



Material Impacts and Embodied Carbon Policy Options

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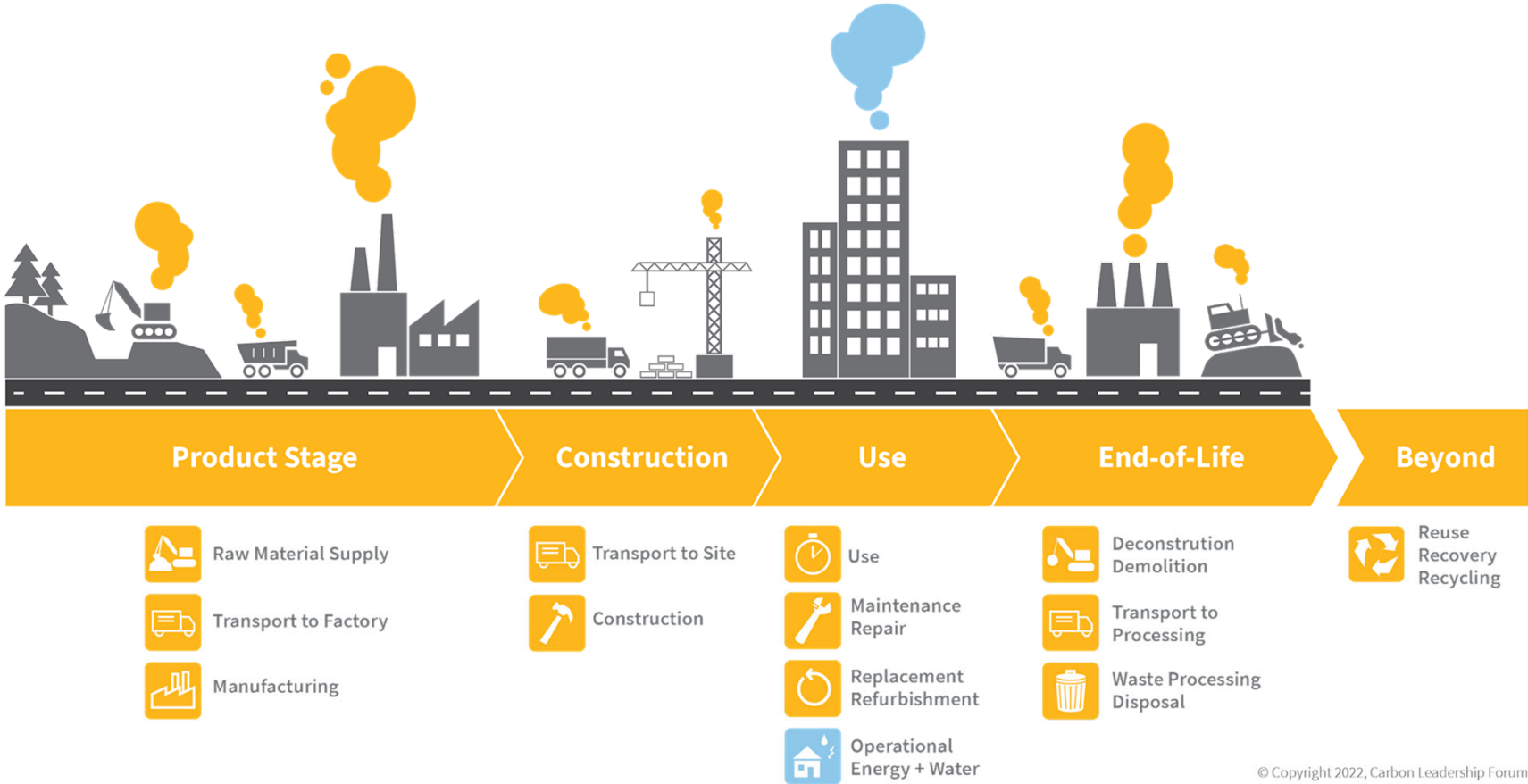


CONSTRUCTING AND OPERATING BUILDINGS HAS A HUGE ENVIRONMENTAL IMPACT.

In the next 40 years, the global building stock is expected to double, an increase equivalent to constructing an additional New York City every 35 days.

During this period of growth we expect embodied carbon to make up **nearly half of that impact.**

