry-wide Type III EPD: Conventional Loose-Fill Cellulose Insulation." 2019.</i>	12/23/2024	kgCO2e/m2-RSI	0.24	0.37	0.49	0.61	0.73
Insulated metal panel (Associated with Cladding) <i>Metal Construction Association. "Environmental Product Declaration: Insulated Metal Panels - Wall and Roof Panel Systems." 2020.</i>	4/1/2025	kgCO2e/100m2	5,350	8,025	10,700	13,375	16,050
Aluminum Roll Formed Cladding <i>Metal Construction Association. "Environmental Product Declaration: Roll Formed Cladding - Wall and Roof Cladding Systems." 2020.</i>	4/1/2025	kgCO2e/100m2	930	1,395	1,860	2,325	2,790

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg CO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
Steel Roll Formed Cladding <i>Metal Construction Association. "Environmental Product Declaration: Roll Formed Cladding - Wall and Roof Cladding Systems." 2020.</i>	4/1/2025	kgCO2e/100m2	765	1,148	1,530	1,913	2,295
Gypsum Board 1/2" <i>Gypsum Association. "An industry average cradle-to-gate Life Cycle Assessment of 1/2" Lightweight and 5/8" Type X Conventional Gypsum Borad for the USA and Canadian Markets." 2020.</i>	4/28/2025	kgCO2e/92.9 m2 (1 MSF)	104	155	207	259	311
Gypsum Board 5/8" <i>Gypsum Association. "An industry average cradle-to-gate EPD for 5/8" Type X Conventional Gypsum Borad produced by Gypsum Association member companies for the USA and Canadian Markets." 2020.</i>	4/28/2025	kgCO2e/92.9 m2 (1 MSF)	139	208	277	346	416
Rubber Flooring <i>Resilient Floor Covering Institute. "Environmental Product Declaration: Rubber Flooring." 2019.</i>	1/1/2024	kgCO2eq/m2	7.80	11.70	15.6	19.50	23.40
Vinyl Tile <i>Resilient Floor Covering Institute. "Environmental Product Declaration: Vinyl Tile." 2019.</i>	1/1/2024	kgCO2eq/m2	5.95	8.93	11.9	14.88	17.85
Vinyl Composition Tile <i>Resilient Floor Covering Institute. "Environmental Product Declaration: Vinyl Composition Tile." 2019.</i>	1/1/2024	kgCO2e/m2	2.48	3.72	4.96	6.20	7.44
Resilient Flooring - Homogeneous Vinyl Flooring <i>Resilient Floor Covering Institute. "Environmental Product Declaration: Homogeneous Vinyl Flooring." 2019.</i>	1/1/2024	kgCO2e/m2	4.51	6.76	9.01	11.26	13.52
Resilient Flooring - Heterogeneous Vinyl Flooring <i>Resilient Floor Covering Institute. "Environmental Product Declaration: Heterogenous Vinyl Flooring." 2019.</i>	1/1/2024	kgCO2e/m2	3.52	5.28	7.04	8.80	10.56
Resilient Flooring - Rigid Core Flooring <i>Resilient Floor Covering Institute. "Environmental Product Declaration: Rigid Core Flooring." 2019.</i>	1/1/2024	kgCO2e/m2	10.25	15.38	21	26	31
Solid Wood Flooring <i>National Wood Flooring Association. "Cradle-to-grave EPD for industry average solid wood flooring products." 2022.</i>	11/25/2027	kgCO2e/m2	4.90	7.34	9.79	12.24	14.69

