Carbon Leadership Forum

The Rapidly Evolving Policy Landscape for Embodied Carbon

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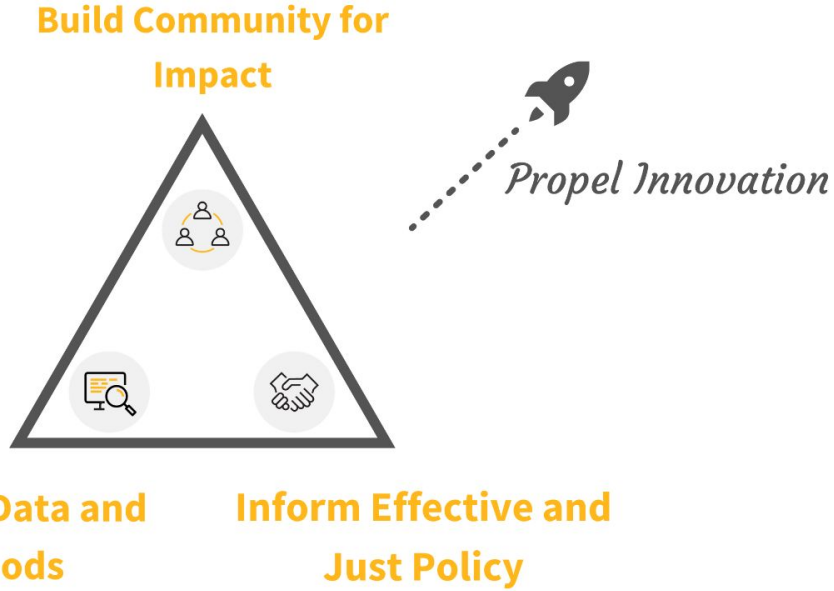
Building for a Better Planet

We accelerate the transformation of the building sector to radically reduce the embodied carbon emissions associated with building materials and construction.

The CLF Theory of Change



Network Overview

Communication and knowledge building platform

~6,500 members from industry, nonprofits, governments, academia

Common mission to accelerating the transformation of the building sector to radically decarbonize buildings and building materials through collective action

Overview

This Presentation

1. Why Embodied Carbon?
2. Overview of Types of Policies
3. Growing Policy Landscape
    a. Buy Clean
        i. State
        ii. Federal
    b. Building Codes + ByLaws
    c. Zoning + Permitting
    d. Deconstruction + Reuse
4. Role of Structural Engineers
5. Policy Outlook for 2023

Learn more: EC Educational Series

Six-part series with short videos and additional resources

1. Introduction to the Embodied Carbon Policy Landscape
2. Climate Action Plans
3. Procurement Policy
4. Building Codes
5. City Zoning and Incentive Programs
6. Reuse and Deconstruction

https://carbonleadershipforum.org/embodied-carbon-policy-educational-series/

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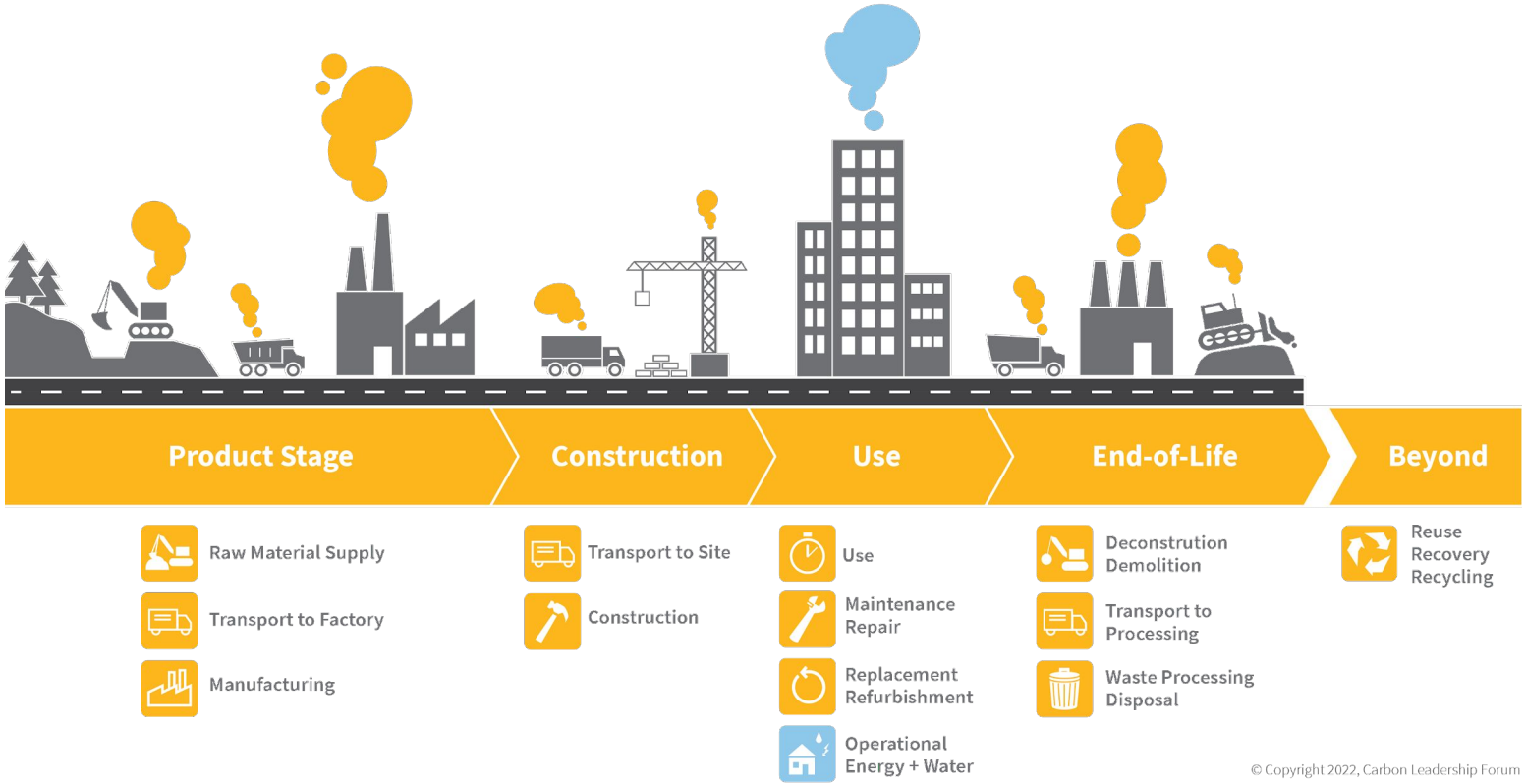
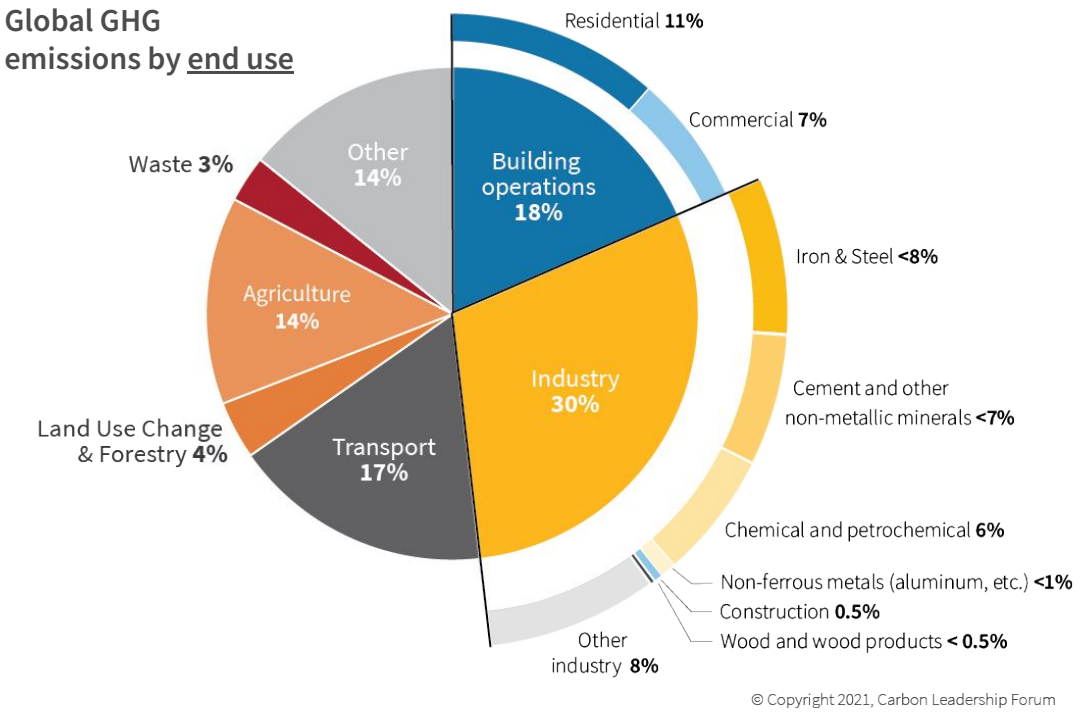
Why Embodied Carbon?

