Carbon Leadership Forum

Alternative Material Solutions Workshop

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Carbon Leadership Forum

Our **mission** is to accelerate the transformation of the building sector to radically reduce the embodied carbon in building materials and construction through collective action.

Research

- Data assessment
- Data methodology
- Policy
- Strategies
- Applied research
- Peer review

Initiatives

- EC3 Tool
- SE 2050 Challenge
- Other Tools/Data

Resources

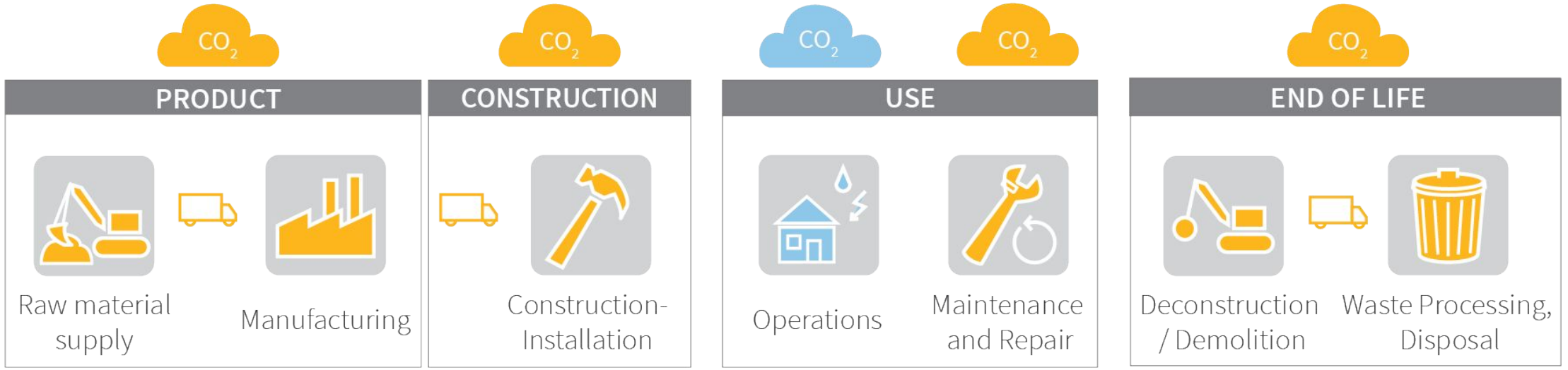
- Newsletters
- Toolkits
- Curricula
- References
- Policy primers

Network

- Local hubs
- Online community
- NGO roundtable
- Members
- Sponsors
- Policymakers

Embodied carbon across the building life cycle

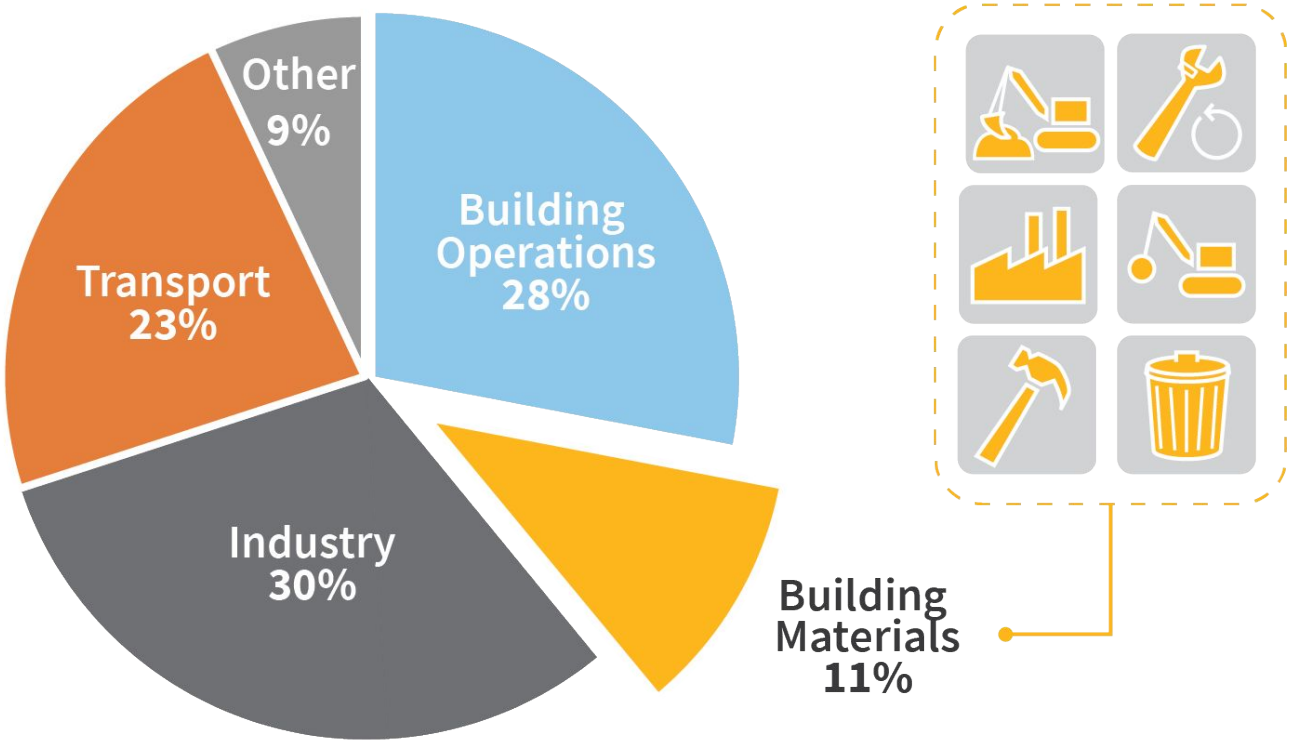
Embodied carbon refers to the greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials.



