



West Coast Climate & Materials Management Forum

March 20, 2023

Built Environment: West Coast state updates and federal funding overview

Zoom Logistics and Technical Orientation

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- For closed captioning of today's discussion, please select the closed captioning icon at the bottom of your screen.
- All participants are in listen-only mode now. Please email gabby.vinyard@erg.com if you experience any technical difficulties with Zoom.
- Please add all feedback and any clarifying questions to the Q&A.
- Today's session will be recorded and shared at a later date.



West Coast Climate Forum Webinar Series Disclaimer

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This webinar is being provided as part of the West Coast Climate and Materials Management Forum Webinar Series. The Forum is a collaboration of state, local, and tribal governments. We invite guest speakers to share their views on climate change topics to get participants thinking and talking about new strategies for achieving our environmental goals. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Please note the opinions, ideas, or data presented by speakers in this series do not represent West Coast Climate and Materials Management Forum members policy or constitute endorsement by the forum.

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& Materials Management Forum

Today's Speakers

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Jean Prijatel
EPA Region 9
Acting Assistant Director



Jordan Palmeri
Carbon Leadership Forum



Webly Bowles
New Buildings Institute



Anish Tilak
RMI



West Coast Climate
& Materials Management Forum

Today's Speakers



Alison Kinn Bennett
EPA Office of Chemical
Safety and Pollution
Prevention



Amanda Ingmire
Oregon Department of
Environmental Quality



Kinley Deller
King County



Today's Agenda

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- Introduction
- Partner resources from CLF, NBI, RMI
- Federal funding opportunities
- WA, OR, CA state policy updates
- Questions & Answers



West Coast Climate & Materials Management Forum

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A collaboration of state, local, and tribal governments with the mission to:

- Develop ways to institutionalize sustainable materials management practices.
- Develop tools to help jurisdictions reduce the greenhouse gas emissions associated with materials



Check out the Forum's Resources

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- [Original Report Connecting Materials/Climate](#)
- [Research Summaries](#)
- [Turn-key Materials Management Presentation](#)
- [Climate Action Toolkit](#)
- [Climate-Friendly Purchasing Toolkit](#)
- [Food: Too Good to Waste Toolkit](#)
- [Webinar Series](#)

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Welcome!

Federal Center South, LEED Gold
https://www.gsa.gov/cdnstatic/GSA_FCS_Press_Book_email.pdf

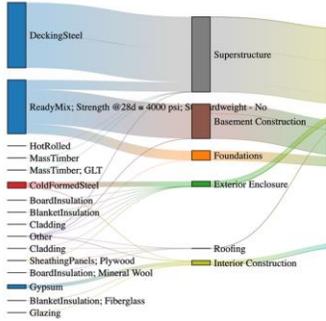


Carbon Leadership Forum

Founded 2010
College of Built Environments,
University of Washington

Mission

Our mission is to eliminate embodied carbon of buildings, materials, and infrastructure to create a just and thriving future.



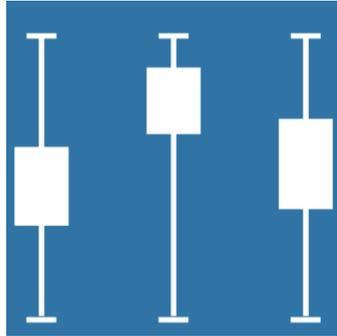
MATERIAL BASELINE PUBLICATIONS



LEADERSHIP IN STANDARDS COMMITTEES



GLOBAL CLF HUBS



WHOLE BUILDING BENCHMARKS



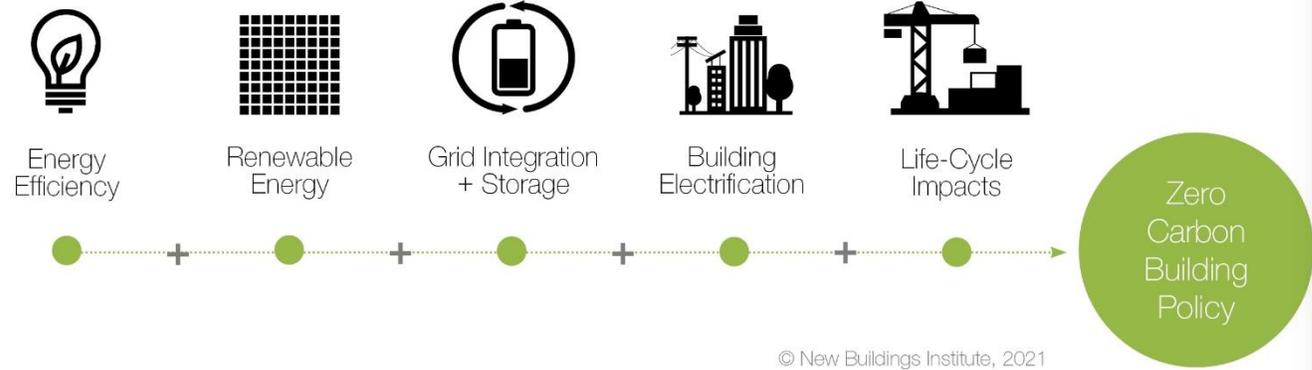
NOVEL MATERIAL RESEARCH



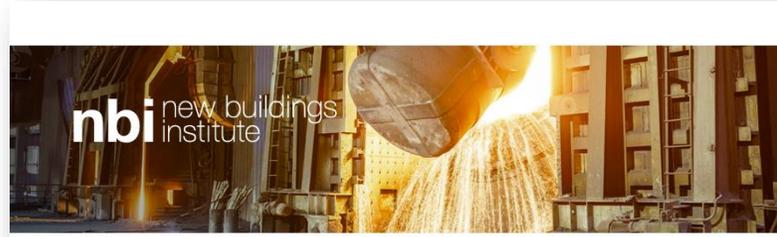
GUIDANCE FOR EFFECTIVE POLICY MAKING

New Buildings Institute: Lifecycle Impacts

The Five Foundations of Zero Carbon Building Policies



newbuildings.org/code_policy/embodied-carbon/



Addressing Embodied Carbon in Building Codes

Building codes have been one of the most influential tools to address climate change: The energy code addresses operational emissions and the building code address resiliency. The codes needs to address protecting the public by addressing embodied carbon. We aim to reduce national GHG emissions 50%.