What is embodied carbon?



Industrial sector is the largest and challenging to abate



Data sources: WRI Climate Watch (2016); IEA World Energy Balances (2019).

Design and Procurement

Structural engineers are critical players in reducing embodied carbon during design and procurement.

Why design & procurement?

- **Broadens the solution space**
- **Avoid the carbon loophole** (emissions outsourcing) by addressing global supply chains
- **Create market demand** for low carbon products and designs

Reducing embodied carbon is urgent

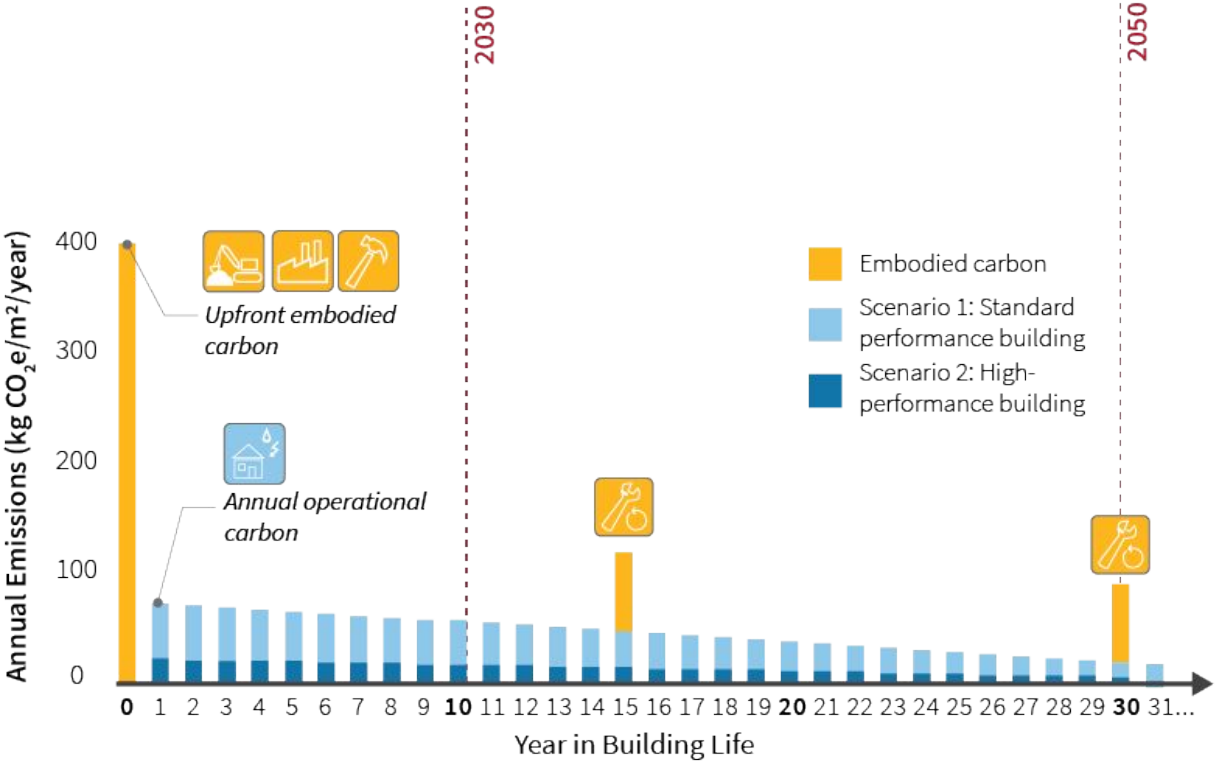
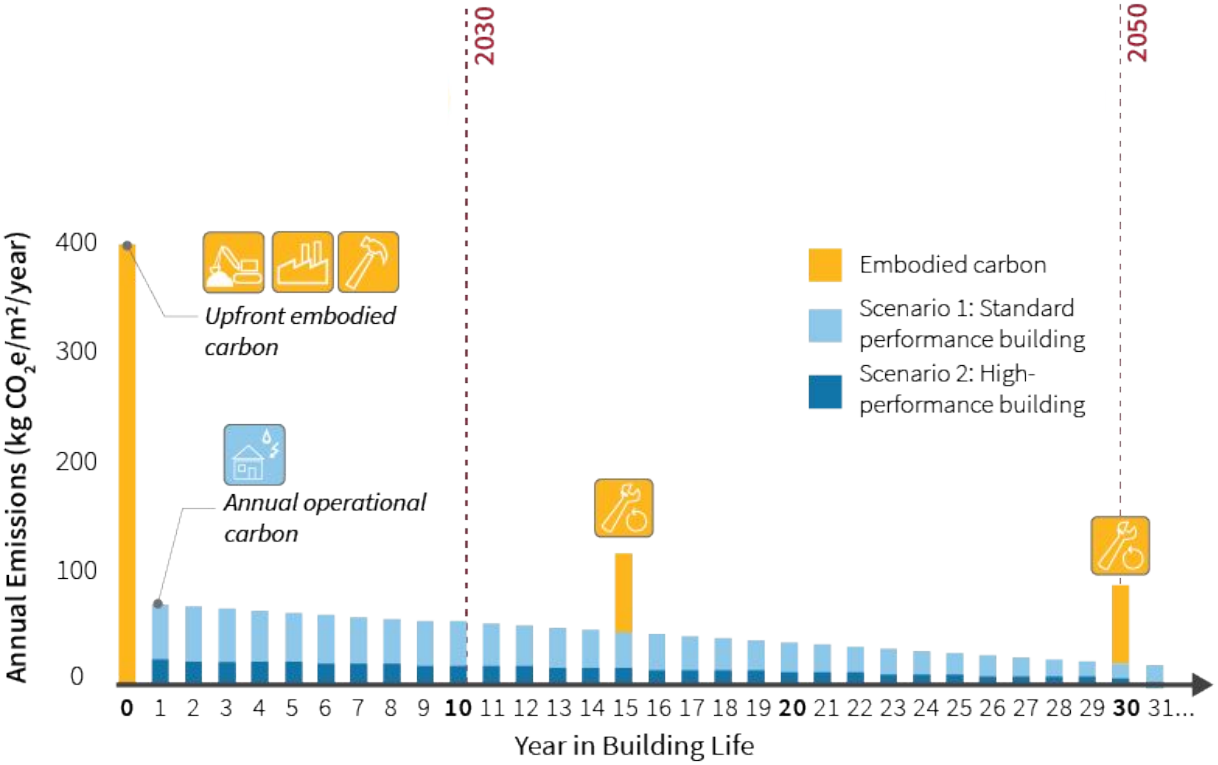


