STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

1. State Building Code to be Amended:

- ☒ International Building Code
- ☐ ICC ANSI A117.1 Accessibility Code
- ☐ International Existing Building Code
- ☐ International Residential Code
- ☐ International Fire Code
- ☐ Uniform Plumbing Code
- ☐ International Mechanical Code
- ☐ International Fuel Gas Code
- ☐ NFPA 54 National Fuel Gas Code
- ☐ NFPA 58 Liquefied Petroleum Gas Code
- ☐ Wildland Urban Interface Code

For the Washington State Energy Code, please see specialized energy code forms

Section(s): Chapter 1, New Appendix Q

Title: Embodied Greenhouse Gas Emissions Reporting and Reduction

2. Proponent Name (Specific local government, organization or individual):

Proponent: New Buildings Institute
Title: Non-profit organization
Date: September 19, 2024, updated November 15, 2024

3. Designated Contact Person:

Name: Ariel Brenner
Title: Senior Policy Analyst
Address: 151 SW 1st, Portland, OR 97204

Office Phone: (503) 761-7339
Cell: (818) 298-2441
E-Mail address: ariel@newbuildings.org

4. Proposed Code Amendment:

Code(s): Washington State Building Code **Section(s)**: Chapter 1, new Appendix Q

Chapter 1 Scope and Administration

Section 107.2 Construction Documents

Add new section as follows:

107.2.10 Submittal for reduction of Embodied Carbon. Projects required to meet the provisions of RCW 39.116 must submit compliance documentation per RCW 39.116. Such projects may reference the methodologies in Appendix Q of this code for additional guidance.

Add new Appendix as follows:

Appendix Q Embodied Greenhouse Gas Emissions Reporting and Reduction

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

User note:

About this appendix: *The purpose of Appendix Q is to establish methods to measure and reduce the embodied carbon impact of building materials over the course of a building's life. Appendix Q provides criteria for the production and submission of environmental product declarations, whole building life cycle assessment, and proof of building reuse for a building project.*

Section Q101
General

Q101.1 Scope. The provisions of this appendix promote methods to measure and to reduce the environmental impact of building materials over the course of a building's life.

Section Q102
Definitions

Section Q102.1 General. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

Embodied carbon. The sum of greenhouse gas emissions associated with extraction, production, transport, and manufacturing of a product through the product's life, typically reported in kg CO_2e/unit, using life cycle assessment.

Environmental product declaration (EPD). A type III, third-party verified report providing information about the environmental performance or impact of a product or material. An EPD reports at least the production stage, covering the cradle-to-gate phase or life cycle modules A1 through A3.

Global warming potential (GWP). The metric for tracking *Embodied Carbon* (see definition), which is reported in kg CO_2e/unit. GWP normalizes different gases associated with a product to an equivalent mass of carbon dioxide over a period of 100 years.

Product-specific EPD. A type III *EPD* (see definition) that represents the impacts of a single product. A *product-specific EPD* may combine varying levels of manufacturing specificity and may be covered across multiple facility locations.

Work area. That portion or portions of a building consisting of all reconfigured spaces as indicated on the construction documents. *Work area* excludes other portions of the building where incidental work entailed by the intended work must be performed and portions of the building where work not initially intended by the owner is specifically required by this code.

Section Q103
Documentation of reduction of Embodied Carbon

Section Q103.1 Reduction of Embodied Carbon. The construction, *addition*, *alteration*, or *substantial improvement* that impacts a *work area* of 100,000 sf or larger shall comply with one of the following pathways:

1. Building reuse pathway. The building reuse pathway requires compliance with Section Q103.2.
2. Product compliance pathway. The product compliance pathway requires compliance with Section Q103.3.
3. Whole building compliance pathway. The whole building compliance pathway requires compliance with Section Q103.4.