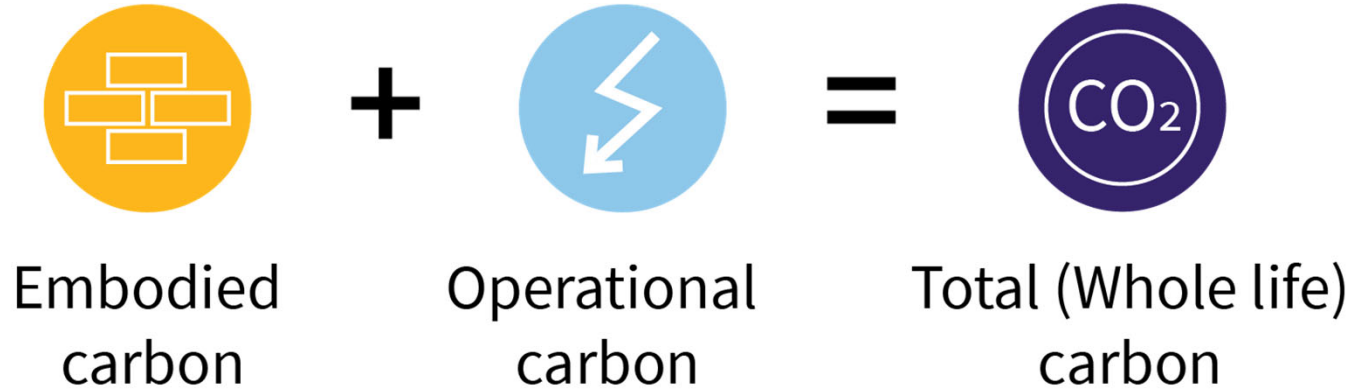
What is Embodied Carbon?



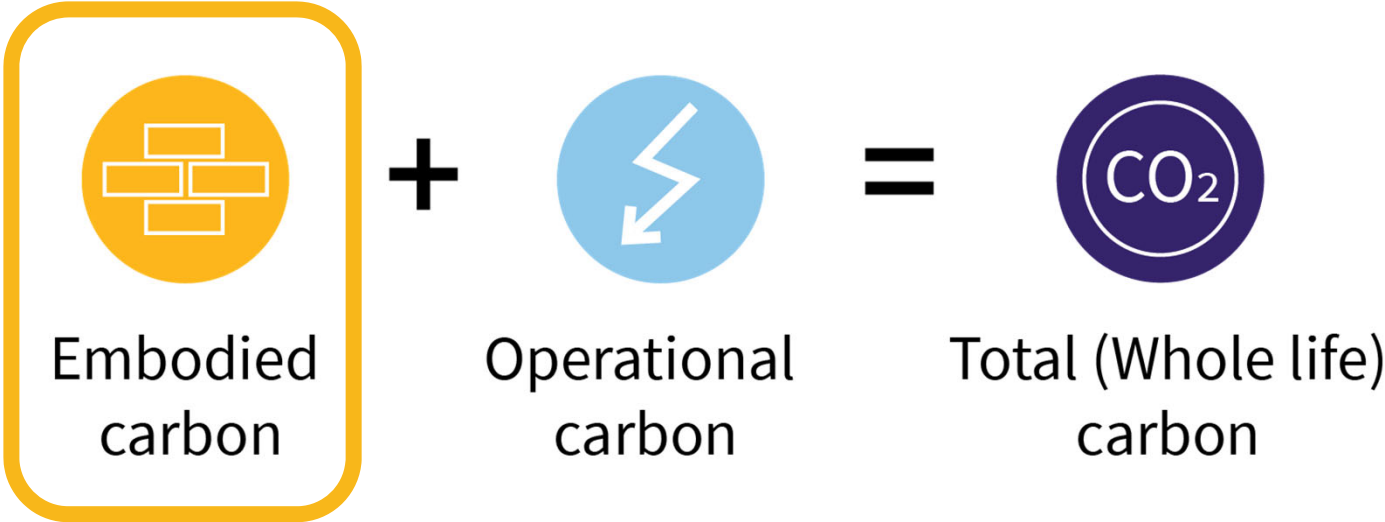
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What is Embodied Carbon?