Image Source: *AIA-CLF Embodied Carbon Toolkit for Architects, 2021*

Reducing embodied carbon is urgent



Embodied carbon is…

⅔ of total emissions in the first 10 years

½ of total emissions in the first 30 years

Image Source: *AIA-CLF Embodied Carbon Toolkit for Architects, 2021*

Embodied carbon **disproportionately impacts frontline communities**

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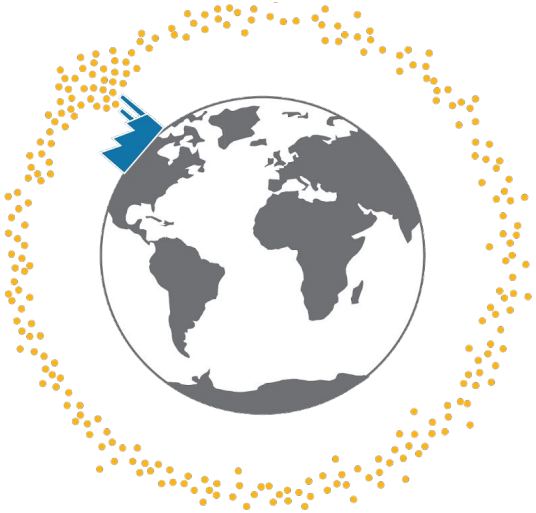
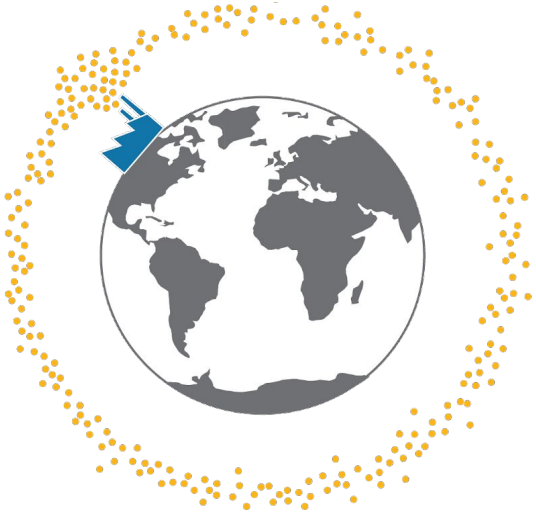
Global Impacts from Climate Change

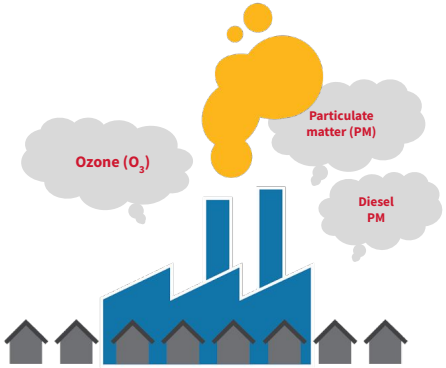


Embodied carbon disproportionately impacts frontline communities

Global Impacts from Climate Change



Regional/Local Impacts on Health and Environment



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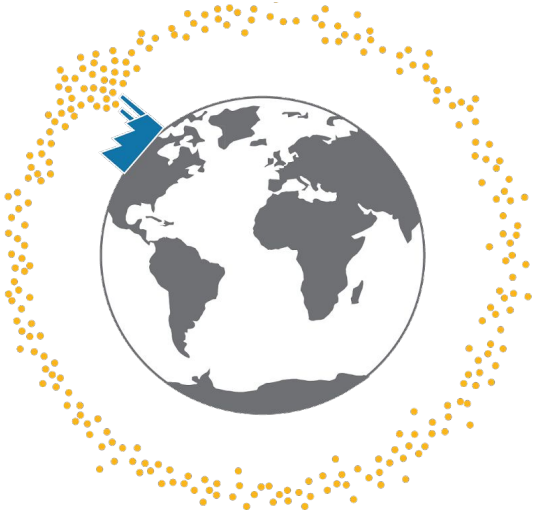

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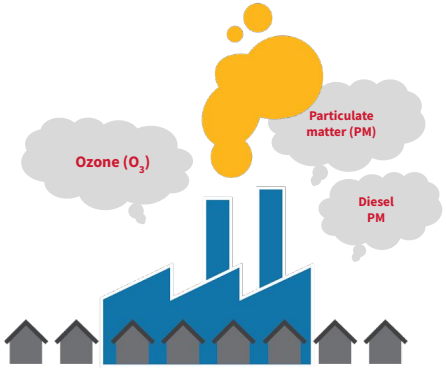

Supply Chain Concerns

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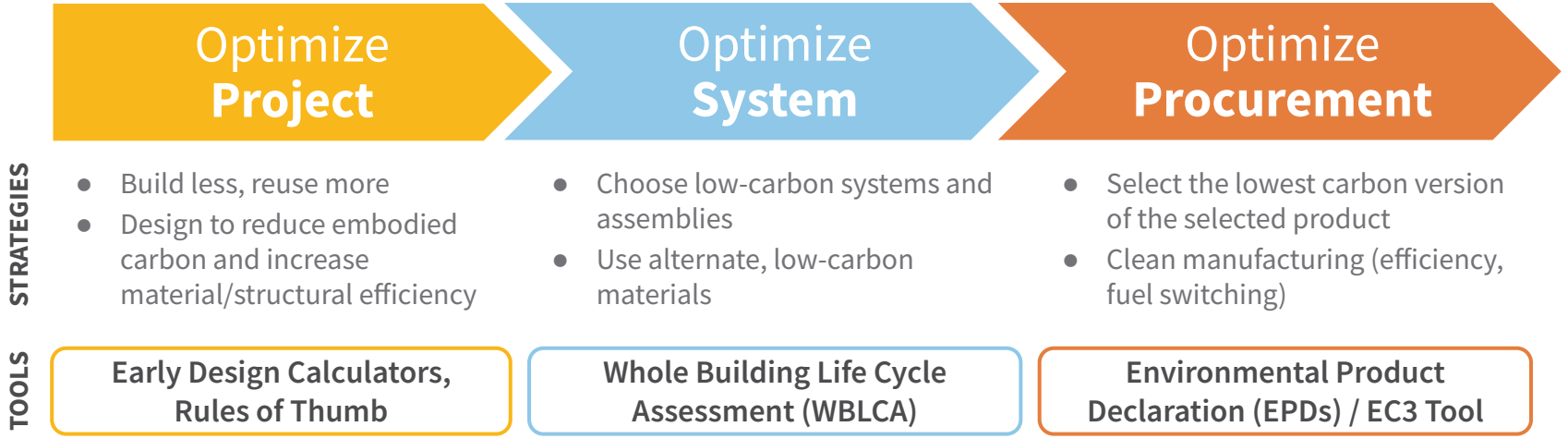
Overview of Types of Policies