Q103.2 Building reuse pathway. An *addition, alteration,* or *substantial improvement* where the total *work area* is 100,000 gross square feet or larger shall include retaining no less than 45 percent combined of the *existing building's primary structural frame* and *exterior wall envelope* as part of the entire *work area.* This calculation includes plan area for roof and floor structure, including slab on grade, and façade area as measured in elevation. Façade area can be considered preserved even if existing *exterior wall covering* material is repaired or replaced or it is modified to increase insulation or airtightness. Portions of buildings deemed structurally unsound or hazardous, and *hazardous materials* that are remediated as part of the project, are excluded from the calculation. Any combined *addition(s)* to existing building(s) that is more than two times the area of the existing building(s) shall not comply with this section.

Q103.2.1 Compliance for building reuse. *Construction documents* shall clearly distinguish the square footage for existing and new elements. Documentation for building reuse shall include the information listed in items (a) through (e) below:
(a) Gross area of *existing building*(s) in square feet;
(b) Gross area of the aggregate addition(s) in square feet (if applicable);
(c) Gross area of the *alteration* and/or *substantial improvement* in square feet (if applicable);
(d) Existing total floor area and retained total floor area of the *primary structural frame* of the *existing building*(s) in square feet; and
(e) Existing total *exterior wall* and *fenestration* surface area and total retained *exterior wall* and *fenestration* surface area of the *existing building*(s) in square feet, as well as areas excluded from the calculations per Q103.2.

Q103.3 Product compliance pathway. The *global warming potential* of the total mass or volume of the covered products used in the project that are listed in Section Q103.3.1 shall total no more than 90 percent of the sum of the applicable values from Table Q103.3.1, for the same total mass or volume of the covered products. This calculation shall include project-specific product quantities and *product-specific EPDs,* be averaged across the entire project based on mass or volume, and be submitted on a form provided by the State Building Code Council.

Q103.3.1 Covered products. Covered products shall include no less than 90 percent of the total combined mass or volume of all product(s) used in the building project that are included in Table Q103.3.1 below.

TABLE Q103.3.1 COVERED PRODUCT GWP VALUES

COVERED PRODUCT	GLOBAL WARMING POTENTIAL	UNIT OF MEASUREMENT

Ready mix concrete products	Up to 2,499 psi	235	kg CO_2e/m^3
	2,500-3,999 psi	261	kg CO_2e/m^3
	4,000-4,999 psi	316	kg CO_2e/m^3
	5,000-5,999 psi	386	kg CO_2e/m^3
	6,000-7,999 psi	408	kg CO_2e/m^3
	8,000 psi and greater	487	kg CO_2e/m^3
	Lightweight, up to 3,999 psi	518	kg CO_2e/m^3
	Lightweight, 4,000-4,999 psi	575	kg CO_2e/m^3
	Lightweight, 5,000 psi and greater	632	kg CO_2e/m^3
Concrete masonry unit products	Normal weight, up to 3,249 psi	208	kg CO_2e/m^3
	Normal weight, 3,250-4,499 psi	232	kg CO_2e/m^3
	Normal weight, 4,500 psi and greater	241	kg CO_2e/m^3
	Medium weight, up to 3,249 psi	360	kg CO_2e/m^3
	Medium weight, 3,250 psi and greater	244	kg CO_2e/m^3
	Lightweight, up to 3,249 psi	395	kg CO_2e/m^3
	Lightweight, 3,250 psi and greater	286	kg CO_2e/m^3
Reinforcing steel products	Rebar – unfabricated	753	kg CO_2e/metric ton
	Rebar – fabricated	854	kg CO_2e/metric ton
Structural steel products	Hot-rolled sections – unfabricated	1,000	kg CO_2e/metric ton
	Hot-rolled sections – fabricated	1,220	kg CO_2e/metric ton
	Hollow structural sections – unfabricated	1,710	kg CO_2e/metric ton
	Hollow structural sections – fabricated	1,990	kg CO_2e/metric ton
	Decking	2,320	kg CO_2e/metric ton
	Plate – unfabricated	1,480	kg CO_2e/metric ton
	Plate – fabricated	1,730	kg CO_2e/metric ton
Structural wood products	Laminated veneer lumber	361.45	kg CO_2e/m^3
	Laminated strand lumber	274.9	kg CO_2e/m^3
	Glue laminated timber	137.19	kg CO_2e/m^3
	Wood framing	63.12	kg CO_2e/m^3
	Softwood plywood	219.32	kg CO_2e/m^3
	Oriented Strand Board (OSB)	242.58	kg CO_2e/m^3
Insulation products	Expanded polystyrene (EPS)	2.67	1 m^2 @ RSI-1
	Polyiso - wall	4.19	1 m^2 @ RSI-1
	Polyiso – roof – GRF facer	2.20	1 m^2 @ RSI-1
	Polyiso – roof – CFG facer	3.04	1 m^2 @ RSI-1