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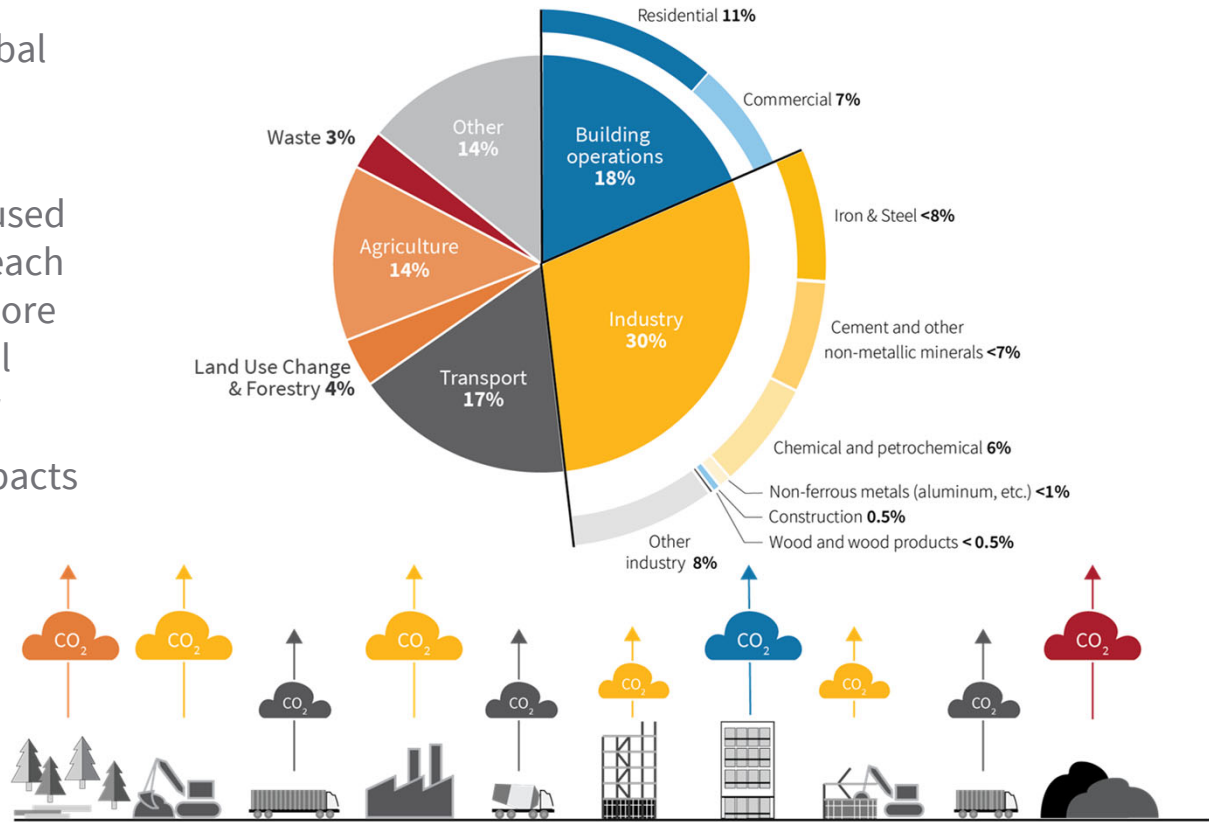


1. Embodied carbon is significant

- The largest contributor to global emissions by end-use is the industrial sector ~30%
- Steel and cement, which are used in building construction, are each individually responsible for more emissions than all commercial building energy use each year
- Over the full life cycle, the impacts of the built environment are spread across nearly every economic sector

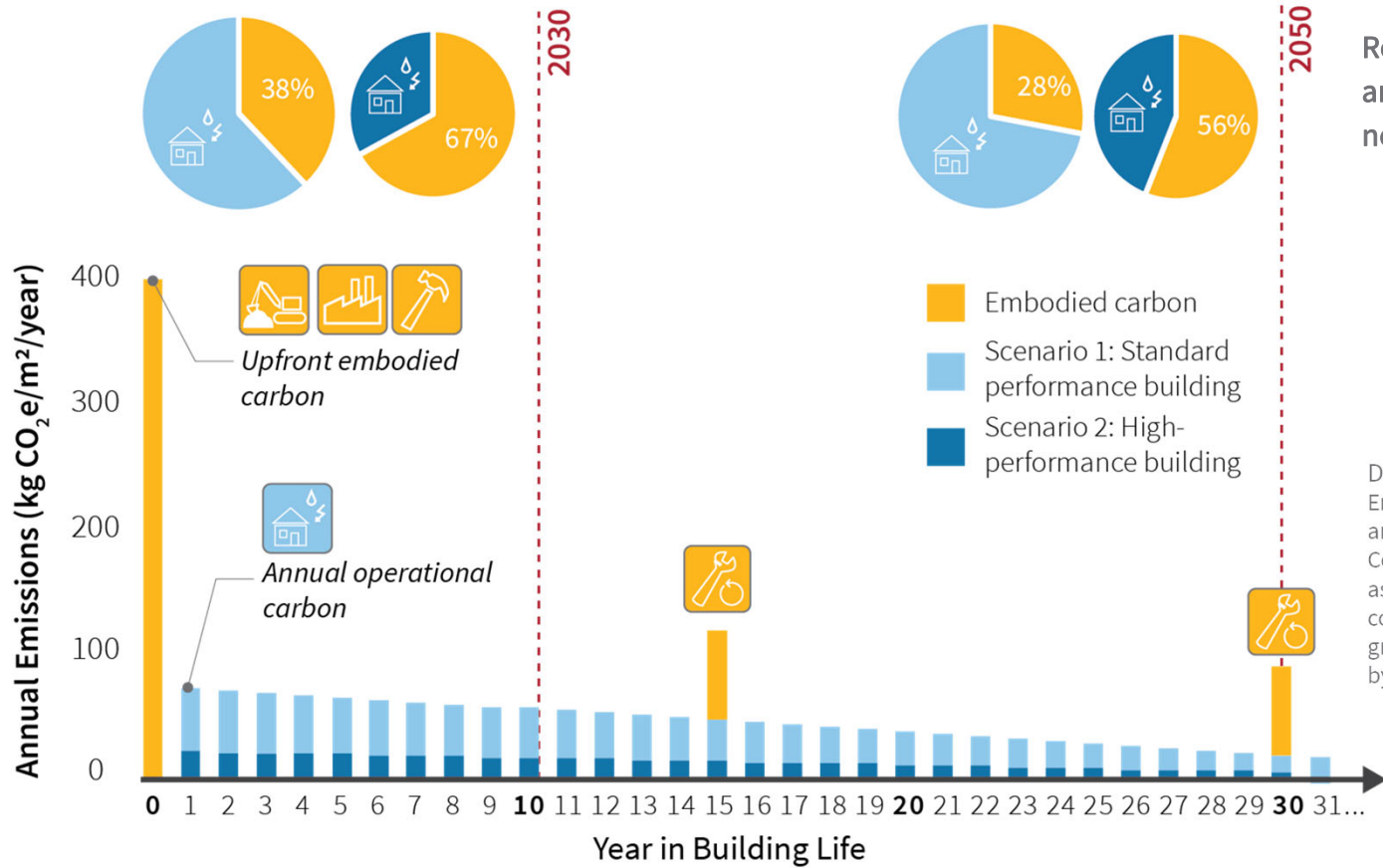
Data sources: Emissions data from IEA and WRI Climate Watch (2016 GHG Emissions Data)