What Matching Policy Measures and Embodied Carbon Reduction Strategies



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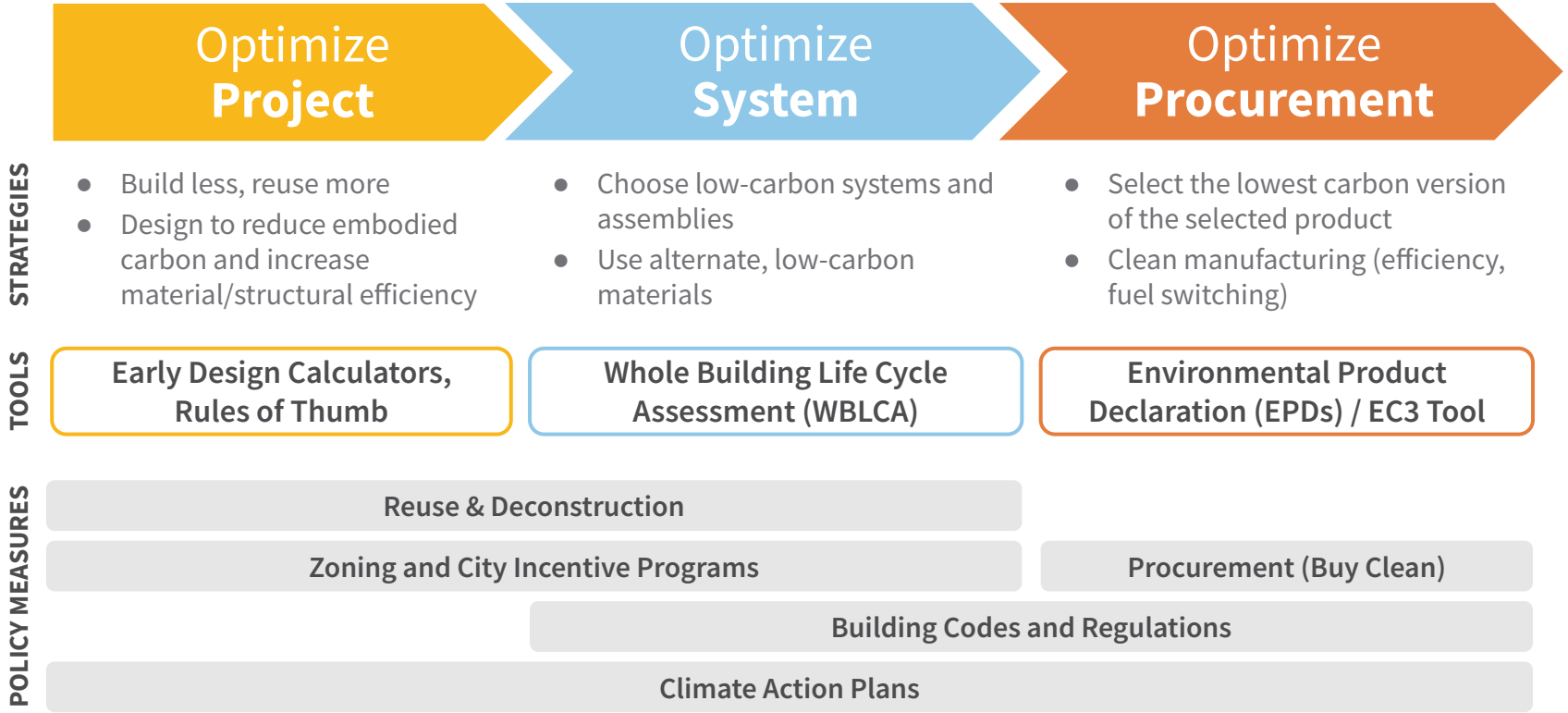
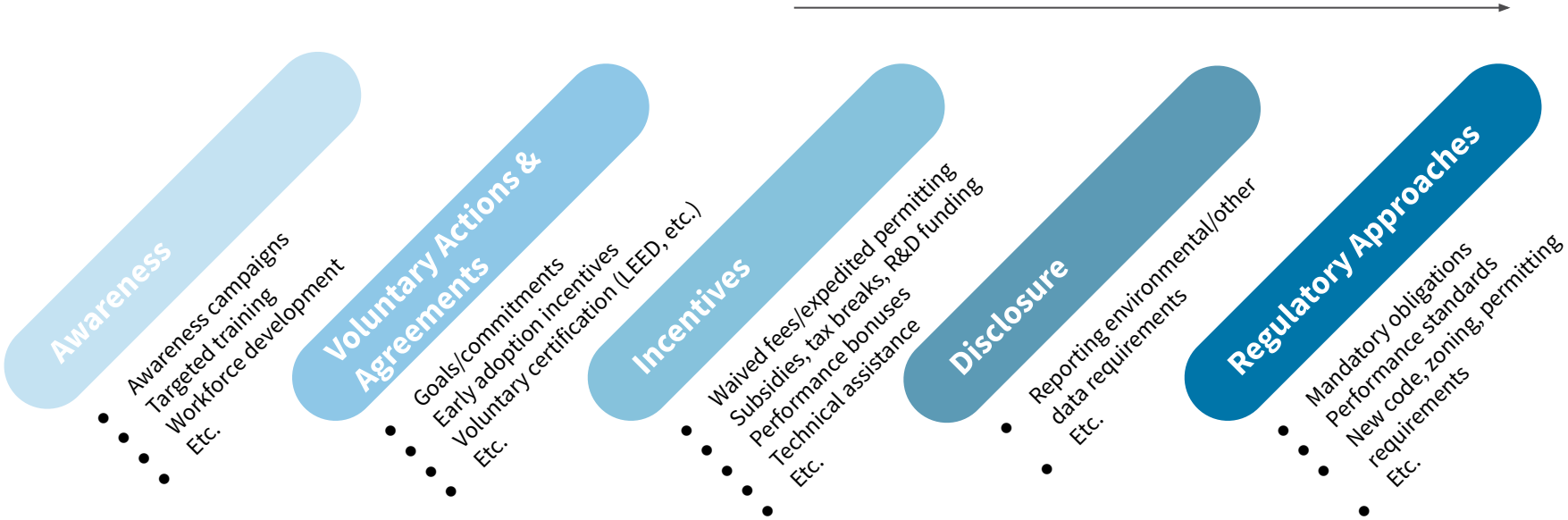


What Policy Instruments



Where Policy Jurisdiction

International

- Global climate/environmental agreements and treaties

Federal

- Research, funding, and tool development
- National climate, industrial, and waste policies
- Federal green building and procurement requirements ('Lead-by-example')

State

- State climate, industrial, and waste policies
- State building codes & regulations
- State green building & procurement requirements ('Lead-by-example')

Local

- Local building codes, zoning and land use policies, and green building incentive programs
- Climate action plans
- Local green building and procurement requirements ('Lead-by-example')
- Local waste management policies, including deconstruction

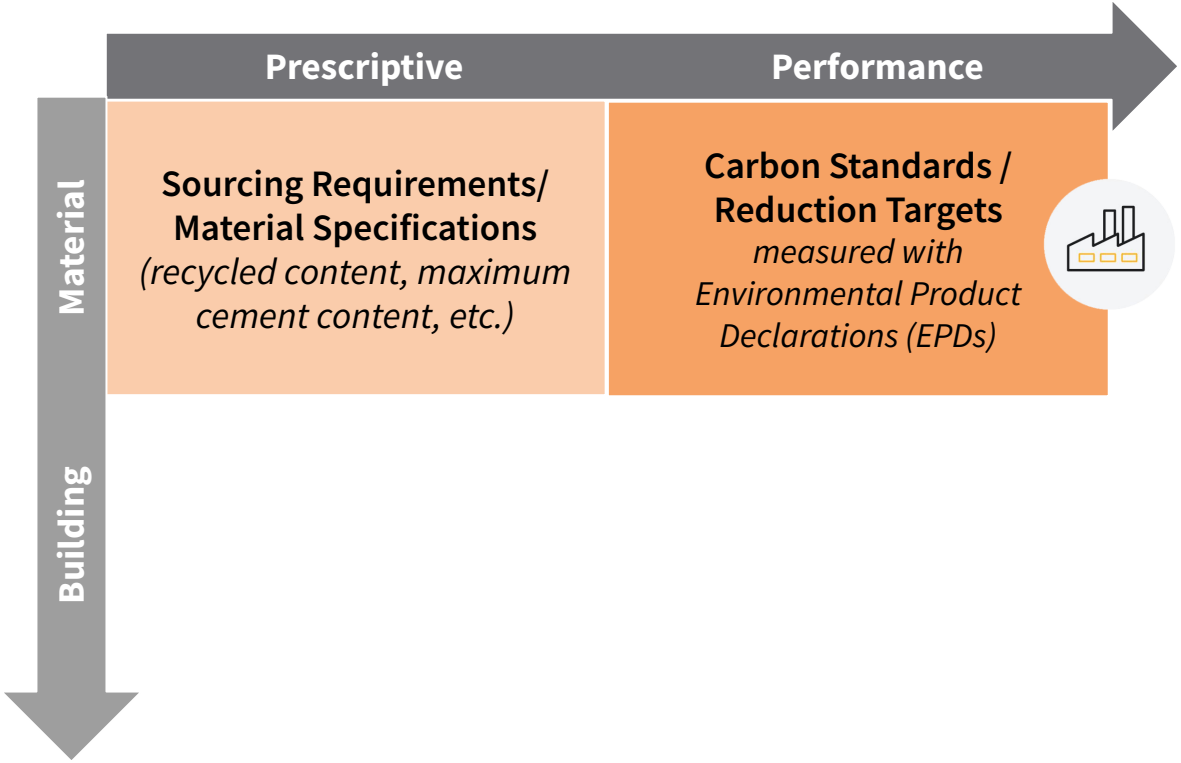
Prescriptive or Performance-based?