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg CO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
Engineered Wood Flooring <i>Decorative Hardwoods Association, National Wood Flooring Association. "Cradle-to-grave EPD for industry average engineered wood flooring products." 2022.</i>	11/25/2027	kgCO2e/m2	3.42	5.14	6.85	8.56	10.27
Ceramic Tile <i>Tile Council of North America. "Environmental Product Declaration: Ceramic Tile." 2020.</i>	4/1/2025	kgCO2e/m2	7.05	10.58	14.1	17.63	21.15
Natural Stone Countertops <i>Natural Stone Institute. "Industry-wide Type III EPD: Natural Stone Countertops." 2022.</i>	10/31/2027	kgCO2e/m2	23	35	47	59	70
Natural Stone Flooring and Paving <i>Natural Stone Institute. "Industry-wide Type III EPD: Natural Stone Flooring and Paving." 2022.</i>	10/31/2027	kgCO2e/m2	11.00	16.50	22	28	33
Exterior Dimension Stone Cladding <i>Natural Stone Institute. "Industry-wide Type III EPD: Exterior Dimension Stone Cladding." 2022.</i>	10/31/2027	kgCO2e/m2	10.70	16.05	21	27	32
Vinyl Siding <i>Vinyl Siding Institute. "Environmental Product Declaration: Vinyl Siding." 2022.</i>	7/15/2022	kgCO2e/m2	2.36	3.53	4.71	5.89	7.07
Insulated Vinyl Siding <i>Vinyl Siding Institute. "Environmental Product Declaration: Insulated Vinyl Siding." 2022.</i>	7/15/2022	kgCO2e/m2	3.03	4.54	6.05	7.56	9.08
Polypropylene Siding <i>Vinyl Siding Institute. "Environmental Product Declaration: Polypropylene Siding." 2022.</i>	7/15/2022	kgCO2e/m2	4.91	7.36	9.81	12.26	14.72
Flat Glass <i>National Glass Association. "Environmental Product Declaration: Flat Glass." 2019.</i>	12/20/2024	kgCO2e/metric ton	715	1,073	1,430	1,788	2,145
Ready-Mix Concrete - 0-2500 <i>National Ready Mixed Concrete Association. "Environmental Product Declaration: NRMCA Member Industry-Averaged EPD for Ready Mixed Concrete." 2022.</i>	11/16/2024	kgCO2e/y3	88	131	175	219	263

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg CO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
Ready-Mix Concrete - 2501 – 3000 National Ready Mixed Concrete Association. “Environmental Product Declaration: NRMCA Member Industry-Averaged EPD for Ready Mixed Concrete.” 2022.	11/16/2024	kgCO2e/y3	97	146	194	243	292
Ready-Mix Concrete - 3001 – 4000 National Ready Mixed Concrete Association. “Environmental Product Declaration: NRMCA Member Industry-Averaged EPD for Ready Mixed Concrete.” 2022.	11/16/2024	kgCO2e/y3	119	178	238	297	357
Ready-Mix Concrete - 4001 – 5000 National Ready Mixed Concrete Association. “Environmental Product Declaration: NRMCA Member Industry-Averaged EPD for Ready Mixed Concrete.” 2022.	11/16/2024	kgCO2e/y3	145	217	289	362	434
Ready-Mix Concrete - 5001 – 6000 National Ready Mixed Concrete Association. “Environmental Product Declaration: NRMCA Member Industry-Averaged EPD for Ready Mixed Concrete.” 2022.	11/16/2024	kgCO2e/y3	152	228	304	381	457
Ready-Mix Concrete - 6001 – 8000 National Ready Mixed Concrete Association. “Environmental Product Declaration: NRMCA Member Industry-Averaged EPD for Ready Mixed Concrete.” 2022.	11/16/2024	kgCO2e/y3	176	265	353	441	529
Lightweight Concrete - 0 – 3000 National Ready Mixed Concrete Association. “Environmental Product Declaration: NRMCA Member Industry-Averaged EPD for Ready Mixed Concrete.” 2022.	11/16/2024	kgCO2e/y3	182	274	365	456	547
Lightweight Concrete - 3001 – 4000 National Ready Mixed Concrete Association. “Environmental Product Declaration: NRMCA Member Industry-Averaged EPD for Ready Mixed Concrete.” 2022.	11/16/2024	kgCO2e/y3	209	313	417	522	626
Lightweight Concrete - 4001-5000 National Ready Mixed Concrete Association. “Environmental Product Declaration: NRMCA Member Industry-Averaged EPD for Ready Mixed Concrete.” 2022.	11/16/2024	kgCO2e/y3	230	345	461	576	691