	Extruded polystyrene (XPS)	41	1 m^2 @ RSI-1
	Heavy density mineral wool board	8.35	1 m^2 @ RSI-1
	Mineral wool blanket	3.33	1 m^2 @ RSI-1
	Closed-cell spray polyurethane foam – medium density	12.1	1 m^2 @ RSI-1
	Closed-cell spray polyurethane foam - roofing	15.5	1 m^2 @ RSI-1
	Closed-cell spray polyurethane foam - 2K-LP	19.7	1 m^2 @ RSI-1
	Open-cell spray polyurethane foam	1.6	1 m^2 @ RSI-1
	Loose-fill cellulose	0.487	1 m^2 @ RSI-1
	Loose-fill mineral wool	1.56	1 m^2 @ RSI-1

Q103.4 Whole building pathway. Provide a whole building life cycle assessment, complying with this section, and in accordance with ISO 14040 and ISO 14044, for the proposed building.

Q103.4.1 Reduction Requirement. The *global warming potential* of the proposed building shall be no more than 90 percent of 1,102 lbCO_2e/square feet (500 kgCO_2e/m^2) or 90 percent of the *global warming potential* of a functionally equivalent reference building, where calculated using a whole building life cycle assessment in compliance with Q103.4.2 through Q103.4.6 and performed in accordance with ISO 14040 and ISO 14044.

Q103.4.2 Reference building. The reference building shall represent the same size, geographic location, function, type of construction, building service life, and thermal performance as the proposed building. The product specifications and product quantities in the proposed building and the reference building may vary. The products represented in the reference building shall represent industry average *global warming potential* values. The same LCA tool(s) or software shall be used to complete the whole building life cycle assessment for both the reference and final building designs.

Q103.4.3 Software and data quality. Software used to conduct a whole building life cycle assessment shall conform to ISO 21931—1 and/or EN 15978 and shall have a data set compliant with ISO 14044 and ISO 21930 and/or EN 15804. The software shall utilize calculation methodology that is compliant with EN 15978, ISO 21931—1 and ISO 21929—1. Environmental impact data shall not be sourced from expired or retired data sources.

Q103.4.4 Life cycle stages. The whole building life cycle assessment shall be cradle-to-grave in scope, including all modules in life cycle stages A, B, and C, except for operating energy and water stages (B6 and B7).

Q103.4.5 Building elements. The whole building life cycle assessment shall include all of the following building elements: foundations; *exterior wall envelope; primary structural frame; secondary structural members; roof covering; roof deck; fenestration; load-bearing walls; non-load-bearing walls;* fireproofing; insulation; interior constructions and *interior finishes.* A whole building life cycle assessment submitted for an *addition, alteration,* or *substantial improvement* may exclude existing and/or remaining building components.

Q103.4.6 Reference study period. The reference study period shall be 60 years.

Section Q104

Verification and amended documentation of reduction of Embodied Carbon

Q104.1 Registered design professional. The *Registered Design Professional* shall provide signature verifying compliance with the requirements of Section Q103.2, Q103.3, or Q103.4.

Q104.2 Amended submittals for reduction of Embodied Carbon. *Embodied Carbon* documentation that is submitted per Section Q103.3 or Section Q103.4 shall be updated before the issuance of a certificate of occupancy based on EPD data from procured products.

Q105
Referenced Standards

Q105.1 General. See Table Q105.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix that reference the standard.