Embodied carbon is significant

- Globally, building materials are responsible for 11% or more of energy-related carbon emissions.
- Steel and cement are the two largest emitters in the industrial sector (IEA)
- By 2060, 40% of emissions from building and construction will be from the production of cement and steel alone (IEA)

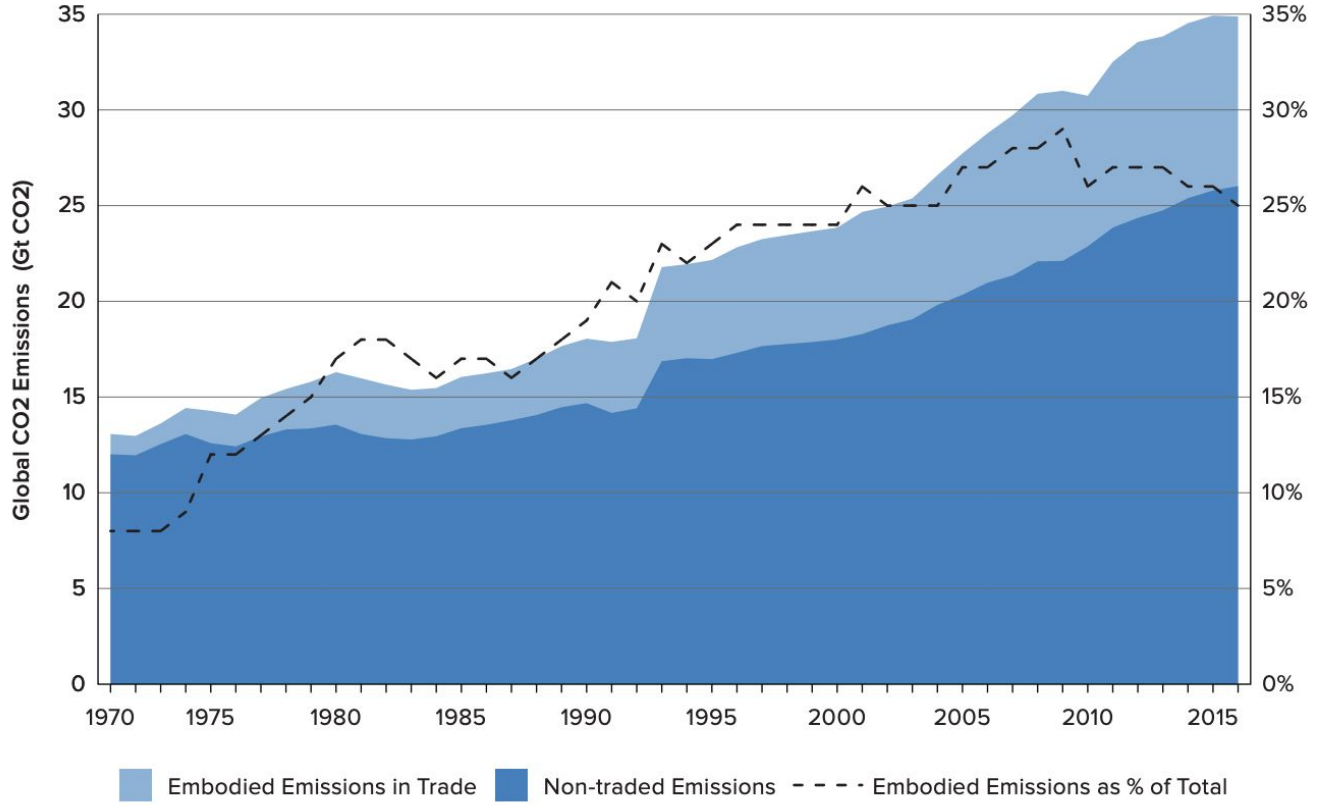
Global energy-related carbon emissions



Data sources: UNEP Global Status Report 2017; EIA International Energy Outlook 2017.