- Requires products or projects to use all or a portion of a **list of strategies**
- Describes the **attributes** required by a policy

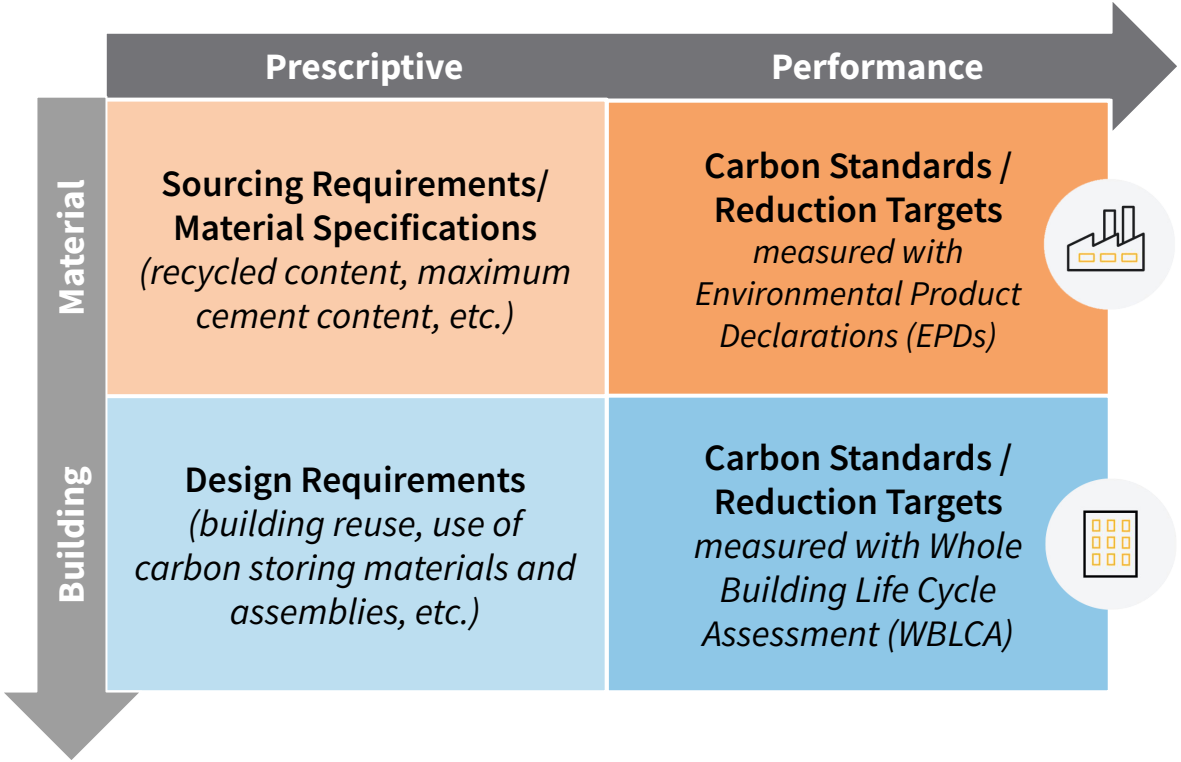
- Requires products or projects to perform **relative to a baseline or threshold**
- Describes the **outcome** desired by a policy

Materials or Buildings?

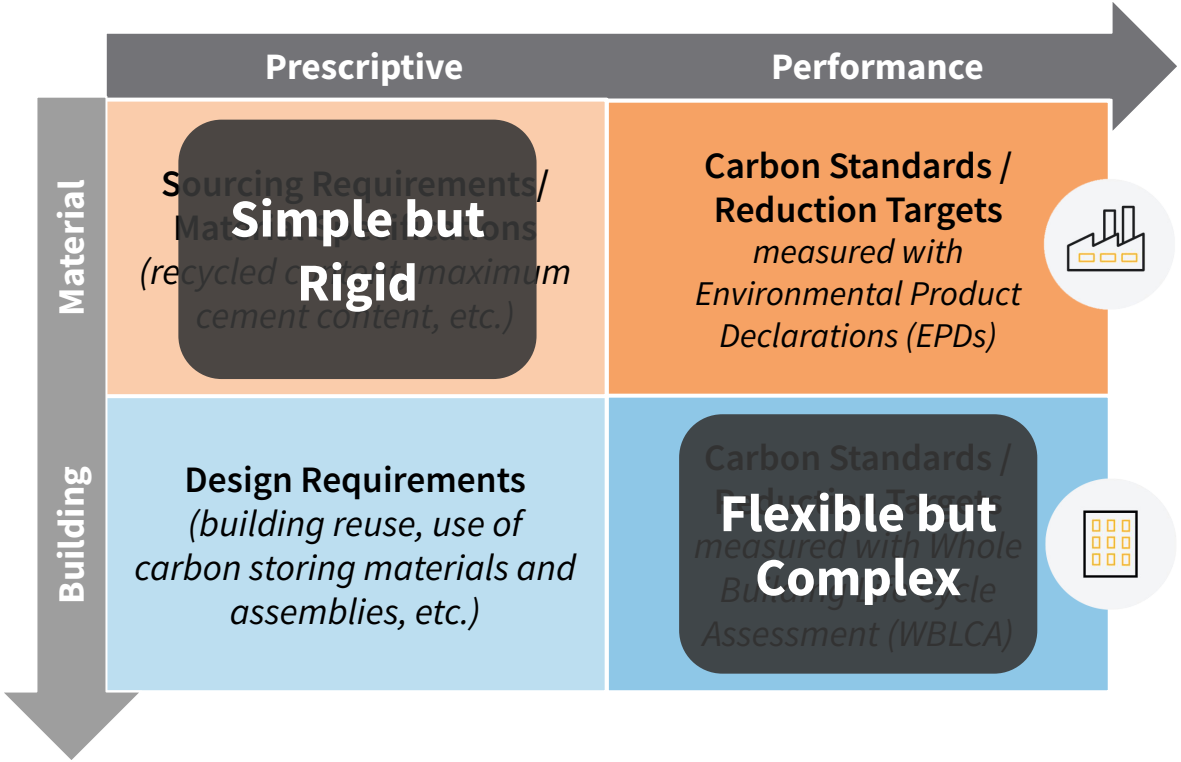
Material Policies: Prescriptive and Performance Requirements



Building Policies: Prescriptive and Performance Requirements



Pros and Cons



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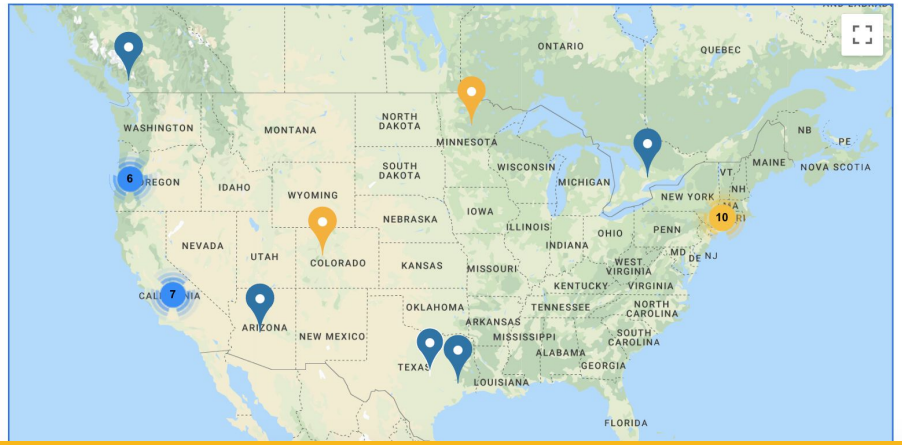
Growing Policy Landscape

Tracking the Growing Embodied Carbon Policy Landscape

Current Embodied Carbon Policy

Embodied carbon policies are spreading rapidly across the United States and the world. Click on the map markers below to learn more about existing and proposed policies. For more information about the individual policies, see the links for each policy below the map.