TABLE Q105.1 REFERENCED STANDARDS

Standard Acronym	Standard Name	Sections Herein Referenced
EN 15804—2022	*Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*	Q103.4.3
EN 15978—2011	*Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method*	Q103.4.3
ISO 14040—2006	*Environmental management – Life cycle assessment – Principles and framework*	Q103.4, Q103.4.1
ISO 14044—2006	*Environmental management – Life cycle assessment – Requirements and guidelines*	Q103.4, Q103.4.1, Q103.4.2
ISO 21929-1—2011	*Sustainability in building construction – Sustainability indicators – Part 1: Framework for the development of indicators and a core set of indicators for buildings*	Q103.4.3
ISO 21930—2017	*Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services*	Q103.4.3
ISO 21931-1—2022	*Sustainability in buildings and civil engineering works – Framework for methods of assessment of environmental, social and economic performance of construction works as a basis for sustainability assessment – Part 1: Buildings*	Q103.4.3

Sample SBCC Form for Section Q103.3 Product Compliance Pathway

COVERED PRODUCT		INDUSTRY-AVERAGE GWP	UNIT	PROJECT-SPECIFIC VOLUME OR MASS	GWP PER PRODUCT-SPECIFIC EPD	REDUCTION, BY VOLUME OR MASS
Ready mix concrete products	Up to 2,499 psi	235	kg CO_2e/m^3			
	2,500-3,999 psi	261	kg CO_2e/m^3			
	4,000-4,999 psi	316	kg CO_2e/m^3			
	5,000-5,999 psi	386	kg CO_2e/m^3			
	6,000-7,999 psi	408	kg CO_2e/m^3			
	8,000 psi and greater	487	kg CO_2e/m^3			
	Lightweight, up to 3,999 psi	518	kg CO_2e/m^3			
	Lightweight, 4,000-4,999 psi	575	kg CO_2e/m^3			
	Lightweight, 5,000 psi and greater	632	kg CO_2e/m^3			
Concrete masonry unit products	Normal weight, up to 3,249 psi	208	kg CO_2e/m^3			
	Normal weight, 3,250-4,499 psi	232	kg CO_2e/m^3			
	Normal weight, 4,500 psi and greater	241	kg CO_2e/m^3			
	Medium weight, up to 3,249 psi	360	kg CO_2e/m^3			
	Medium weight, 3,250 psi and greater	244	kg CO_2e/m^3			
	Lightweight, up to 3,249 psi	395	kg CO_2e/m^3			
	Lightweight, 3,250 psi and greater	286	kg CO_2e/m^3			
Reinforcing steel products	Rebar – unfabricated	753	kg CO_2e/metric ton			
	Rebar – fabricated	854	kg CO_2e/metric ton			
Structural steel products	Hot-rolled sections – unfabricated	1,000	kg CO_2e/metric ton			
	Hot-rolled sections – fabricated	1,220	kg CO_2e/metric ton			
	Hollow structural sections – unfabricated	1,710	kg CO_2e/metric ton			
	Hollow structural sections – fabricated	1,990	kg CO_2e/metric ton			
	Decking	2,320	kg CO_2e/metric ton			
	Plate – unfabricated	1,480	kg CO_2e/metric ton			
	Plate – fabricated	1,730	kg CO_2e/metric ton			

Structural wood products	Laminated veneer lumber	361.45	kg CO_2e/m^3			
	Laminated strand lumber	274.9	kg CO_2e/m^3			
	Glue laminated timber	137.19	kg CO_2e/m^3			
	Wood framing	63.12	kg CO_2e/m^3			
	Softwood plywood	219.32	kg CO_2e/m^3			
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	Polyiso - wall	4.19	1 m^2 @ RSI-1			
	Polyiso – roof – GRF facer	2.20	1 m^2 @ RSI-1			
	Polyiso – roof – CFG facer	3.04	1 m^2 @ RSI-1			
	Extruded polystyrene (XPS)	41	1 m^2 @ RSI-1			
	Heavy density mineral wool board	8.35	1 m^2 @ RSI-1			
	Mineral wool blanket	3.33	1 m^2 @ RSI-1			
	Fiberglass blanket	N/A	1 m^2 @ RSI-1			
	Closed-cell spray polyurethane foam – medium density	12.1	1 m^2 @ RSI-1			
	Closed-cell spray polyurethane foam - roofing	15.5	1 m^2 @ RSI-1			
	Closed-cell spray polyurethane foam - 2K-LP	19.7	1 m^2 @ RSI-1			
	Open-cell spray polyurethane foam	1.6	1 m^2 @ RSI-1			
	Loose-fill cellulose	0.487	1 m^2 @ RSI-1			
	Loose-fill mineral wool	1.56	1 m^2 @ RSI-1			
	Loose-fill fiberglass	N/A	1 m^2 @ RSI-1			
Total						