Global GHG emissions and the life cycle of buildings



When considered over their full life cycle, the building industry influences nearly every major sector of global GHG emissions.

2. Embodied carbon is urgent



Relative impact of embodied and operational carbon of a new building from 2020-2050

Data Sources: Embodied Carbon Benchmark Study and Commercial Buildings Energy Consumption Survey (CBECS), assuming a medium-sized commercial office building. Assumes gradual grid decarbonization to zero by 2050.

3. Embodied carbon disproportionately impacts frontline communities

Global Climate Change



Regional and Local Health Impacts



Supply Chain Concerns






Four rules of thumb

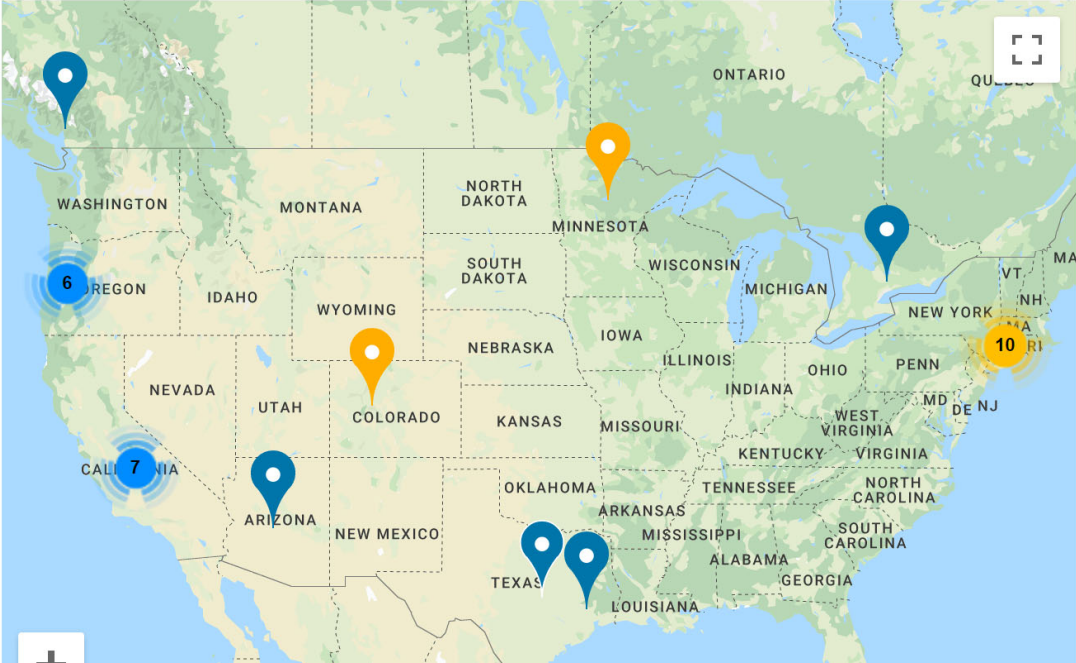
- 1 BUILD LESS, REUSE MORE** 
- 2 DESIGN LIGHTER AND SMARTER** 
- 3 USE LOW-CARBON ALTERNATIVES** 
- 4 PROCURE LOW(ER) CARBON PRODUCTS** 