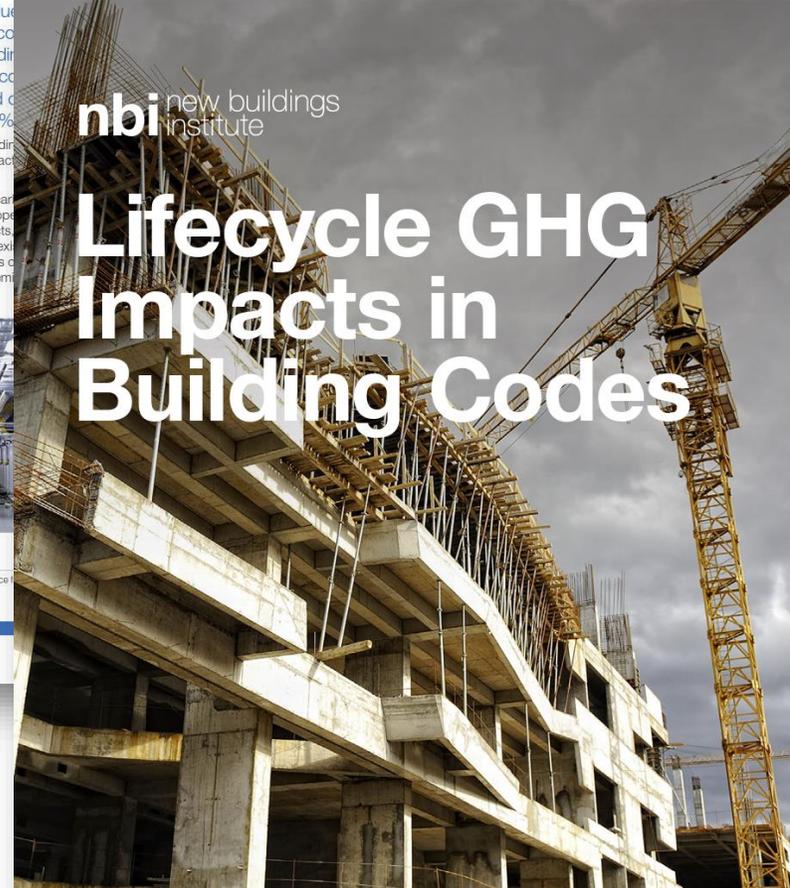
Worldwide, emissions associated with the most common building products and practices account for 15% of greenhouse gas (GHG) impact, the carbon dioxide (CO₂) impact of buildings.¹

Emissions from building products, also known as embodied carbon, become a larger part of a building's total carbon footprint as operational emissions decrease. To minimize the impacts of these products, policymakers are using all the tools available, including using existing structures to incorporate global warming potential (GWP) limits of common building products and those with the highest GHG emissions.



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

What is GWP?



RMI Embodied Carbon Initiative

Federal Policy

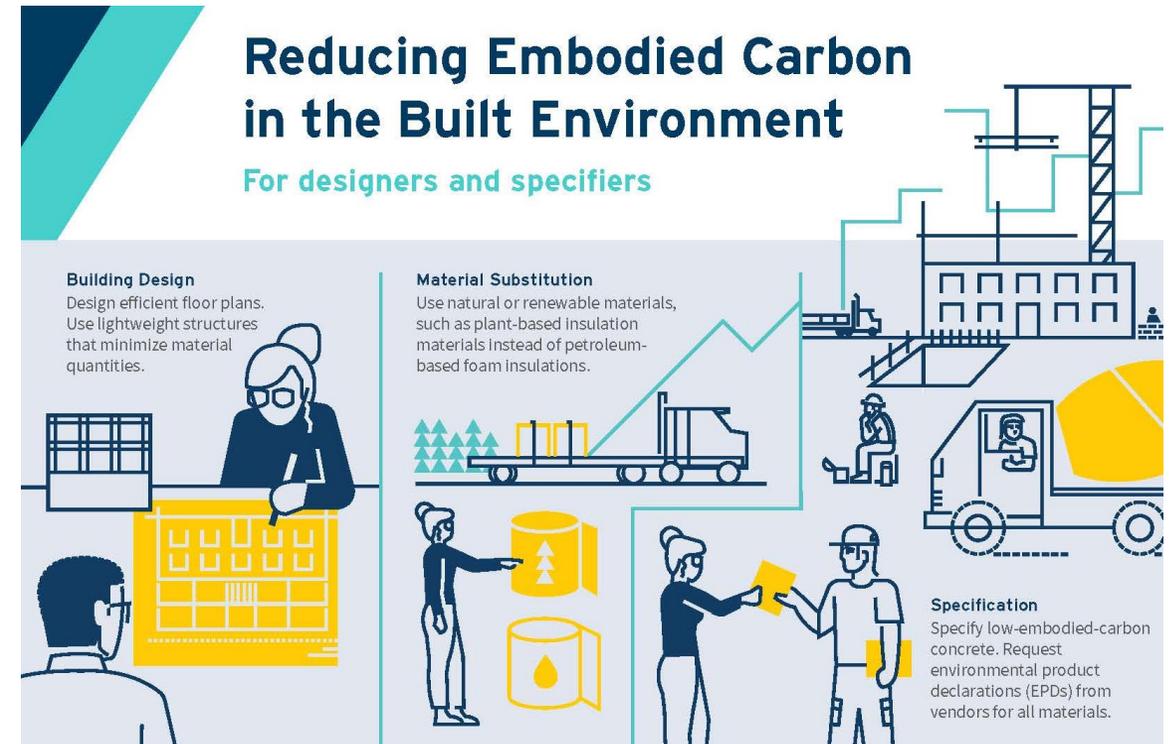
- [Roadmap to Zero Embodied Carbon](#)
- 2021 GSA Buy Clean Guidelines / 2022 IRA program engagement

State Policy

- Buy Clean Colorado policy development & implementation
- Technical advisory group for NYS low carbon concrete procurement
- Research for NY & MA on Buy Clean and low-carbon concrete bills
- Work on low-carbon concrete with State DOTs
- California green building code

Local Policy

- [2021/2022 Embodied Carbon in Climate Action Plans Workshops – Policy Toolkit!](#)
- [Policy brief on material circularity](#)



Getting to Substantially Lower Embodied Greenhouse Gas Emission Construction Materials

OCSP Inflation Reduction Act Implementation
March 2023



What is “Embodied Carbon”?