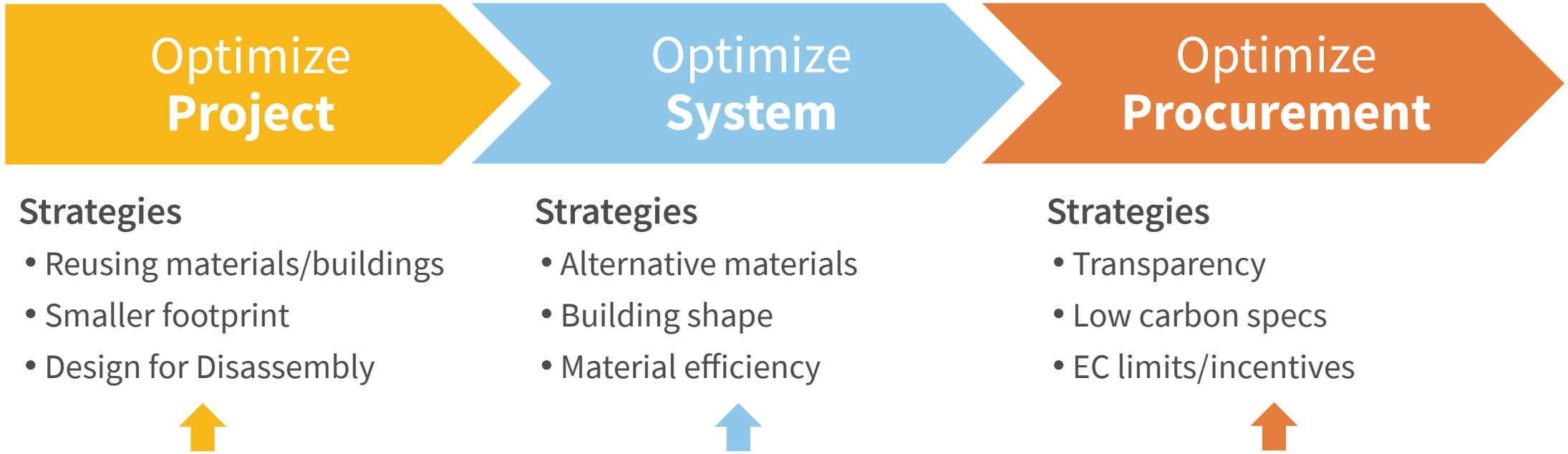
Embodied carbon is missing from global climate policy

- The majority of a product's embodied carbon footprint is generated across its supply chain, which may be spread across the globe.
- Emissions are accounted locally, creating a 'carbon loophole'
- Approximately 25% of global emissions are embodied in traded goods that pass through this loophole



Source: KGM & Associates and Global Efficiency Intelligence; 2019 Report

Embodied Carbon Reduction Strategies



Peformance-Based, Technology Agnostic Policy Solutions

Part 1

Building Approach

- Used by green building certifications and some city policies
- Uses **Whole Building Life Cycle Assessment** to measure performance

- Incentivizes **Architects & Engineers** to design a lower carbon building
- Key for encouraging building/material reuse and use of newer innovative materials