5. Briefly explain your proposed amendment, including the purpose, benefits and problems addressed.

Summary of Requirements and Purpose

This proposal adds a new appendix that, when adopted by a jurisdiction, would require construction document submittals to include reporting on the embodied carbon emissions associated with proposed projects over 100,000 square feet. Project teams adhering to this appendix must choose one form of documentation from the following three options:

(1) submit proof of reuse of at least 45% of an existing building's structure and enclosure;
(2) submit product-specific environmental product declarations (EPDs) for covered products that indicate a 10% reduction in global warming potential (GWP) compared to the industry average;
(3) submit a whole building life cycle assessment (WBLCA) for the building that indicates a 10% reduction in global warming potential (GWP) compared to industry average.

This code change proposal would support Washington's goal to reduce its greenhouse gas (GHG) emissions by 95% by 2050. In its 2021 State Energy Strategy, the Washington State Department of Commerce identified the reduction of embodied carbon in the built environment as a key strategy for reaching the state's 2050 goal. The state's recent House Bill (HB) 1282 took a major step toward addressing this need by establishing a buy clean and buy fair policy that requires reporting on the embodied carbon of concrete, steel, and wood used in projects over 100,000 square feet beginning in 2025. At present, there are no code provisions that point project teams to the requirements of HB 1282 nor that provide direction on how to meet those requirements. This code change incorporates a reference to HB 1282 (RCW 39.116) in chapter 1. The appendix provides more guidance on the methodologies, requirements, and determination of compliance for projects required to meet HB 1282, as well as others aiming to report and reduce their embodied carbon.

This proposal builds on the strong foundation and clear direction that Washington state has set for reducing the embodied carbon associated with building materials. The state's buy clean strategies – intended to increase demand for low embodied carbon products, spur EPD development, and build market awareness of GWP reporting methods – are, however, incomplete without these building code provisions. A code-based approach has the unique ability to directly influence the design and construction practices demonstrated by building projects across the state.

Problem and Opportunity

Building operations and building construction are responsible for 39% of today's annual global greenhouse gas (GHG) emissions.[1] About 11% of these emissions are embodied carbon emissions – the emissions associated with the creation of building materials and construction activities. The largest contributors tend to be found in buildings' structures and envelopes, which typically include materials such as concrete, steel, and wood.

The need to confront and reduce embodied carbon is urgent. The IPCC reports that limiting warming to the target set by the Paris Agreement – and avoiding the worst-case impacts of the climate crisis – is contingent on GHG emissions peaking by 2025 at the latest and reducing them by 43% by 2030.

Historically, policies that have targeted the reduction of the built environment's climate impact have focused on the operations associated with buildings' uses: the amount of pollution generated by fuel consumption from mechanical systems used to heat, cool, or light a building. While this focus has been critical, it has not accounted for the full scope of buildings' climate impacts. Additionally, as clean energy policy and efficiency standards and practices ratchet down operational carbon emissions, embodied carbon will continue to become a larger share of buildings' carbon footprint.

Doing justice to the urgency presented by climate change requires a focus on the embodied emissions associated with the early phases of buildings' construction and materials. Unlike operational emissions, which can be improved over the lifespan of a building through deep-energy retrofits and decarbonizing the electric grid, embodied carbon emissions occur before a building is occupied and cannot be reduced over time. A joint University of Washington and University of California, Berkeley study found that, on average, 80% of a building's embodied carbon impacts over its lifetime takes place in the phases leading up to a building's completion before occupancy. Therefore, addressing embodied carbon in the construction of buildings presents an urgent and valuable opportunity to reduce carbon emissions in Washington. Code-based policies thus hold critical potential to address this bulk of emissions, as they impact decisions made early during the design process, which directly and most substantially influence early production and construction activities. Prioritizing these immediate emissions will help to stop the accumulation of GHGs in the atmosphere, improving the likelihood that the world – and Washington – will reach their GHG peaks sooner.