National Policy State or Provincial Policy Local Policy



Learn more at the CLF Policy Toolkit:
carbonleadershipforum.org/clf-policy-toolkit

NOTE: Includes all embodied carbon related policies, not just procurement

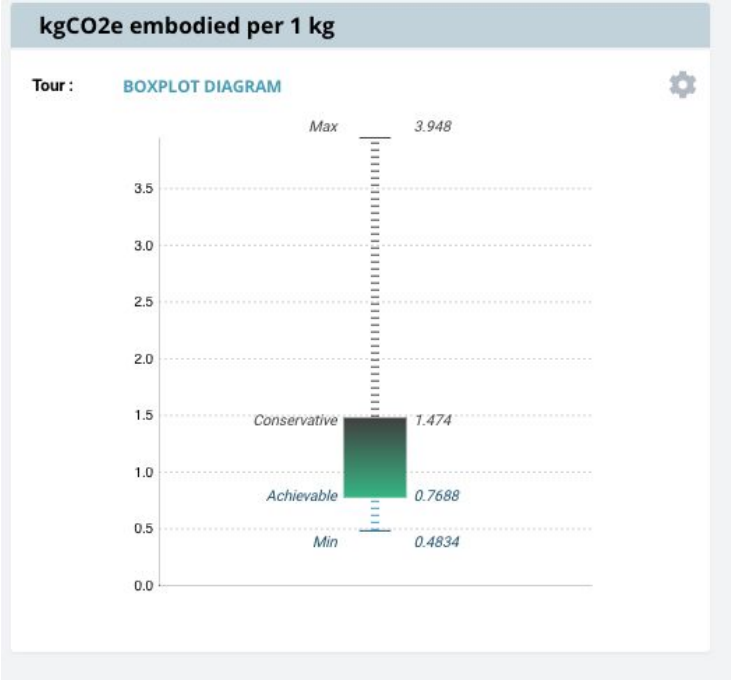
Embodied Carbon Provisions in the Inflation Reduction Act

Section	Agency	Funding	Summary	Expiration Date
60112	**EPA**	$250M	**EPD Assistance** to support the development and standardization of EPDs for construction materials with grants and technical assistance to manufacturers.	9/30/2031
60116	**EPA**	$100M	**Low-Embodied Carbon Labeling for Construction Materials** to identify and label low-carbon materials and products based on data available via EPDs	9/30/2026
60503	**GSA**	$2.15B	**Specify and install low-embodied carbon materials** and products for use in General Services Administration-owned buildings	9/30/2026
60506	**FHWA**	$2B	**Low-Carbon Transportation Grants** that reimburse and incentivize the use of low-carbon materials and products for Federal Highway Administration projects.	9/30/2026
70006	FEMA	?	**FEMA Building Materials Program (SEC.)** may provide financial assistance for the use of low-carbon materials and incentives that encourage low-carbon and net-zero energy projects.	9/30/2026

- **DOE** has $5.8B to fund advanced technology retrofits for steel, aluminum, cement, concrete, glass, and other energy intensive industrial processes
- $10B to expand clean technology manufacturing tax credits
- **HUD** funding includes low-carbon materials as one criteria (of many)

GSA and FHWA Low Carbon Material Spending

- Low-carbon interim determination published in December by the EPA, which determines how the $4B of funding for GSA and FHWA may be spent
- Defines low-carbon materials as the **best 20% of materials available**
  - *If can't find best 20%, can move to best 40%*
  - *Cannot spend money on materials worse than industry average (likely defined as IW EPD)*
- Focusing on concrete, steel, glass, asphalt
- First GSA projects announced in December (border control facilities)



North American Rebar example from EC3: below 'Achievable' bar

GSA and Federal Buy Clean

Biden signed EO Catalyzing America's Clean Energy Economy Through Federal Sustainability, included a Federal Buy Clean (December 2021)

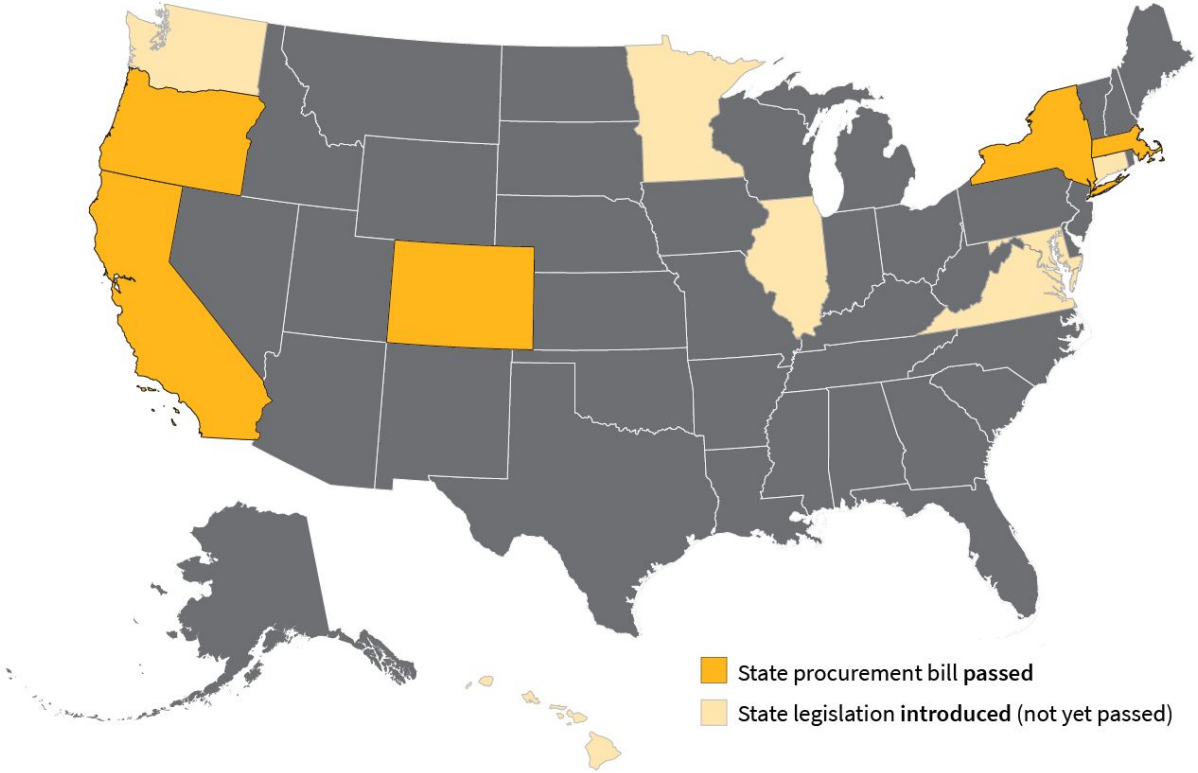
GSA included new concrete and asphalt standards in the P100

- **Concrete:** Required EPDs and lower carbon concrete (20% below baselines)
- **Asphalt:** Pick 2 from a menu of decarbonization strategies)
- Waiver process available
- **Building carbon reductions:** Get at least 1 point from LEED WBLCA credit (reuse existing building or demonstrate reductions with WBLCA)
  - Also requires WBLCA reports at Final Concept, 100% DD, pre-Final CD

Federal Buy Clean Taskforce (led by White House)

- Coordinate action across federal agencies that procure materials (GSA, FHWA, etc.)
- Convening states to partner on Buy Clean
- Helps prioritize materials
- Education + research on embodied carbon emissions

Government Procurement: State Buy Clean & LECCLA



Clean Procurement Policy Components

Reporting *(<u>all</u> policies)*

Embodied Carbon Reporting

Required reporting of a **Product-Specific Type III EPD** that follows relevant ISO standards and PCRs

**May also require whole project LCA results*

EPD Incentives

Tax rebates/similar for suppliers to help with cost

Clean Procurement Policy Components

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Reductions *(regulatory approach; varies by policy)*

Maximum GWP Limits (Carbon Budget)

Maximum allowable global warming potential (GWP) value set for each product category, limit is often set at industry average.