Lifecycle emissions of cement and concrete

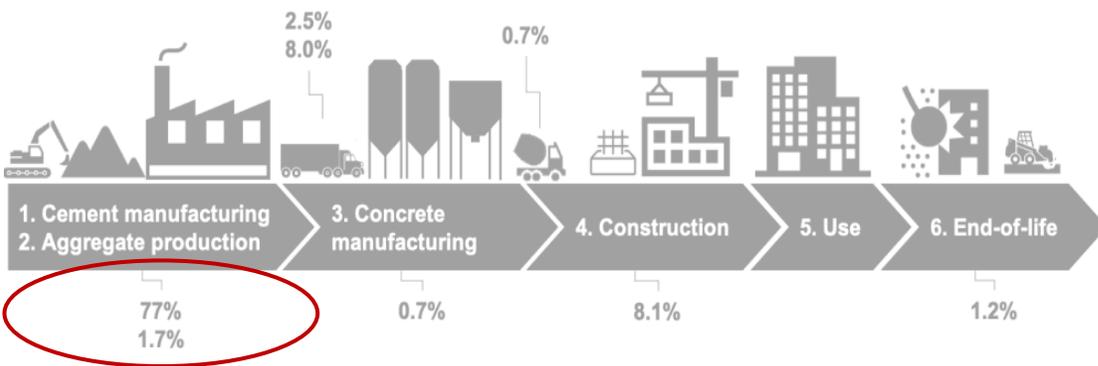


Figure 1. Lifecycle emissions of cement and concrete showing percent GHG emissions associated with the production of concrete. Cao & Masanet, 2021. Reprinted with permission of Eric Masanet.

- “Embodied carbon” refers to the amount of greenhouse gas (GHG) emissions associated with the extraction, production, transport, and manufacturing of material;
- Note that the Inflation Reduction Act also directs EPA to look at the use and disposal stages.
- Traditional manufacturing produces significant GHG emissions due to the energy-intensive processes used to extract raw materials like limestone, taconite ore, and silica and then converting those raw materials via industrial processes to produce an end product.
- Federal and local governments purchase almost 50% of the concrete poured in the U.S. each year – demand signals for “low embodied carbon” materials can drive changes through the entire supply chain.

Federal Buy Clean Initiative

Leverages Federal procurement and funding to catalyze markets for low-carbon construction materials to upgrade our transportation, buildings and energy infrastructure

- As the **world's largest buyer of goods and services**, the Federal government's supply chain emissions twice as large as emissions from Federal buildings and vehicles
- The **U.S. manufacturing sector** produces the materials that are critical to rebuilding and strengthening the nation's infrastructure but is responsible for nearly a **third of U.S. greenhouse emissions** from industrial processes
- Buy Clean Federal efforts aim to build upon and accelerate **existing Buy Clean efforts** led by local governments – especially Cities and States – with support from industry, labor and environmental groups
- A White House-led **Buy Clean Task Force** is coordinating interagency efforts to send the **first Federal demand signal** for lower embodied-carbon construction materials – **steel, cement/concrete, asphalt and glass** – that are made in America with union jobs

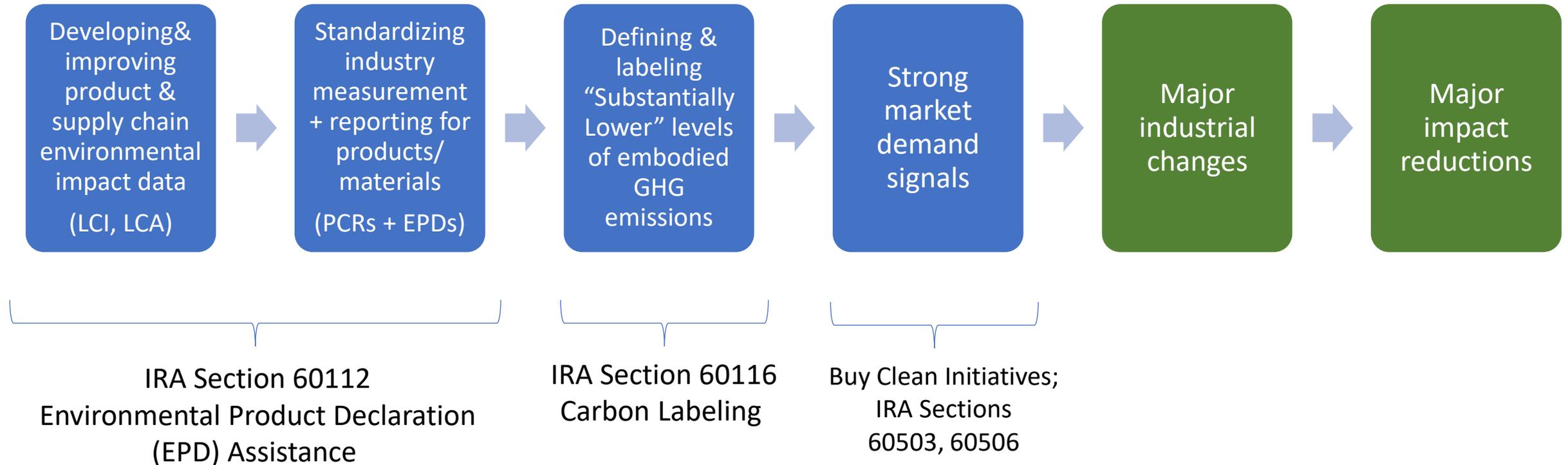


www.sustainability.gov/buyclean

IRA 2022 provides a major boost to lowering embodied carbon

Sec #	Agency	Funding	Purpose	Funds expiration
60503	GSA Federal Buildings Fund	\$2.15B	To acquire and install materials/products for use in the construction or alteration of buildings that have substantially lower levels of embodied GHG emissions (<i>as determined by EPA</i>)	9/30/26
60506	DOT FHWA	\$2B	To reimburse or provide incentives (up to 2% of incremental costs) to eligible recipients for the use of construction materials/products that have substantially lower levels of embodied GHG emissions (<i>as determined by EPA</i>)	9/30/26
60116	EPA	\$100M	For administrative costs to develop (<i>with GSA and DOT-FHWA</i>) a program to identify and label construction materials/products that have substantially lower levels of embodied GHG emissions, based on EPDs and determinations by State agencies, as verified by EPA.	9/30/26
60112	EPA	\$250M	Grants and technical assistance to businesses, states, tribes and nonprofit organizations to support the development, enhanced standardization and transparency, and reporting criteria for EPDs for construction materials/products that include measurements of the embodied GHG emissions across all life cycle stages	9/30/31
50161	DOE	\$5.812B	For financial assistance for advanced technology retrofits for US industrial or manufacturing facilities that produce iron, steel, steel mill products, aluminum, cement, concrete, glass, and other energy intensive industrial processes	
	DOE	\$10B	For the 48C tax credit to expand clean technology manufacturing	
30002	HUD	\$837.5M	For direct loans and grants to improve climate resilience of affordable housing, including low-emission building materials/processes	
70006	FEMA		May provide financial assistance for costs associated with low-carbon materials	

High-Level Theory of Change



Stakeholder Engagement on 60112 & 60116: January 19 announced *RFI* & *public webinars*

- **March 2: Material Prioritization & Data Improvement**

- Scope of materials/products after the initial focus on concrete/cement, steel, asphalt, flat glass, and salvage/reuse?
- How can EPA help improve background life cycle inventory data sets & Product Category Rules?
- How can EPA help the shift from industry average data toward actual product/facility level data in EPDs?