Finally, this code proposal holds the potential to safeguard the public from the hazards associated with the creation of building materials. The International Building Code (IBC) has been in place and used by the design and construction industry to ensure that materials in the built environment preserve public health, safety and welfare. This proposal looks to expand the impact of the IBC to further safeguard the public from the hazards associated with the creation of building materials. This entails reducing emissions in the extraction, manufacturing, and transportation of these products, which can improve air quality and public health in communities located near industrial centers and manufacturing facilities.

Methodology and Reasoning

The materials and building elements that fall within the scope of this proposal were chosen because they are accountable for significant GHG emissions throughout their production phases – at the building level, this means the structure and enclosure; at the material level, this means concrete, steel, and wood.

Three compliance pathways were included to provide project teams the flexibility to choose an option that is most suitable and accessible for its unique circumstances. These pathways are also based in precedent, drawing from California's statewide building code, CALGreen, the latest version of which is now in effect.

Pathway Option 1: Building reuse is incentivized by exempting reuse projects from the reduction and reporting requirements of the other pathways. The aim of including this pathway is to amplify the significant role that building reuse can play in lowering the state's embodied carbon associated with its construction activities. A 2011 study by Preservation Green Lab, Skanska, Green Building Services, and others found that reuse of a variety of building types could realize between 4 and 46 percent embodied carbon savings compared to new construction operating at an equivalent energy performance level.[1] Moreover, it can take between 10 and 80 years for new buildings designed with energy efficiency features to overcome the environmental impacts associated with the construction process. Scaling the practice of reuse across a state's building stock can realize significant reductions.

Pathway Options 2 and 3: The reduction requirements proposed for the next two pathways – both set at 10% below industry average – are also based in precedent and widely regarded as an easily achievable value for most projects. This requirement would encourage the highest-emitting designs, materials and manufacturers to reduce the carbon content of their systems and materials to be more competitive in the market.

[1] Patrice Frey, Liz Dunn, and Ric Cochran, "The Greenest Building: Quantifying the Environmental Value of Building Reuse" (National Trust for Historic Preservation Green Lab, 2022), https://living-future.org/wp-content/uploads/2022/05/The_Greenest_Building.pdf.

Pathway Option 2: The second pathway option in the proposal takes a materials-based approach, requiring EPD submission and reduction of GWP across 90% of covered materials by 10% compared to industry average values. The industry average values provided in the table are drawn from the Carbon Leadership Forum's 2023 material baselines. Limits have similarly been passed in other jurisdictions including California; New York State; Toronto; Marin, CA; Santa Monica, CA; and the Denver Green Code. The U.S. General Services Administration (GSA) has also made strides in setting materials-based GWP limits for concrete and cement; asphalt; steel; and glass. The state of Washington has also begun to chart its own course by requiring reporting for certain materials through the Buy Clean and Buy Fair Act.

Pathway Option 3: The third pathway option takes a building-level approach, requiring the submission of a whole building life cycle assessment that indicates a 10% reduction compared to a reference building based on industry average values. Other jurisdictions that have adopted this building-level approach include California, Minnesota, Toronto, and Vancouver. The 10% reduction required in the whole building life cycle assessment pathway falls within range of these precedents and others, including LEED v4.1, ASHRAE 189.1, and San Francisco's Municipal Green Building Requirements.

Determination of Compliance

The proposed appendix is intended to give guidance on methodologies for projects required to meet HB 1282. The proposed appendix also aims to provide a clear and simple path for code officials to determine compliance at two points along the project timeline: at the initial submission of construction documents and at the subsequent submission of amended construction documents. The role of the code official is to check for the submission of required documentation, confirm that requirements were met, and verify that the registered design professional has signed off on meeting these provisions. These efforts that fall on the design professional as well as the code official are anticipated to require minimal effort.