Embodied Carbon Polies are Coming

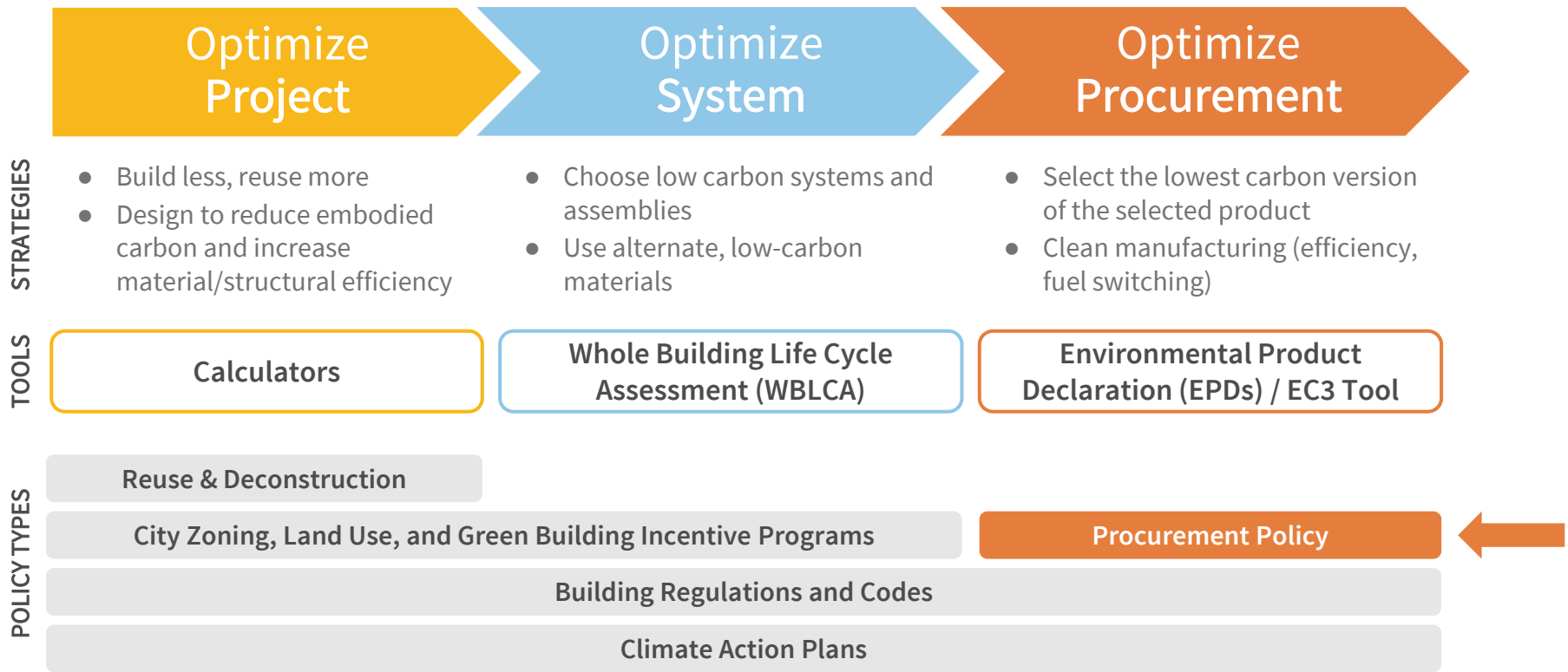
- CLF Policy Toolkit
 - Example policies
 - Map tracking policies

<https://carbonleadershipforum.org/clf-carbon-policy-toolkit/>

 National Policy  State or Provincial Policy  Local Policy



Matching Policy Opportunities with Embodied Carbon Reduction Strategies

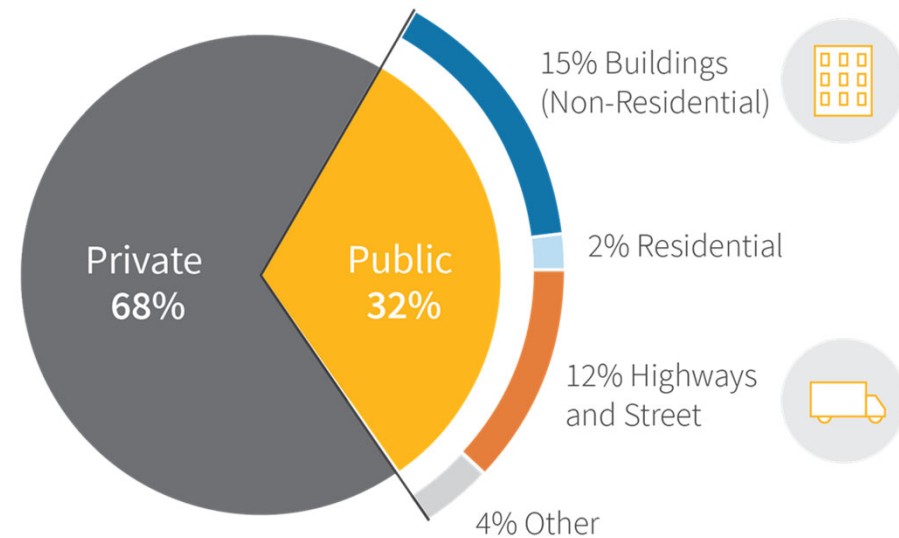




Why Procurement? Why Buy Clean?