**May set a budget for the project as a whole*

Clean Procurement Policy Components

Reporting *(<u>all</u> policies)*

EPD Incentives
Tax rebates/similar for suppliers to help with cost

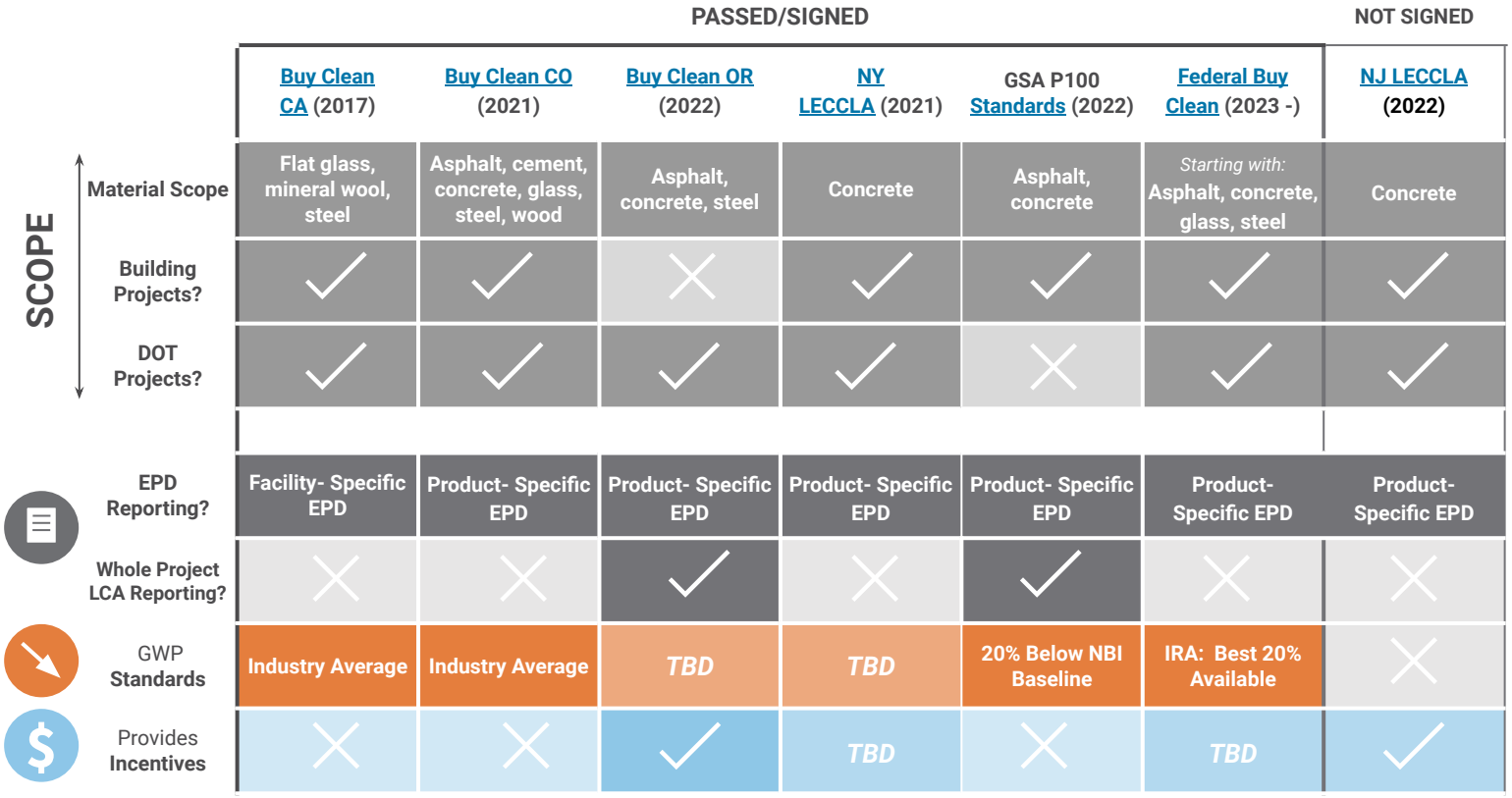
Reductions *(incentive-based approach; varies by policy)*

Bid Incentives
Contractors select material bids based on carbon, in addition to cost, using the GWP values in reported EPD

*Sometimes specific incentives for emerging technologies

Performance Incentives
Incentives awarded to contractor based on performance (i.e. carbon reductions achieved in procurement again a baseline)

Existing State and Federal Procurement Policy Landscape



Maximum GWP Limits Example: Buy Clean California Act

Eligible Material	Subcategory	Limit	Declared Unit	Functional Unit
Structural Steel	Hot-rolled sections	1.01 metric tons CO_2-eq	1 metric ton	N/A
	Hollow structural sections	1.71 metric tons CO_2-eq	1 metric ton	N/A
	Plate	1.49 metric tons CO_2-eq	1 metric ton	N/A
Concrete Reinforcing Steel	N/A	0.89 metric tons CO_2-eq	1 metric ton	N/A
Flat Glass	N/A	1.43 metric tons CO_2-eq	1 metric ton	N/A
Mineral Wool Board Insulation	Light-density mineral wool board insulation	3.33 kg CO_2-eq	N/A	1 m_2 of insulation material with a thickness giving average thermal resistance of RSI = 1 m_2K/W and with a building service life of 75 years.
	Heavy-density mineral wool board insulation	8.16 kg CO_2-eq	N/A	1 m_2 of insulation material with a thickness giving average thermal resistance of RSI = 1 m_2K/W and with a building service life of 75 years.

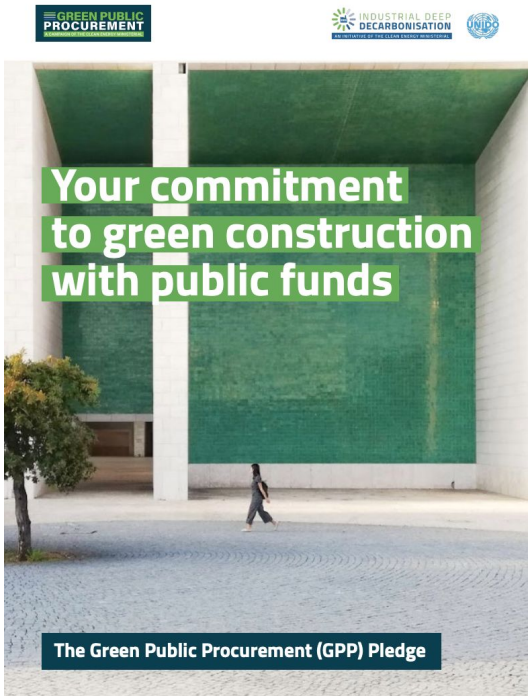
- Passed in 2017, limits just published July 2022
- EPDs verify compliance with GWP limit
- GWP limits will reduce every 3 years to reflect industry average

Read more about the limits set by the Buy Clean California on the **official DGS website** or read the CLF Report ***Buy Clean California Limits***.

Incentive-Based Approach

- Explored most in-depth in versions of LECCLA bills in New York and New Jersey
- Check out NRDC *Design Guide to State and Local Low-Carbon Concrete Procurement* if you want to learn more

International: UN Green Procurement Pledge



Pledge to:

Level One:

Starting no later than 2025, **require disclosure of the embodied carbon in cement/concrete and steel procured for public construction projects.**

Level Two (in addition to Level 1):

Starting no later than 2030, conduct **whole project life cycle assessments for all public construction projects, and, by 2050, achieve net zero emissions in all public construction projects.**

Level Three (in addition to Levels 1 and 2):

Starting no later than 2030, require procurement of **low emission cement/concrete and steel in public construction projects**, applying the highest ambition possible under national circumstances.