- **March 22: EPD Assistance**

- What TA do you most need now? In 2 years? In 5 years?
- How can EPA best reach small businesses and ensure equitable distribution of assistance?

- **April 19: Carbon Labeling**

- What approaches should EPA consider in setting thresholds and verifying products qualify as “substantially lower” GHG emissions?



For more information & to stay in touch...

- Please submit your comments by May 1st on the RFI questions to the open docket at <https://www.regulations.gov/docket/EPA-HQ-OPPT-2022-0924/document>
- EPA IRA Low Embodied Carbon website <https://www.epa.gov/inflation-reduction-act/inflation-reduction-act-programs-fight-climate-change-reducing-embodied>
- White House Council on Environmental Quality Federal Buy Clean Initiative <https://www.sustainability.gov/buyclean/>
- EPA Sustainable Marketplace <https://www.epa.gov/greenerproducts>
- Listserv sign-up <https://www.epa.gov/greenerproducts/forms/contact-us-about-greener-products-and-services>
- Email: embodiedcarbon@epa.gov





State Action Overview

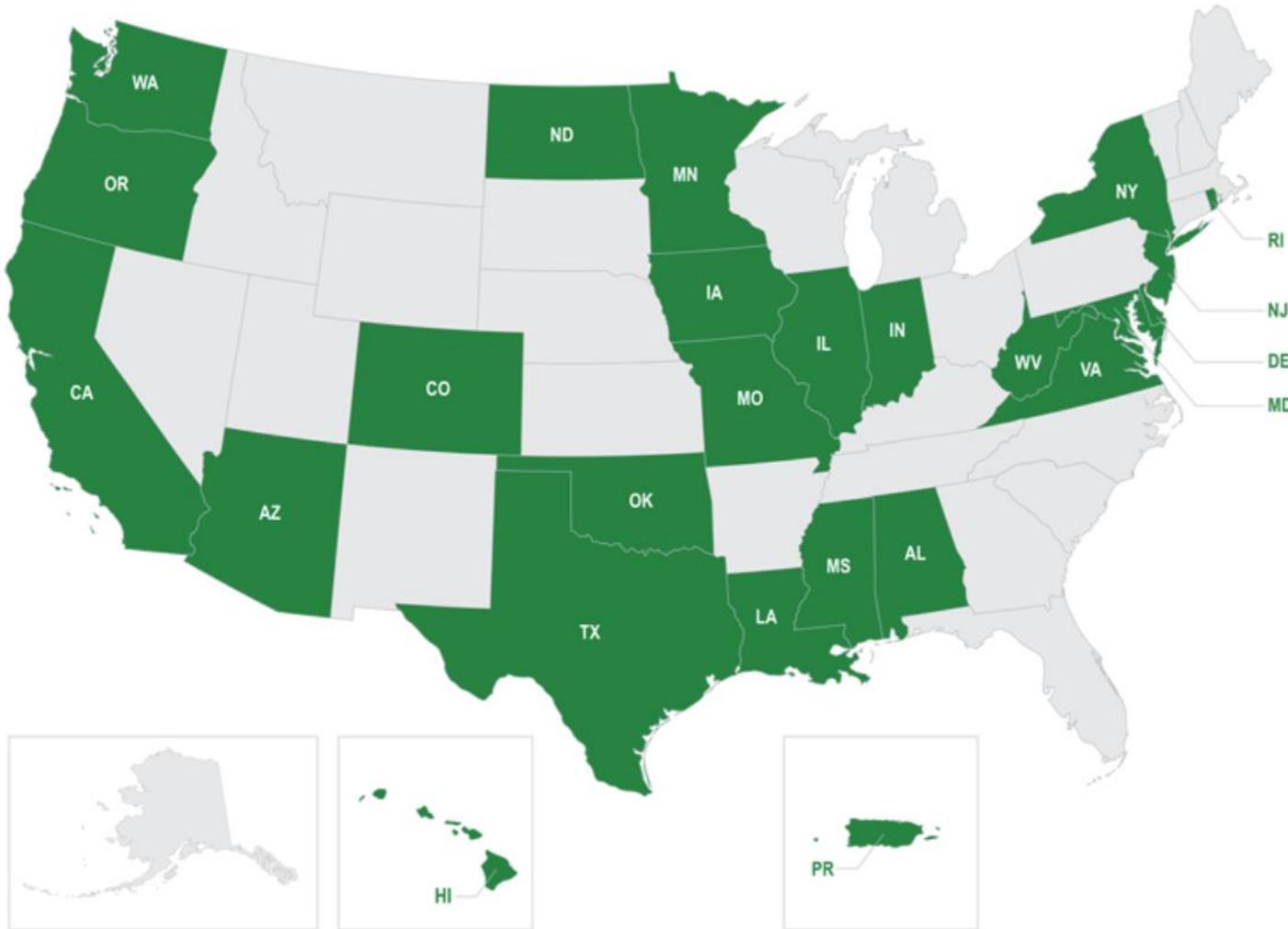
Jordan Palmeri, Senior Researcher

jordpa@uw.edu

Overview

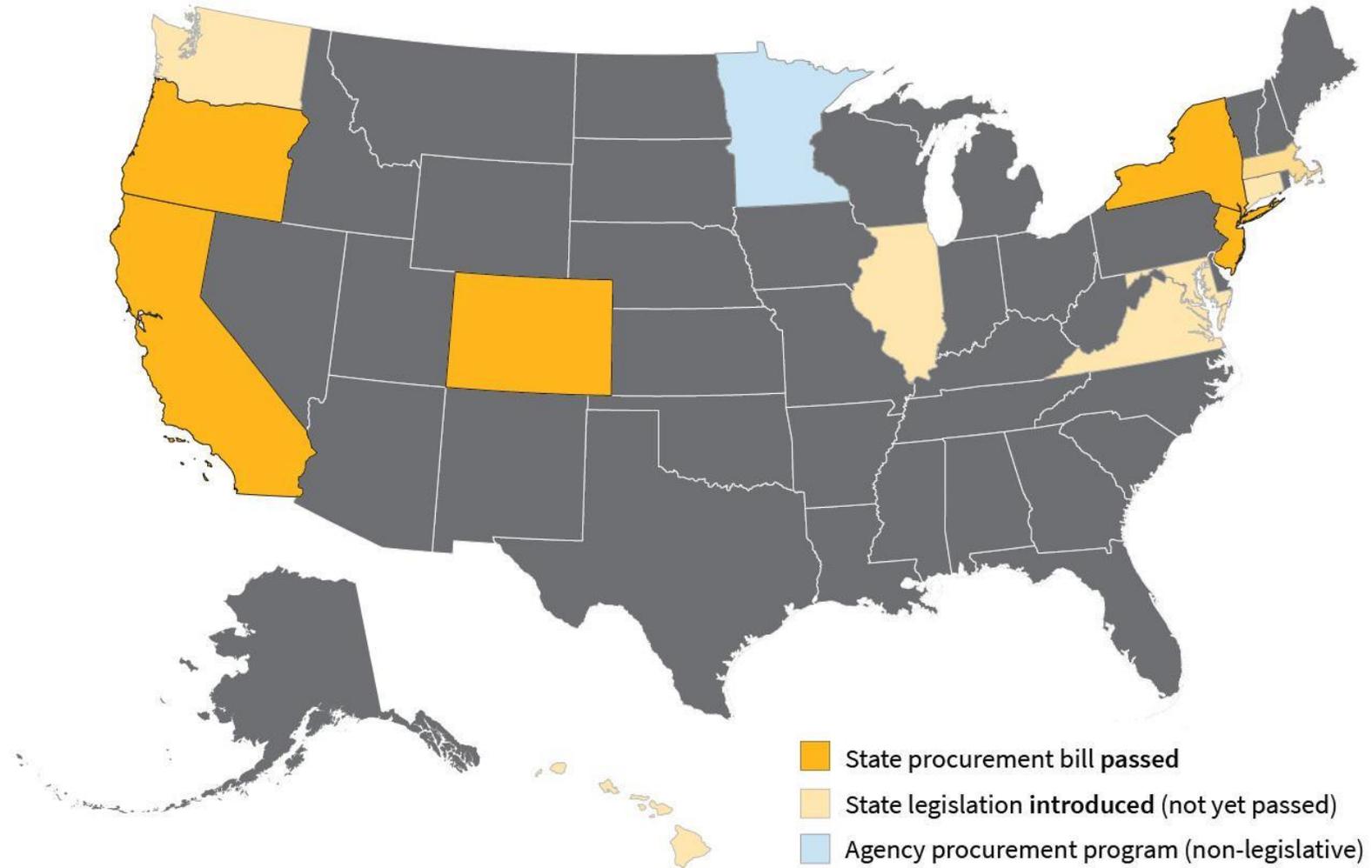
- FHWA Climate Challenge grants
- State-level embodied carbon action
- State-level roles and levers

FHWA Climate Challenge grants



Implement projects that quantify the environmental impacts of pavements using life cycle assessment (LCA) and environmental product declarations (EPDs).

State procurement policies focused on embodied carbon



Colorado

- **Buy Clean CO**
 - EPD + GWP requirements for:
 - steel, concrete, cement, glass, structural wood, asphalt
 - Scope - public projects over 500K
 - Buildings-
 - GWP limits by 2024
 - products sourced from over 100 miles required to report transport distance and mode
 - DOT
 - Collecting EPD already required
 - GWP limits by 2025
 - very active implementation role and impressive comments to all PCR committees on improvements to EPDs.



Minnesota

State Sustainable Building Standards

- applies to new or renovated buildings over 20,000
 - Must do:
 - WBLCA w/various reduction pathways
 - EPDs for at least 5 different materials

Key feature:

- *state procurement policy that did NOT require new legislation*



https://www.b3mn.org/guidelines/3-2/m_1/

New Jersey

Low Embodied Carbon Concrete Leadership Act (LECCLA) - signed Jan 2023

- incentive based policy - begins in 2024
- concrete GWP threshold will be established
- If a concrete company delivers below GWP threshold, company gets a tax credit up to 8% of the cost of the contract
- credit limited to \$1M/year/producer and no more than \$10M total/year statewide



Low Embodied Carbon Concrete Leadership Act (LECCLA)

- The office of general services shall establish guidelines requiring the procurement of low embodied carbon concrete on select projects
- Consider financial incentives
- Consider performance based specifications



Massachusetts

Active legislation:

- S. 2090
 - Embodied carbon advisory board. Study the issue and report back with best practices and recommended legislation/policy.
- H. 3035
 - EPDs + GWP limits on state procurement of steel, insulation, glass, concrete, asphalt, wood, **other materials by rule**