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg kgCO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
Architectural Precast Concrete Wall Panels <i>Canadian Precast/Prestressed Concrete Institute, Precast/Prestressed Concrete Institute. "Environmental Product Declaration (EPD) for Precast Concrete." 2019.</i>	9/25/2024	kgCO2e/metric ton	129	193	258	322	387
Insulated Precast Concrete Wall Panels <i>Canadian Precast/Prestressed Concrete Institute, Precast/Prestressed Concrete Institute. "Environmental Product Declaration (EPD) for Precast Concrete - Architectural & Insulated Wall Panel." 2019.</i>	9/25/2024	kgCO2e/metric ton	140	210	280	350	419
Structural Precast Concrete <i>Canadian Precast/Prestressed Concrete Institute, Precast/Prestressed Concrete Institute. "Environmental Product Declaration (EPD) for Precast Concrete - Structural." 2019.</i>	9/25/2024	kgCO2e/metric ton	128	192	256	320	384
Slag Cement <i>Slag Cement Association. "An Industry Average Environmental Product Declaration for Slag Cement." 2021.</i>	7/30/2026	kgCO2e/metric ton	74	110	147	184	221
White, SPPR PVC Roofing Membrane - 40 mils thick <i>Chemical Fabrics and Film Association. "An industry average cradle-to-building with EOL stage EPD for white, single-ply polyester reinforced PVC roofing membrane, with a finished nominal thickness of 40, 48, 60 and 80 mils, produced by Chemical Fabrics and Film Association (CFFA), Vinyl Roofing Division member companies for the USA and Canadian Markets." 2020.</i>	2/21/2025	kgCO2e/m2 of 40 mils thickness	2.10	3.15	4.20	5.25	6.30
White, SPPR PVC Roofing Membrane - 48 mils thick <i>Chemical Fabrics and Film Association. "An industry average cradle-to-building with EOL stage EPD for white, single-ply polyester reinforced PVC roofing membrane, with a finished nominal thickness of 40, 48, 60 and 80 mils, produced by Chemical Fabrics and Film Association (CFFA), Vinyl Roofing Division member companies for the USA and Canadian Markets." 2020.</i>	2/21/2025	kgCO2e/m2 of 48 mils thickness	2.60	3.90	5.20	6.50	7.80

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg CO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
White, SPPR PVC Roofing Membrane - 60 mils thick <i>Chemical Fabrics and Film Association. "An industry average cradle-to-building with EOL stage EPD for white, single-ply polyester reinforced PVC roofing membrane, with a finished nominal thickness of 40, 48, 60 and 80 mils, produced by Chemical Fabrics and Film Association (CFFA), Vinyl Roofing Division member companies for the USA and Canadian Markets." 2020.</i>	2/21/2025	kgCO2e/m2 of 60 mils thickness	3.15	4.73	6.30	7.88	9.45
White, SPPR PVC Roofing Membrane - 80 mils thick <i>Chemical Fabrics and Film Association. "An industry average cradle-to-building with EOL stage EPD for white, single-ply polyester reinforced PVC roofing membrane, with a finished nominal thickness of 40, 48, 60 and 80 mils, produced by Chemical Fabrics and Film Association (CFFA), Vinyl Roofing Division member companies for the USA and Canadian Markets." 2020.</i>	2/21/2025	kgCO2e/m2 of 80 mils thickness	4.15	6.23	8.30	10.38	12.45
SBS-Modified Bitumen Roofing Membrane (Installation: Torch Applied) <i>Asphalt Roofing Manufacturers Association. "Environmental Product Declaration: SBS-Modified Bitumen Roofing Membrane - Installation: Torch Applied." 2018.</i>	8/29/2023	kgCO2e/m2	3.80	5.70	7.60	9.50	11.40
SBS-Modified Bitumen Roofing Membrane (Installation: Self-adhered) <i>Asphalt Roofing Manufacturers Association. "Environmental Product Declaration: SBS-Modified Bitumen Roofing Membrane - Installation: Self Adhered." 2018.</i>	8/29/2023	kgCO2e/m2	3.40	5.10	6.80	8.50	10.20
Non-Reinforced EPDM Single Ply Roofing Membrane - 45 mils thick <i>Single Ply Roofing Industry. "Environmental Product Declaration: Non-Reinforced EPDM Membrane." 2022.</i>	7/21/2027	kgCO2e/m2 of 45 mils thickness	2.37	3.55	4.73	5.91	7.10
Non-Reinforced EPDM Single Ply Roofing Membrane - 60 mils thick <i>Single Ply Roofing Industry. "Environmental Product Declaration: Non-Reinforced EPDM Membrane." 2022.</i>	7/21/2027	kgCO2e/m2 of 60 mils thickness	3.07	4.61	6.14	7.68	9.21