Chapter 1 of the building code, focusing on Scope and Application as well as Administration and Enforcement, addresses the process with which a project must comply when applying for a permit. Section 107 on Construction Documents includes a description of the submittal documents, where a reference to embodied documentation reporting can seamlessly fit. The language provided above includes an addition to Section 107 that points projects required to meet HB 1282 to the legislation and makes clear that the new proposed appendix is available for further guidance and methodology on how to meet Buy Clean.

6. Specify what criteria this proposal meets.

- ☐ The amendment is needed to address a critical life/safety need.
- ☐ The amendment clarifies the intent or application of the code.
- ☒ The amendment is needed to address a specific state policy or statute.
- ☐ The amendment is needed for consistency with state or federal regulations.
- ☐ The amendment is needed to address a unique character of the state.
- ☐ The amendment corrects errors and omissions.

7. Is there an economic impact: ☐ Yes ☒ **No**

If no, state reason:

The legislature has mandated through HB 1282 that the embodied carbon associated with building materials be addressed; this code proposal carries out that mandate. Therefore, any responsibility to provide a robust measure of economic impact would reside with the legislature.

However, it is anticipated that the economic impact of this proposal will be insignificant.

Costs to Design Teams

A project's embodied carbon can be significantly reduced at little to no additional up-front cost.

Case studies in the Pacific Northwest have shown an embodied carbon savings potential of 19%–46% at cost premiums of less than 1%.[2] These reductions are achievable simply by specifying and substituting material alternatives with lower embodied carbon during the design and specification process. Reductions that go well beyond 50% are possible when an early, whole-building design view is considered.

These cases demonstrate that there are products and solutions available today that can realize embodied carbon reductions with low to no financial burden. In the future, these costs are only anticipated to decrease, and ultimately result in additional cost savings, as the production of low embodied carbon materials, the practice of conducting a whole building life cycle assessment, and pursuing building reuse scale up and the cost of low embodied carbon materials goes down as a result of increased practice and demand.

Costs of Code Enforcement

A study published for CALGreen's 2022 embodied carbon requirements, which includes similar reuse, materials-based, and building-level pathway requirements as this proposal, determined that there was a minor increase of costs to local governments to review and check plans for compliance with one of the three pathways.[3] There is no major fiscal impact on local governments to enforce the regulation: local governments would only need to verify results provided by applicants, in a standardized manner, to ensure compliance with the proposed pathways.

Costs to Manufacturers and Suppliers

Material manufacturers can face costs associated with the production of EPDs. However, most of the products that fall within scope of this proposal are already covered by Washington's Buy Clean and Buy Fair Act. The few outstanding products that were added to this proposal were chosen due to the fact that there already exist sufficient EPDs on the market to determine an industry-wide GWP threshold.

For the most part, manufacturers and suppliers will not experience any additional burden due to the provisions of this proposal, because they are either already required to produce EPDs by state law or have already incurred the upfront costs of producing them. Smaller product manufacturers and suppliers that do not yet have EPDs may see a small financial impact from the development of EPDs for their products, but a study by Energy Transitions Commission showed that the company pass-through cost to individual projects to create the initial $5-30K EPD is negligible.[4]

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[2] Rebecca Esau, Matt Jungclaus, Victor Olgyay, and Audrey Rempher, "Reducing Embodied Carbon in Buildings: Low-Cost, High-Value Opportunities" (RMI, 2021), https://rmi.org/wp-content/uploads/dlm_uploads/2021/08/Embodied_Carbon_full_report.pdf

[3] "Economic and Fiscal Impact Statement (Form 399) Attachment C – CCRC regulations 45day" (California Department of General Services, 2022), https://www.dgs.ca.gov/-/media/Divisions/BSC/03-Rulemaking/2022-Intervening-Cycle/Public-Comments/GREEN-45-Day/BSC/BSC-04-22-399-PT11-Attachment-C-R1-45day.pdf?la=en&hash=E1121CBF2FEA6D07492DCD1E962D8AA1AFC43618

[4] Mission Possible: Reaching Net-Zero Carbon Emissions From Harder-to-Abate Sectors by Mid-Century, Energy Transitions Commission, 2018.