- S. 1982
 - Guidelines for low carbon concrete use requirements on defined projects. Advisory committee study other policy options.



Washington - active legislation

Buy Clean Buy Fair - HB 1282

- public buildings over 50,000 ft²
 - Disclosure only - no GWP limits
 - concrete, steel, engineered wood
 - EPD financial assistance
 - Publicly accessible database
 - Requires material quantity reporting
-
- Requests upstream supply chain specific data for processes contributing more than 70% to the GWP of a product
 - Some labor reporting
 - Requests HPDs
 - Requires workgroup to report on opportunities and barriers to advance EC reductions

Build Clean - SB 5391

- public buildings over 50,000 ft²
 - Disclosure only - no GWP limits
 - concrete, steel, engineered wood
 - EPD financial assistance
 - Publicly accessible database
 - Requires material quantity reporting
-
- Require WBLCA at schematic design
 - Requires embodied carbon intensity (kgCO₂e/m²) of aggregated eligible material quantities using IW EPDs at time of bid and again at project completion with product-specific EPDs.



King County

Department of
Natural Resources and Parks
Solid Waste Division

Waste
Prevention

Resource
Recovery

Waste
Disposal

Washington Codes

2021 C&D Codes Approved by the SBCC



Developed through the RCC



- Allowed lumber reuse w/o grade stamp
- Construction and demolition material (Appendix)
- Building Deconstruction (Appendix)

Appendices are preapproved for local adoption by ordinance

2018 Washington State Residential Code

1.R602.1.1 Sawn Lumber

Sawn lumber shall be identified by a grade mark of an accredited lumber grading or inspection agency and have design values certified by an accreditation body that complies with DOC PS 20. In lieu of a grade mark, a certification of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.

R602.1.1.1 Used Sawn Lumber

Used sawn lumber in good condition and devoid of areas of decay shall meet the requirements of Section 602.1.1 or shall comply with the following:

Dimensional lumber that has a nominal thickness of 2 inches (51 mm) with a nominal width of 6 inches (152 mm), or less, shall be assumed to be Spruce-pine-fir stud grade and shall have structural properties assigned in accordance with current adopted standards. All other dimensional lumber shall be assumed to be Hem-fir No. 2 grade and shall have structural properties assigned in accordance with current adopted standards.



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2021 WA State IBC

2302.1.1.3 Used solid-sawn lumber. Used solid-sawn lumber in good condition and devoid of areas of decay not meeting the requirements of Sections 2303.1.1, 2303.1.1.1 or 2303.1.1.2 shall comply with the following:

1. Dimensional lumber that has a nominal thickness of 2 inches with a nominal width of 6 inches, or less, shall be assumed to be spruce-pine-fir stud grade and shall have structural properties assigned in accordance with current adopted standards. All other dimensional lumber shall be assumed to be hem-fir No. 2 grade and shall have structural properties assigned in accordance with current adopted standards.