Why Procurement? Leveraging Public Procurement

- Procurement policies leverage money that is already being spent
- Align public procurement with environmental, labor, and equity goals
- In the US, nearly **half of all cement** and a **fifth of steel** is purchased with tax dollars
- 32% of the embodied carbon of construction in the United States between 2008-2018 was attributed to public projects



Relative contributions of the global warming potential of US construction for private and public projects). Data sources: [US Census Bureau](#) ("Annual Value of Construction Spending Put in Place" for 2008 - 2018); US EPA Office of Research and Development ([USEEIO v1.1](#) data).

Why Procurement? Addressing the Carbon Loophole

- Emissions are often accounted locally, creating a ‘carbon loophole’
- The majority of a product (and companies) embodied carbon footprint is generated in its supply chain, which is often spread across the globe

“For the average company, supply chain emissions are around 11.4 times greater than direct emissions” ([CDP Supply Chain](#))



Scope 1&2 Emissions

Data Source: [CDP Supply Chain](#)

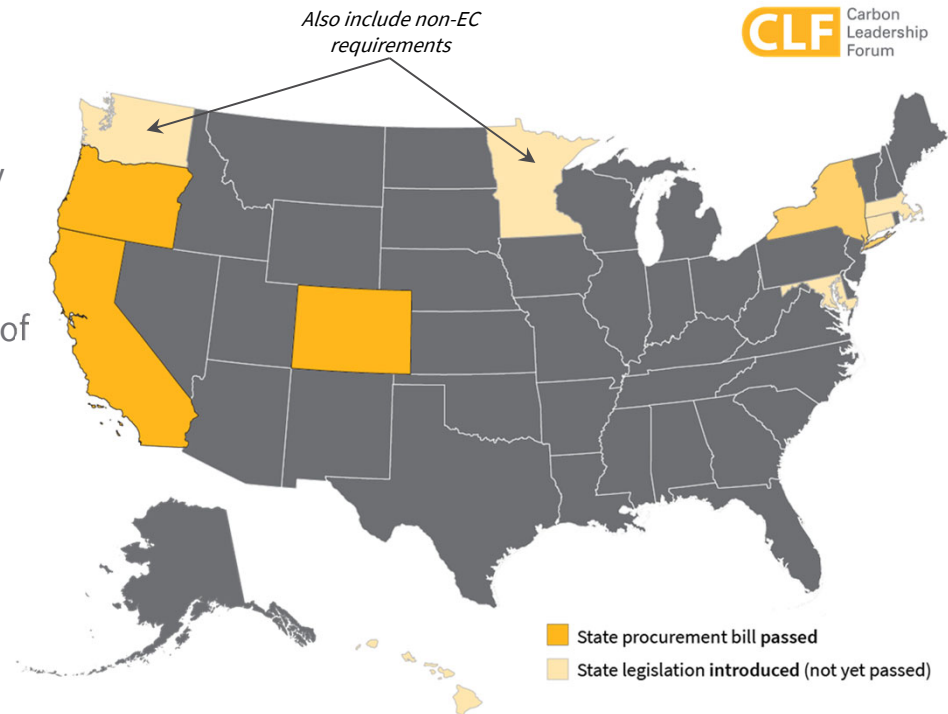


Current Policy Landscape

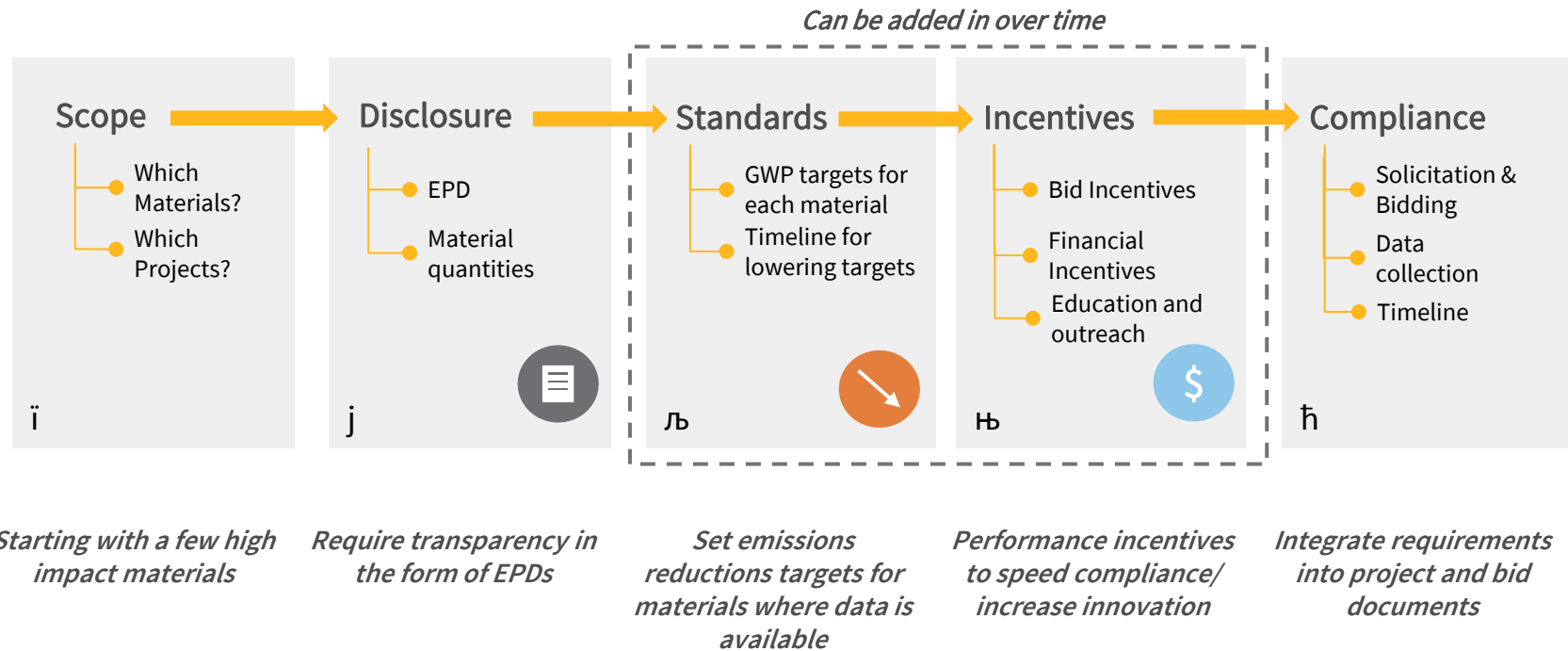
Growing U.S. Procurement Policy Landscape