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg CO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
Non-Reinforced EPDM Single Ply Roofing Membrane - 90 mils thick Single Ply Roofing Industry. "Environmental Product Declaration: Non-Reinforced EPDM Membrane." 2022.	7/21/2027	kgCO2e/m2 of 90 mils thickness	4.78	7.17	9.56	11.95	14.34
Reinforced EPDM Single Ply Roofing Membrane - 45 mils thick Single Ply Roofing Industry. "Environmental Product Declaration: Reinforced EPDM Membrane." 2022.	7/21/2027	kgCO2e/m2 of 45 mils thickness	2.71	4.07	5.42	6.78	8.13
Reinforced EPDM Single Ply Roofing Membrane - 60 mils thick Single Ply Roofing Industry. "Environmental Product Declaration: Reinforced EPDM Membrane." 2022.	7/21/2027	kgCO2e/m2 of 60 mils thickness	3.55	5.33	7.10	8.88	10.65
Reinforced EPDM Single Ply Roofing Membrane - 75 mils thick Single Ply Roofing Industry. "Environmental Product Declaration: Reinforced EPDM Membrane." 2022.	7/21/2027	kgCO2e/m2 of 75 mils thickness	4.43	6.65	8.86	11.08	13.29
Polyiso Roof Insulation Boards (With GRF Facer) Polyisocyanurate Insulation Manufacturers Association. "Environmental Product Declaration: Polyiso Roof Insulation Boards." 2020.	11/4/2025	kgCO2e/m2-RSI	1.05	1.58	2.11	2.64	3.16
Polyiso Roof Insulation Boards (With CGF Facer) Polyisocyanurate Insulation Manufacturers Association. "Environmental Product Declaration: Polyiso Roof Insulation Boards." 2020.	11/4/2025	kgCO2e/m2-RSI	1.48	2.21	2.95	3.69	4.43
Polyiso Wall Insulation Boards Polyisocyanurate Insulation Manufacturers Association. "Environmental Product Declaration: Polyiso Wall Insulation Boards." 2020.	11/4/2025	kgCO2e/m2-RSI	2.05	3.07	4.10	5.12	6.14
Polyiso High-Density Roof Cover Boards Polyisocyanurate Insulation Manufacturers Association. "Environmental Product Declaration: Polyiso High-Density Roof Cover Boards." 2020.	11/30/2025	kgCO2e/m2-RSI	5.34	8.01	10.68	13.35	16.02
Portland Cement Portland Cement Association. "Environmental Product Declaration: Portland Cement." 2021.	3/12/2026	kgCO2e/metric ton	461	692	922	1,153	1,383

Product	EPD Expiration Date	EPD Unit	50% of IW kgCO2e/unit	75% of IW kgCO2e/unit	IW kg kgCO2e/unit	125% IW kgCO2e/unit	150% IW kgCO2e/unit
Portland-Limestone Cement <i>Portland Cement Association.</i> <i>"Environmental Product Declaration: Portland-Limestone Cement." 2021.</i>	3/12/2026	kgCO2e/metric ton	423	635	846	1,058	1,269
Blended Hydraulic Cement <i>Portland Cement Association.</i> <i>"Environmental Product Declaration: Blended Hydraulic Cement." 2021.</i>	3/12/2026	kgCO2e/metric ton	371	557	742	928	1,113
Masonry Cement <i>Portland Cement Association.</i> <i>"Environmental Product Declaration: Masonry Cement." 2021.</i>	3/12/2026	kgCO2e/metric ton	295	442	589	736	884
Metal Composite Material <i>Metal Construction Association.</i> <i>"Environmental Product Declaration: Metal Composite Material - Wall and Roof Panel Systems." 2020.</i>	4/1/2025	kgCO2e/100 m2	1,400	2,100	2,800	3,500	4,200
Aluminum Specialty Products <i>Ceilings and Interior Systems Construction Association.</i> <i>"Environmental Product Declaration: Aluminum Specialty Products." 2020.</i>	4/1/2025	kgCO2e/kg	4.4	6.6	8.8	11.0	13.2
Steel Specialty Products <i>Ceilings and Interior Systems Construction Association.</i> <i>"Environmental Product Declaration: Steel Specialty Products." 2020.</i>	4/1/2025	kgCO2e/kg	1.5	2.3	3.1	3.8	4.6

Appendix B: Table of Concrete CO₂e Limits per Concrete Mixture

This table can be included in the code language for ready-mix concrete. AHJs can omit the table which would require project teams to identify the values per the IW-EPD. The values in the table are based on 125% of the IW-EPD.