C&D Code Developed by the Regional Code Collaboration (RCC)



Regional Code Collaboration:
Jurisdictions across the Puget Sound Region working together to share resources and expertise in order to develop codes, policies, & tools supporting sustainable building practices that can be adopted/utilized locally



Code Consists of 3 Sections:

- XX.100 Reuse & Recycling of Building Materials
- XX.105 Exterior Structure Lead Removal
- XX.110 Deconstruction



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XX.100 Reuse & Recycling of Building Materials

Projects meeting the following shall comply with this section:

- All permitted building construction, alteration or demolition projects
- Project area > 750 SF or project value > \$75,000

Section requirements:

- Provide 2 bins on site
- At application submit:
 - *Deconstruction and salvage assessment*
 - *Certified Salvage Verifier*
 - Statement of compliance with either PSCAA or L&I regarding asbestos
- Prior to Certificate of Occupancy/permit final submit:
 - *Waste diversion report*
 - Receipts for how material was handled



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Solid Waste Division

4/8/2023

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XX.105 Exterior Structure Lead Removal

Projects meeting the following shall comply with this section:

- All existing structures built before 1978 permitted to be demolished
- Project area > 750 SF or project value > \$75,000

Section requirement:

- At application, submit an *Exterior Structure Lead Removal Plan form*
- Demonstrate how siding will be removed/disposed under the oversight of a an EPA Certified Renovator (RRP)

Unless.....

- Proof all exterior lead-coated or lead containing materials were already removed by a USEPA Certified Renovator; or
- Proof that the structure exterior materials do not contain lead



XX.110 Deconstruction

Projects meeting one of the following shall comply with this section:

- SF/D/TH structures built prior to 1940 permitted for “demolition”
- Designated as a historic structure

Section requirements:

- Structure must be deconstructed
- Work shall be performed by a *certified deconstruction contractor*
 - King County will manage a list of *certified deconstruction contractors*

Exemptions:

- Relocated structure
- Building structurally unsafe/hazardous
- *Certified salvage verifier* determines that 50% of the material (not concrete) is not suitable for reuse.



Department of
Natural Resources and Parks
Solid Waste Division





Construction and Demolition Material Appendix

- New construction, alterations, and demolition projects
 - 750 SF work area or \$75,000 construction value
- Prior to issuance: Submit Salvage Assessment (alts/demo only)
- Prior to Permit Final, submit a Waste Diversion Report

Building Deconstruction Appendix

- Applies to SF, D, TH buildings permitted to be demolished
- Buildings 90 years or older to be deconstructed in lieu of demolition



Thank You!



Kinley Deller
kinley.deller@kingcounty.gov

Oregon Updates

Embodied Carbon Policies and Programs

West Cost Climate and Materials Management Forum
20 Mar 2023



Buy Clean Oregon

- HB 4139 (2022)
- Requires Oregon Department of Transportation to establish a program for GHG emission reduction
 - Assess GHG emissions from concrete, asphalt paving, and steel
 - Conduct LCA of ODOT's construction and maintenance activities
 - Devise strategies for reducing GHG emissions
- ODOT shall establish a grant program to provide financial assistance in preparing EPDs



SB 869: Build Smart from the Start

- Currently being considered by the Oregon State Legislature
- Directs Building Codes Division to:
 - Accelerate reductions in GHG emissions
 - Work with DEQ to investigate opportunities to address GHG emissions through the building codes or other means



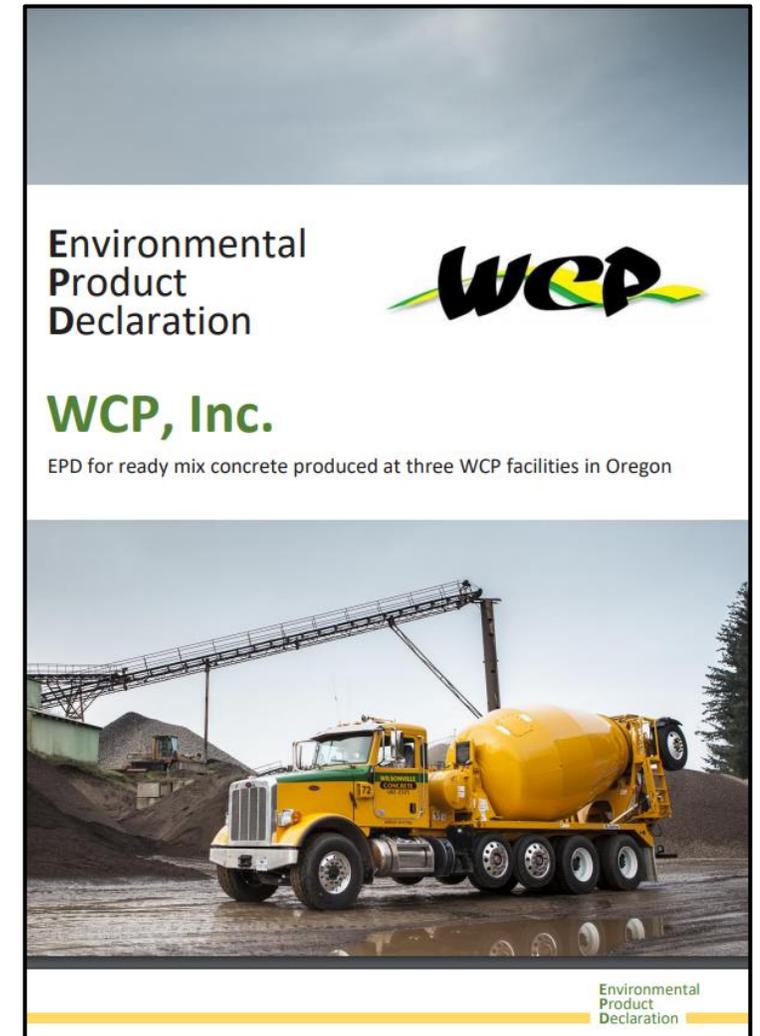
SB 871: Smart State Buildings

- Currently being considered by the Oregon State Legislature
- Retrofit and reduce GHG emissions for existing state buildings
- Develop an embodied carbon study that provides recommendations to the legislature on how embodied carbon can be reduced in state buildings
- Incorporate embodied carbon reductions into statewide sustainable building standards