Part 2

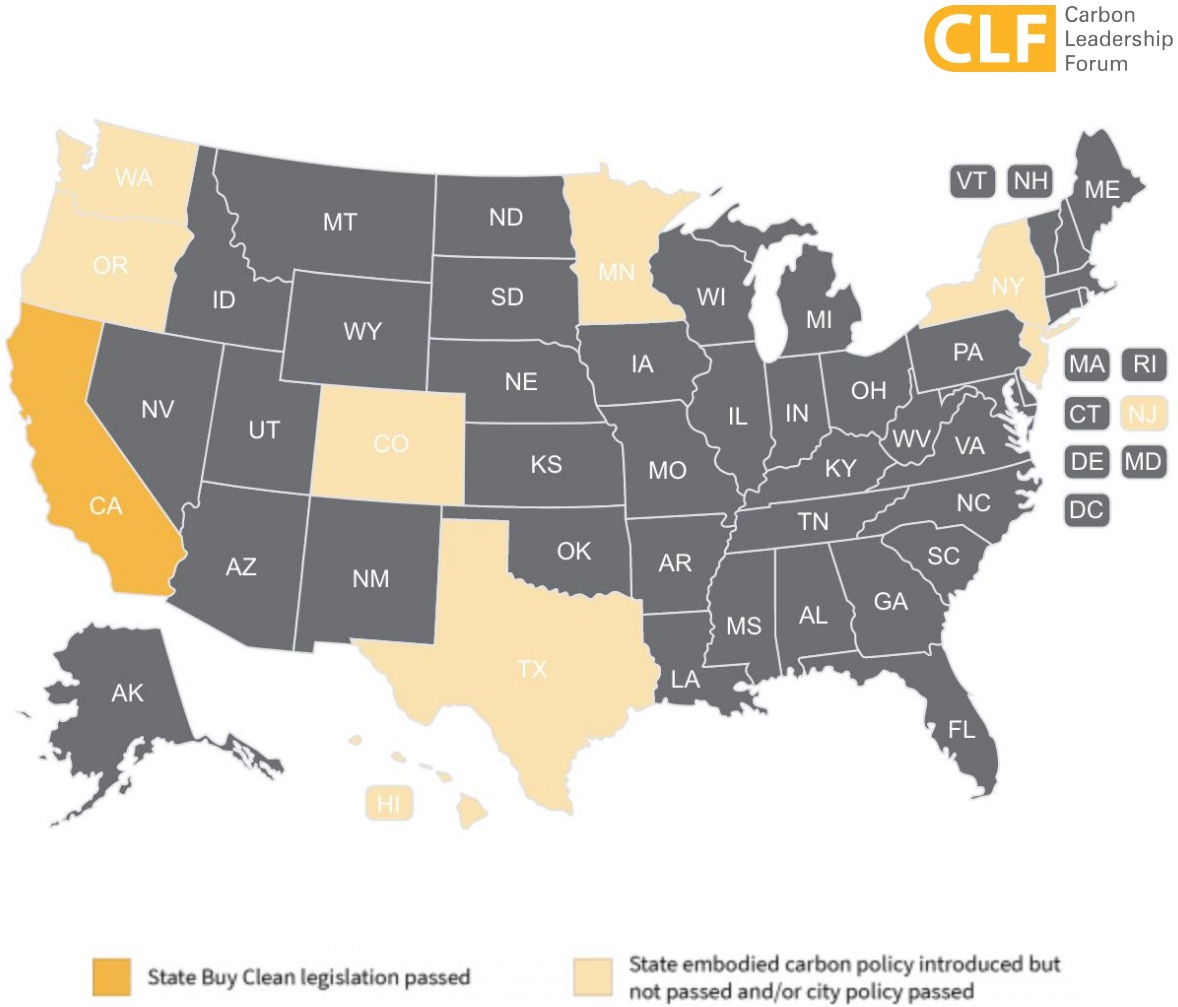
Material Approach

- Buy Clean / other procurement policies
- Uses **Environmental Product Declarations** to measure performance

- Incentivizes **Manufacturers** to invest in clean manufacturing practices
- Key for low carbon technology adoption, particularly for products like concrete/steel
- Transportation/infrastructure policy

Growing Embodied Carbon Policy Landscape

- **Federal Buy Clean program proposed** (Clean FUTURES Act
- **Bills introduced in 6 states in 2021** (WA, MN, OR, NY, NJ, CT)
- **California published first GWP limits** in Jan. 2021 for steel, insulation, glass
- **Local** climate action plans and procurement requirements and incentives
- Policymakers are building off private sector for leadership



Alternative Material Solutions

**Excluding 'high temperature processes'*

		Market Ready Today	Reduction Potential	Examples

01	**Low(er) Carbon Material**	✓	~10-40%	• Products with high recycled content
				• Cement alternatives
				  ◦ SCMs (fly ash, slag)
				  ◦ Limestone Calcined Clay Cement (LC3)
				  ◦ Portland Limestone cement (Type 1L)

02	**Carbon Storing Materials**	✓	>100% (Carbon 'Negative')	• Sustainably harvested timber (CLT, etc.) • Non-timber structural/cladding (bamboo, etc.) • Bio-based insulation and panel products (fiberboard, cellulose, straw, hempcrete) • Rammed earth (floor slabs)
03	**Emerging Materials**	✗	Unknown, likely high	• Carbon-Storing Aggregate (such as synthetic limestone aggregate from sequestered CO2) • Algae / seaweed products • Mycelium insulation / structural and cladding products

Carbon Storing Materials

- Biogenic materials have the potential to not just store carbon but also **support the rural communities where they are grown**
- Fiber-based, earth-based, purpose-grown, and waste stream materials
- Many have been available for thousands of years or are on the shelf at Home Depot

For more info, also check out the Carbon Leadership Forum's partner the Endeavour Centre.