Table 1901.7 CO₂e Limits in Concrete Mixtures^a

<u>Procured compressive strength f_c, psi at 28 days</u>	<u>Maximum kg/y³</u>	<u>High-early strength Maximum kg/y³</u>	<u>Lightweight concrete Maximum kg/y³</u>
<u>2500</u>	<u>219</u>	<u>285</u>	<u>N/A</u>
<u>3000</u>	<u>243</u>	<u>316</u>	<u>456</u>
<u>4000</u>	<u>297</u>	<u>387</u>	<u>522</u>
<u>5000</u>	<u>362</u>	<u>470</u>	<u>576</u>
<u>6000</u>	<u>381</u>	<u>495</u>	<u>N/A</u>
<u>8,000</u>	<u>441</u>	<u>574</u>	<u>N/A</u>

a: If a mix does not have a product-specific EPD, assume 200% of IW-EPD kgCO₂e/y³.

kgCO₂e/cubic yards are included in the table. However, the IW-EPD also includes kgCO₂e/cubic meter. Either metric can be used as long as the GWP values are updated to align.

High-early-strength concrete can achieve compressive strength and structural concrete quality within 24 hours to seven days. While lightweight concrete contains lightweight aggregate and has an equilibrium density determined by ASTM C567.

Appendix C: Example kgCO₂e/unit Summary Reporting Table

Documentation requires that EPDs are “verified by a registered design professional on the project, and a summary shall be made available to the code official that includes a list of each product and associated kgCO₂e/unit, per the EPD.” The following is an example summary:

Product	Required Percent of Compliance	Procured Product Amount	Total Product Amount	Percentage Confirmed	Target kgCO ₂ e/unit 150% IW-EPD	Actual kgCO ₂ e/unit per the EPD	Confirmed Compliance
Ready Mix Concrete 5000 psi	90%				434 kgCO ₂ e/v3		
Ready Mix Concrete 6000 psi	90%				457 kgCO ₂ e/y3		
Ready Mix Concrete 6000 psi—High early strength concrete	90%				594 kgCO ₂ e/y3		
Polyurethane Foam Insulation	50%				5.75 kgCO ₂ e/mr-RSI		
Hollow structural steel sections	90%				1500 kgCO ₂ e/metric ton		
Hot rolled structural steel sections	90%				2565 kgCO ₂ e/metric ton		
Rebar I	90%				1470 kgCO ₂ e/metric ton		
Rebar II	90%				1470 kgCO ₂ e/metric ton		



Additional Resources:

[Addressing Embodied Carbon in Building Codes](#)

[Lifecycle GHG Impacts in Building Codes](#)

[NBI's Embodied Carbon in Policies](#)

Codes for Climate™

Codes for Climate is an initiative of NBI to deliver the climate-aligned building codes and standards needed by U.S. states and cities in the face of the pressing demands of policy goals. To scale greenhouse gas reductions in the buildings sector to be in step with a 1.5°C future, the initiative works to support policy makers at multiple levels to move codes and standards forward, making significant reductions in energy consumption and GHG emissions from buildings possible and effective. The Embodied Carbon Building Code supports the goals of the Codes for Climate Initiative.

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New Buildings Institute (NBI) is a nonprofit organization working to advance best practice energy efficiency and decarbonization of the built environment. Our efforts are imperative to keeping energy costs affordable, cutting carbon emissions that are fueling climate change, and delivering on improved health, safety, and resiliency for all. We work collaboratively with industry market players—governments, utilities, advocates, AEC professionals, and others—to drive leading-edge design, innovative technologies, and public policies and programs for scale. Throughout its over 25-year history, NBI has become a trusted and independent resource helping to create buildings that are better for people, communities, and the planet.