Transparency Disclosure Incentive Program

- Oregon Concrete EPD Program (2017-2020)
 - 10 companies
 - 21 central batch plants
 - 4 mobile mix plants
 - Over 1500 EPDs produced
- Expanded program (beginning 2023)
 - Available to additional material manufacturers and other sectors of the industry
 - Incentivize additional disclosures that address other impacts such as health and equity



Amanda Ingmire
Architect & Senior Policy Analyst
Built Environment program, Materials Management
amanda.ingmire@deq.oregon.gov

<https://www.oregon.gov/deq/mm/production/Pages/Built-Environment.aspx>



Active California Embodied Carbon Policies

Marin County
Concrete Code

Buy Clean California

HFC Refrigerant
Regulations

AB 2446: Embodied
Carbon Emissions:
Construction
Materials

Table 19.07.050 Cement and Embodied Carbon Limit Pathways

	Cement limits for use with any compliance method 19.07.050.2 through 19.07.050.5	Embodied Carbon limits for use with any compliance method 19.07.050.2 through 19.07.050.5
Minimum specified compressive strength f_c , psi (1)	Maximum ordinary Portland cement content, lbs/yd ³ (2)	Maximum embodied carbon kg CO ₂ e/m ³ , per EPD
up to 2500	362	260
3000	410	289
4000	456	313
5000	503	338
6000	531	356
7000	594	394
7001 and higher	657	433
up to 3000 light weight	512	578
4000 light weight	571	626
5000 light weight	629	675
Notes		
(1) For concrete strengths between the stated values, use linear interpolation to determine cement and/or embodied carbon limits.		
(2) Portland cement of any type per ASTM C150.		

Active California Embodied Carbon Policies

Marin County
Concrete Code

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HFC Refrigerant
Regulations

AB 2446: Embodied
Carbon Emissions:
Construction
Materials

Table 1: GWP limits for eligible materials

Eligible material	Maximum acceptable GWP limit (unfabricated)*
Hot-rolled structural steel sections	1,010 kg CO ₂ eq. or 1.01E+03 kg CO ₂ eq. for one metric ton of structural steel.
Hollow structural sections	1,710 kg CO ₂ eq. or 1.71E+03 kg CO ₂ eq. for one metric ton of structural steel.
Steel plate	1,490 kg CO ₂ eq. or 1.49E+03 kg CO ₂ eq. for one metric ton of structural steel.
Concrete reinforcing steel	890 kg CO ₂ eq. or 8.90E+02 kg CO ₂ eq. for one metric ton of bar.
Flat glass	1,430 kg CO ₂ eq. or 1.43E+03 kg CO ₂ eq. for one metric ton of flat glass.
Light-density mineral wool board insulation	3.33 kg CO ₂ eq. for 1 m ² of mineral wool board insulation at RSI-1.
Heavy-density mineral wool board insulation	8.16 kg CO ₂ eq. for 1 m ² of mineral wool board insulation at RSI-1.

*GWP limit is based on a 100-year lifetime impact.

Buy Clean California

DGS leveraged current industrywide EPDs to determine the industry average and set the final limit above.

Active California Embodied Carbon Policies

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Regulations

AB 2446: Embodied
Carbon Emissions:
Construction
Materials

California Air Resources Board (CARB) was directed to issue rules to reduce HFC emissions 40% below 2013 levels by 2030. CARB adopted **EPA's Significant New Alternatives Policy (SNAP)** Rule 20, which prohibits higher GWP HFC-based refrigerants.

As of January 2022, CARB finalized their HFC regulations limiting GWP of refrigerants, including:

- Refrigerants used in most refrigeration equipment not to exceed 150 GWP by January 1, 2022
- AC manufacturers must use 10% reclaimed refrigerant annually for 2023 and 2024 through the **Refrigerant Recovery, Recycle, and Reuse (R4) Program** (See Page 4)
- Residential and light commercial stationary AC refrigerants not to exceed 750 GWP by January 1, 2025
 - » Excluding variable refrigerant flow (VRF) equipment which must convert in 2026, and small equipment in 2023

Active California Embodied Carbon Policies

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AB 2446: Embodied
Carbon Emissions:
Construction
Materials

CARB to develop a building product carbon reduction framework for measuring and reducing carbon intensity in Building Materials by July 1, 2027

- Dec 31, 2030 - Baseline to be reduced by 20%
- Dec 31, 2035 - Baseline to be reduced by 40%

CalGreen 2022 Proposal

	Description	Existing Voluntary	Mandatory 100,000 sf (Schools: 50,000 sf)	Tier 1 100,000 sf (Schools: 50,000 sf)	Tier 2 100,000 sf (Schools: 50,000 sf)
Option 1	Building Reuse	75% of the structure and enclosed to be reused	45% of the structure and enclosed to be reused	75% of the structure and enclosed to be reused	75% of the structure and enclosed to be reused AND 30% of interior non-structural elements to be reused
Option 2	WBLCA	10% reduction from baseline	10% reduction from baseline	15% reduction from baseline	20% reduction from baseline
Option 3	Prescriptive Approach	N/A	175% of IW-EPD GWP Limits (weighted average available for concrete)	150% of IW-EPD GWP Limits (weighted average available for concrete)	IW-EPD GWP Limits (weighted average available for concrete)

Non-California EC Codes

ASHRAE 189.1 (addendum ak) (Green Code)

- GWP limit set at 125% IW-EPD.
 - Enough products to equal 15% or 20% (JO) of material costs.
 - 20 products from 10 companies;
 - Products that cost 5%+ of the estimated material costs;
- Exceptions for assemblies.

GWP Limits

- Portland Low Carbon Concrete Initiative
- Marin County (Concrete)
- Denver Green Code (concrete & steel)
- NY (& NJ) Low Embodied Carbon Concrete Leadership Act (LECCLA)
- U.S. GSA Low Embodied Carbon Concrete and Environmentally Preferable Asphalt Standards

- *Other jurisdictions that have considered GWP limits in code: California (CalGreen), Oregon (residential), Washington (commercial), and Seattle (commercial), Denver (commercial)*