- **State**
 - First policy introduced in CA in 2017
 - Bills introduced in 8 states in 2021, already continued 2022 momentum
- **Federal**
 - GSA requirements for concrete/asphalt as of March 2022 (now part of P100)
 - Federal Buy Clean taskforce launched following EO 14057
- **International**
 - Canadian Greening Government Initiative
 - UN IDDI working to align global green procurement policy

<https://carbonleadershipforum.org/clf-carbon-policy-toolkit/>



Low Embodied Carbon Procurement Policy Framework



2022 State and Federal Procurement Policy Landscape *(as of March 2022)*

	PASSED/SIGNED			LAUNCHED (2022)		ONGOING (Introduced in 2021/2)						
	Buy Clean CA (2017)	Buy Clean CO (2021)	Buy Clean OR (2022)	NY LECCLA (2021)	GSA Standards (2022)	E.O. 14057	CA (SB 778)	CA AB 1369	MA (H.4182)	NY CFCLA (A09042)	BCBF MN (BE177)	B.C. MD (HB 806)
Materials	Steel, glass, mineral wool	Asphalt, cement, concrete, glass, steel, wood	Concrete, Asphalt, Steel	Concrete	Concrete, Asphalt	TBD	Concrete (adds to BCCA)	Adds gypsum board, Insulation, Carpet/carpet tiles, and ceiling tiles to BCCA	Steel, flat glass, mineral wool, concrete, cement	Concrete	Steel, concrete, asphalt, PVs, energy storage	Cement, concrete, glass, steel, wood
Includes Buildings	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓
Includes DOT Projects	✓	✓	✓	✓	✗	TBD	✓	✗	✗	✓	✓	✓
Requires Disclosure	✓	✓	✓	✓	✓	TBD	✓	✓	✓	✓	✓	✓
GWP Limits	Industry Average	Industry Average	TBD	TBD	✓	TBD	✓	✓	✓	✓	✓	✓
Provides Incentives	✗	✗	✓	TBD	✗	TBD	✓	✗	✗	✓	✗	✗



Trends in proposed/passed policies: Eligible Materials and Projects

Which projects are covered?

Most proposed bills have included both:

- Vertical infrastructure (e.g. **buildings**)
- Horizontal infrastructure (e.g. **transportation projects**)

REMINDER *A procurement policy refers to spending on materials used in public projects like universities, courthouses, or roads.*

Which materials are covered?

- The most frequently included materials are **concrete and steel**, including ready-mixed concrete, structural steel, reinforcing steel
- The following materials are also included, in order of most to least common:
 - Asphalt
 - Engineered wood/flat glass/insulation
 - Finishes (*CA AB 1369 is first bill to include*)

Trends in proposed/passed policies:
Environmental Product Declarations (EPDs)



- EPDs are third party verified disclosures of a material's environmental impacts *(like a nutrition label)*
- Must follow international LCA/EPD standards (ISO) and industry-specific rules (PCRs)
- **Performance-based:** Enables companies to pursue (and communicate) the clean manufacturing solutions that are right for their facilities and products
- Focus on upstream (sourcing > manufacturing) impacts and strategies like:
 - Plant energy efficiency & on-site renewables
 - Sourcing (recycled content, etc.)
 - Carbon capture and utilization