Level Four (in addition to Levels 1, 2 and 3):

Starting in 2030, require procurement of a share of cement and/or crude steel from **near zero emission material production** for signature projects.

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Additional Case Studies

Zoning and Building Codes City of Vancouver

Green Buildings Policy for Rezoning (2017 -)

- **Report the GWP of each building, in kgCO2e/m², as calculated by a whole-building life-cycle assessment (LCA)**
- Percentage reduction targets from a baseline building added in over time

Vancouver Building By-Law Amendment (2023 -)

- **Report the GWP of each building, in kgCO2e/m², as calculated by a whole-building life-cycle assessment (LCA)**
- Demonstrate via the WBLCA that the proposed building is **not more than double that baseline.**

2025:

- Embodied carbon must be reduced by 10-20% compared to the standardized baseline
- Pick from three sourcing options: sustainable sourcing standards; disclosure of material ingredients; or construction waste diversion and design for disassembly.

Deconstruction and Salvage Policy - Portland Deconstruction Law

Case Study: Portland Deconstruction of Buildings Law

As of 2020, all single-dwelling structures (houses and duplexes) in all zones must be fully deconstructed as opposed to mechanically demolished if:

- The structure was built in 1940 or earlier; or
- The structure is designated as a historic resource

Projects must use a city-published list of Certified Deconstruction Contractors to perform the deconstruction work.

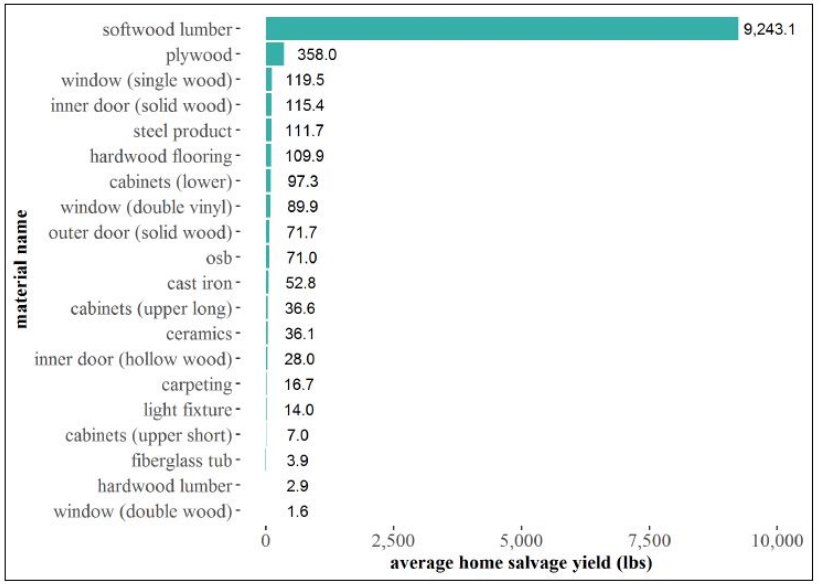

Figure 5: Quantity of materials salvaged from an average home

Source: Oregon DEQ Materials Management, "Deconstruction and Demolition" Study

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Policy Outlook for 2023

What We Expect to See More

- **More states** pass Buy Clean
  - NOT redundant with Federal Buy Clean. Federal/state procurement are separate $$
  - IRA is a huge boost in enabling states to pass because of available incentives
- **Expansion of scope** in states that already have Buy Clean
- **Implementation** of existing policies coming soon
  - GWP limit requirements are only currently active in California, other states (CO, OR) will follow in the next 1-2 years
- **IRA funding will have a big impact** on availability of EPDs and (hopefully) carbon intensity of focus materials (concrete, steel, glass, asphalt)
- **Increased adoption of project/building approach**, requiring whole project / whole building LCA reporting and eventually setting a carbon budget or required reductions per square foot
- Increased action on transportation infrastructure

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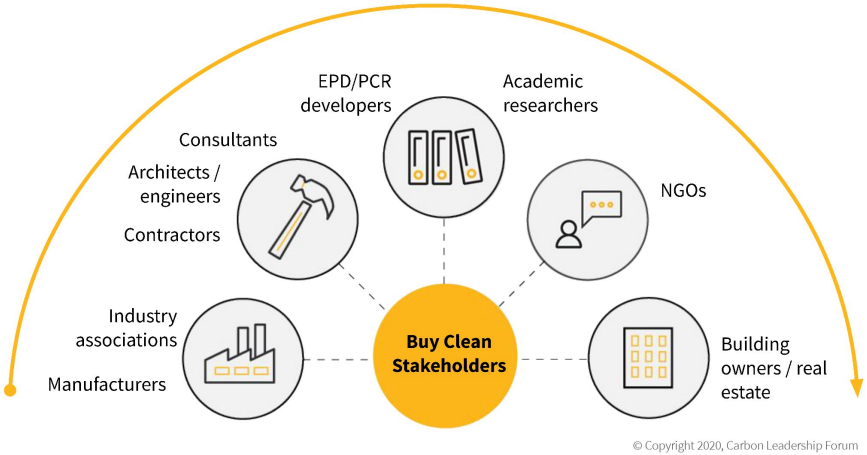
Role of Structural Engineers

Structural Engineer Role

- Critical to all policies targeting embodied carbon in design and procurement
- Contractor typically lead for compliance with Buy Clean, but will lean heavily on engineers

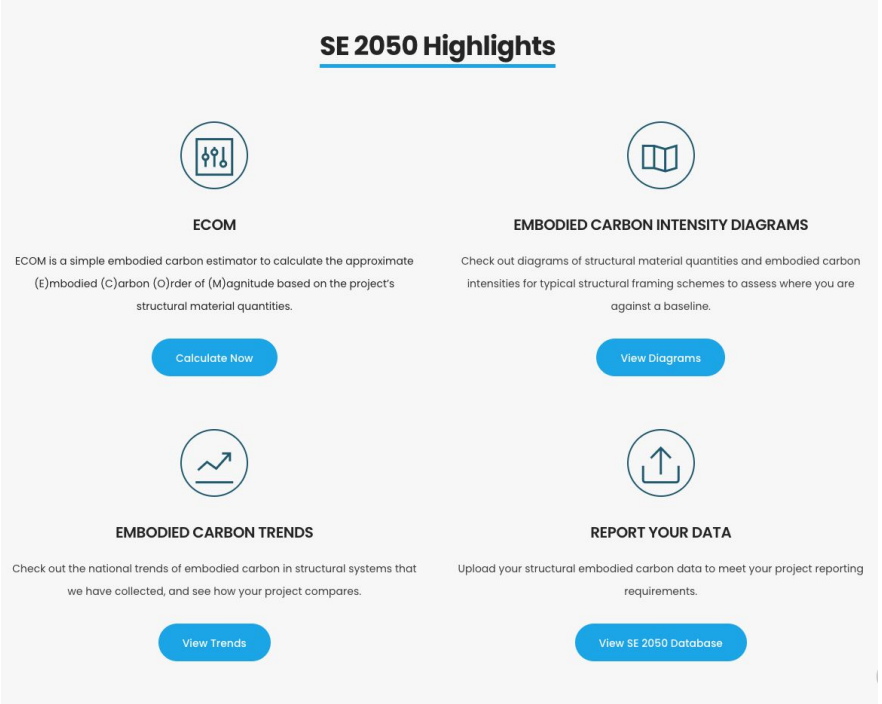


Structural Engineers 2050 Commitment Program (SE2050)

- A coalition of structural engineers dedicated to developing and managing a comprehensive program designed to ensure substantive embodied carbon reductions.
- Mission to support professional community in the goal of net zero embodied carbon structural systems by 2050.

SEI STRUCTURAL ENGINEERING INSTITUTE ASCE | SE2050 COMMITTING TO NET ZERO

https://se2050.org/



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