Whole Building Lifecycle Analysis

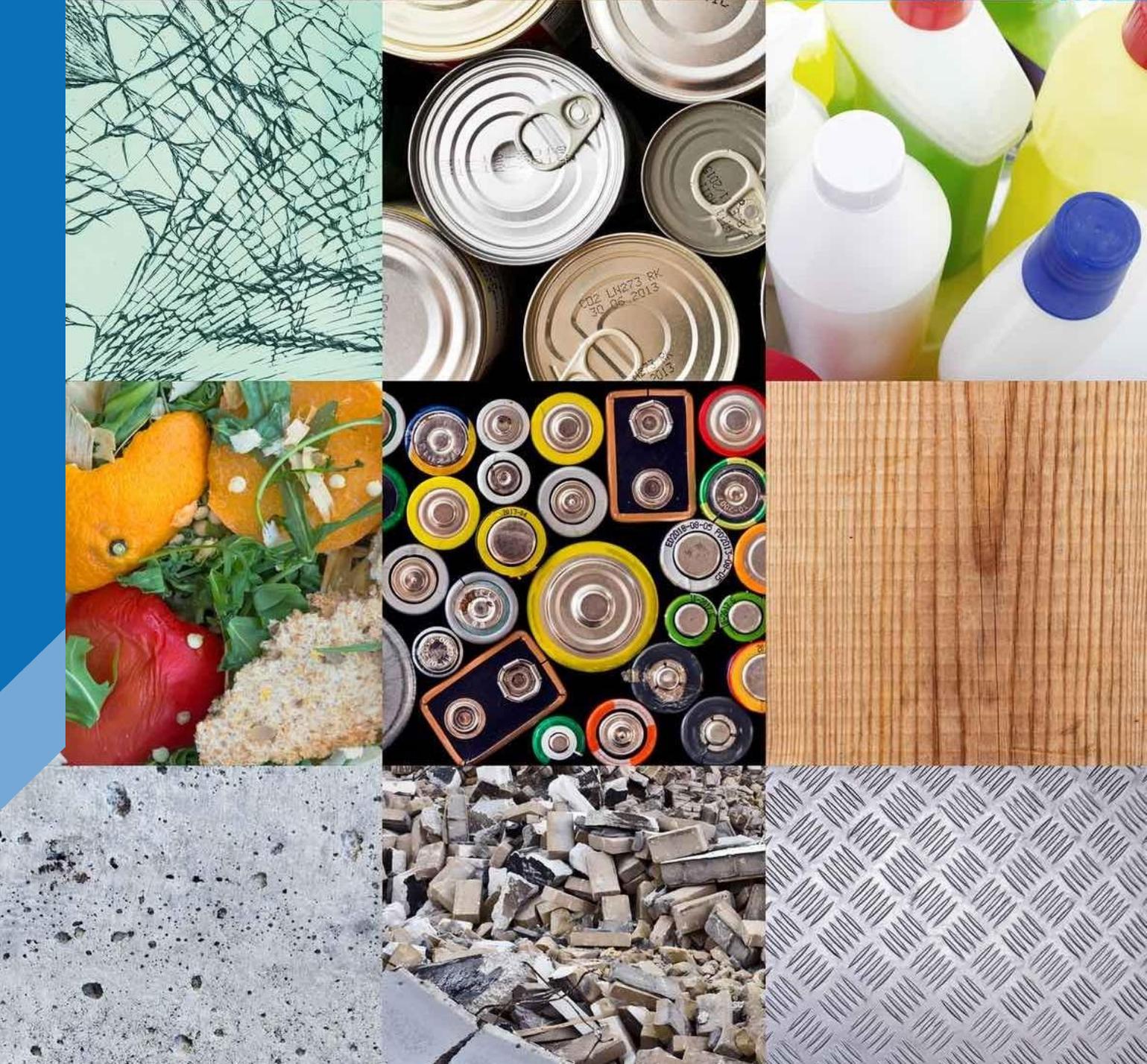
- Vancouver Green Buildings Policy for Rezoning
 - 2023: kg CO₂e/m² limit set at 2x the baseline
 - 2025: 10% kg CO₂e/m² reduction

Thank you!

Webly Bowles, AIA

Senior Project Manager

Webly@newbuildings.org



Coming Up

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The Forum anticipates holding additional sessions on embodied carbon:

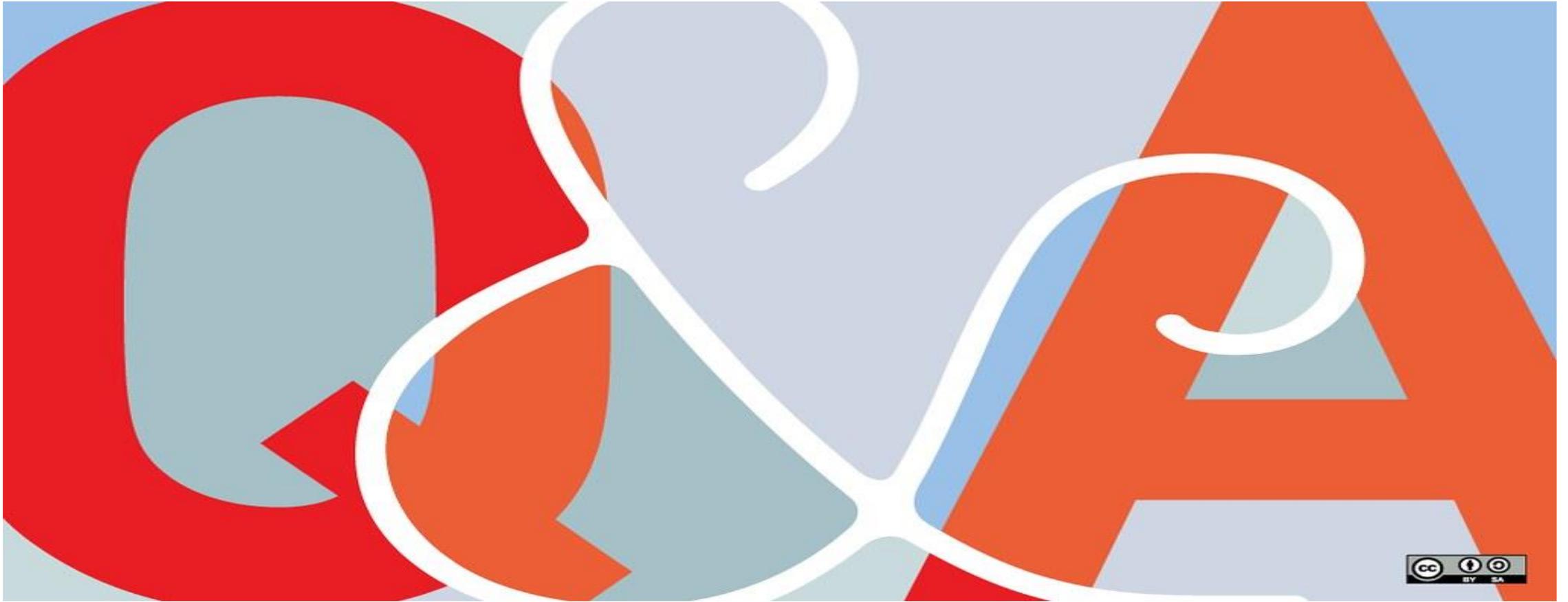
May: Local action examples and resources

June/July: Federal funding opportunities and implications for local governments

September: Pacific Coast Collaborative update



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THANK YOU!

For more information, visit www.westcoastclimateforum.com