Product Impacts	
Declared Unit: 1 m ³ of 10,000 psi concrete at 28 days	
Amount Per Declared Unit	
Global Warming Potential	445 kgCO ₂ eq
Emitted	460 kgCO ₂ eq
Sequestered	-15 kgCO ₂ eq
Ozone Depletion	0.000 kgCFC11eq
Acidification	2.96 kgSO ₂ eq
Eutrophication	0.09 kgNeq
Smog Formation	0.61 kgO ₃ eq
Primary Energy Demand	3017 MJ
Non-renewable	3000 MJ
Renewable	17 MJ

Standards Global Warming Potential (GWP) Limits



Sets a maximum allowable value for the carbon intensity (e.g. CO₂e per unit) of a product

Example:

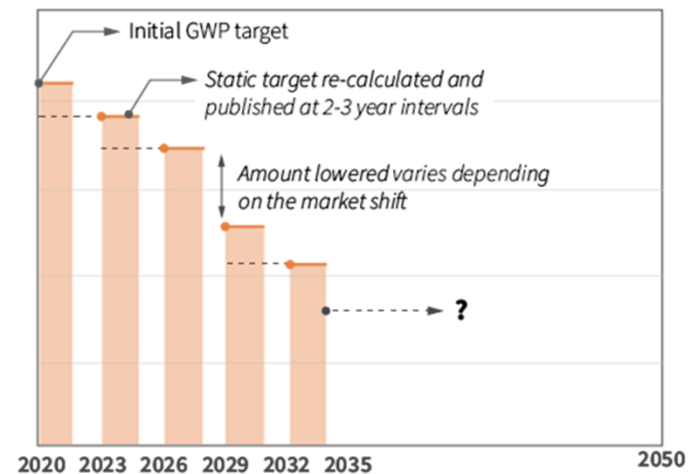
Buy Clean California requires that rebar used on eligible projects must be <1.06 MT CO₂e/MT of rebar, as verified by a Type III, facility-specific EPD



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](#).

Lowering Limits Over Time: Option 1

Buy Clean California requires the GWP limits to be set at industry average and updated every 3 years to continue to reflect the industry average.



Standards Reduction Targets from a Baseline



Sets an initial baseline carbon intensity (e.g. CO₂e per unit) that a product must reduce from. *Baselines may be for a specific year, or relative to a value that updates over time.*

Example:

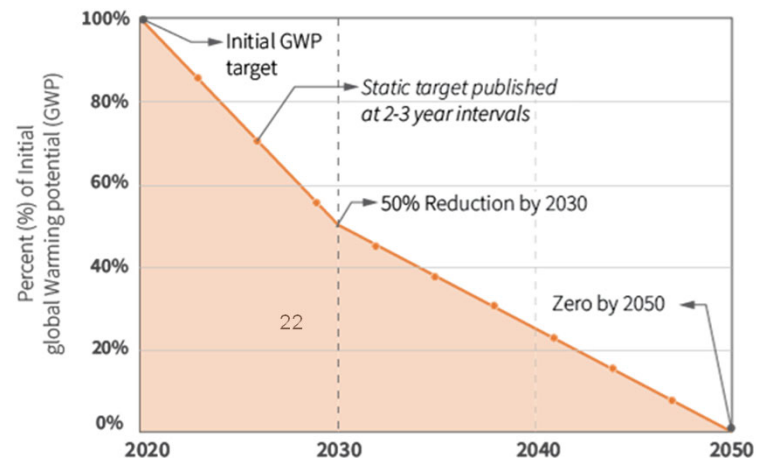
This LEEDv4 [Pilot Credit](#) awards 1-2 points to teams that achieve percentage reductions from the [CLF Material Baselines](#), as verified by a product-specific EPD.



Read more about the low, typical, and high GWP values published in the [CLF Material Baselines](#) for 30+ construction products.

Lowering Limits Over Time: Option 2

If an initial GWP baseline is set, policies may require percentage reductions by certain dates. This is similar to how companies or governments typically make public commitments to reduce carbon broadly.



Incentives



Goal: Rewarding high performers, incentivizing innovation, and increasing compliance

- **Direct financial support/tax incentives** for developing EPDs
 - Examples: [Oregon State EPD Program](#); included in [Buy Clean Oregon](#) passed in 2022; included in Build Back Better Act (*\$20M for EPD program run by EPA*)
- **Performance incentives** to contractors at end of project (if achieved certain GWP reductions)
- **Purchasing preference incentives** to evaluate products for carbon AND cost
 - Example: Bid Incentives included in original [NY LECCLA](#) and later versions of [CA SB-778](#)
- **Expedited product evaluation** by for new products
 - Example: Proposed in [NY Climate Forward Concrete Leadership Act](#)

Increasing Policy Compliance

Policies that are difficult to comply with may be less successful (i.e. result in less embodied carbon reductions, etc.)

Examples of tactics used by government agencies to ease compliance and increase the success of a policy:

- Provide (or partner to provide) free education and training sessions
- Standardized, easy to use reporting interfaces for project teams
- Pilot projects to test requirements
- Model specifications or other documents for use by project teams
- Multi-year timelines for phase-in of requirements
- Policy exceptions and waivers (or ‘hardship clauses’)
- Early adoption incentives



Thank you!