

# The Impact of Federal Buy Clean Requirements on the Concrete Industry

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# Meet the Speaker



**Eric Dunford**

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# Key Points

**01 What is Buy Clean?**

**02 Carbon in Concrete**

**03 Measuring Carbon  
in Concrete**

**04 Executive Orders**

**05 Potential Effects on  
the Concrete Industry**

**06 How Buy Clean  
Could Affect Your  
Business**



# What is Buy Clean?

'Buy Clean' loosely refers to any legislation that proposes to incorporate climate considerations as a part of public procurement decision-making.

## Key Principles:

- Climate impact of purchased materials must be tracked and recorded
- Independent and transparent quantification of life cycle impacts of materials
- Establishment and publication of industry averages, maximum carbon limits, etc.



# What is Buy Clean?

- First implemented in California beginning in 2017 (Bill 262 – Assemblyman Rob Bonta)
- Subsequently implemented in Colorado and proposed in several other states (e.g., Washington, Minnesota)
- Scheduled for introduction at the federal level in the United States beginning on January 1, 2023

# How Carbon in Concrete is Measured

Type III Environmental Product Declaration (EPD):  
A third party-verified declaration of environmental impact

- Estimates environmental impacts associated with material manufacturing
- Equivalent to a nutritional label
- Ideally, EPDs are prepared for individual concrete mix designs at a specific plant
- Relies on a Life Cycle Assessment (LCA) following a Product Category Rule (PCR)
- Valid for five years

## ENVIRONMENTAL IMPACTS

### Declared Product:

*Plant name / mix code here*

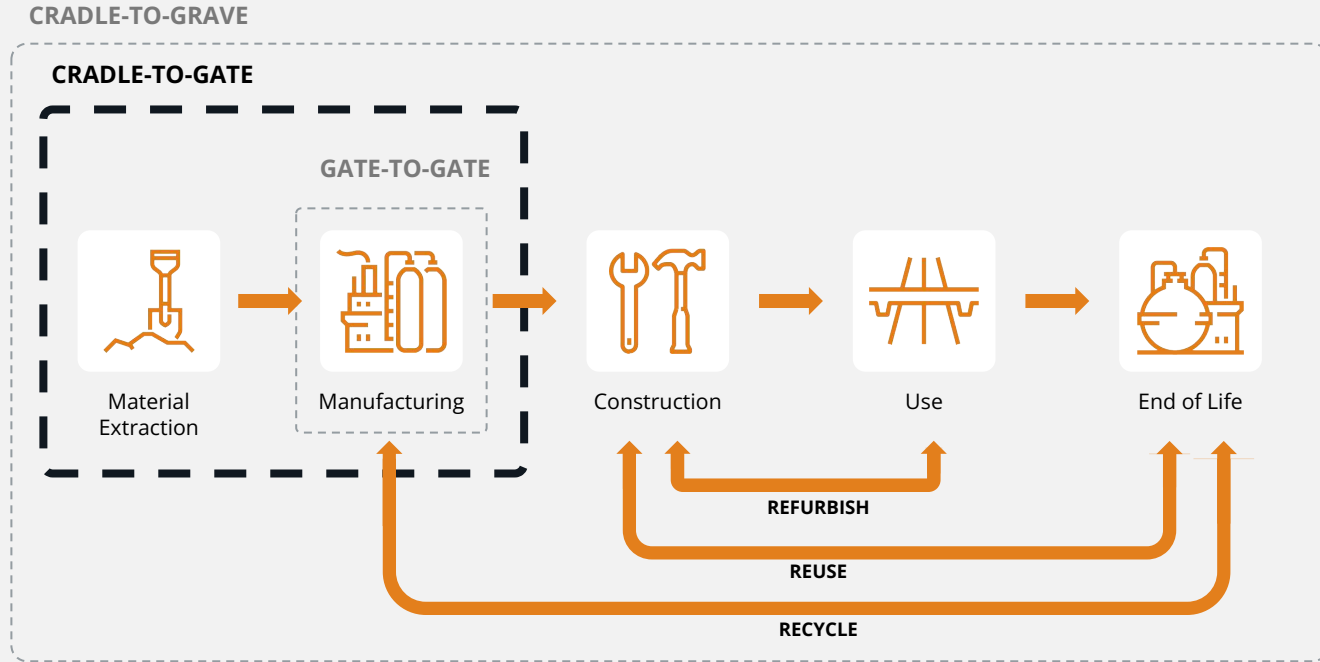
Compressive strength: 4000 PSI at 28 days

**Declared Unit:** 1 m<sup>3</sup> of concrete

Global Warming Potential (kg CO <sub>2</sub> -eq)	432
Ozone Depletion Potential (kg CFC-11-eq)	2.95E-5
Acidification Potential (kg SO <sub>2</sub> -eq)	3.10
Eutrophication Potential (kg N-eq)	0.35
Photochemical Ozone Creation Potential (kg O <sub>3</sub> -eq)	56.1
Abiotic Depletion, non-fossil (kg Sb-eq)	9.05E-5
Abiotic Depletion, fossil (MJ)	4,238
Total Waste Disposed (kg)	0.38
Consumption of Freshwater (m <sup>3</sup> )	1.93

**Product Components:** natural aggregate (ASTM C33), lightweight aggregate (ASTM C330), Portland cement (ASTM C150), slag cement (ASTM C989), batch water (ASTM C1602), admixture (ASTM C494), admixture (ASTM C260)

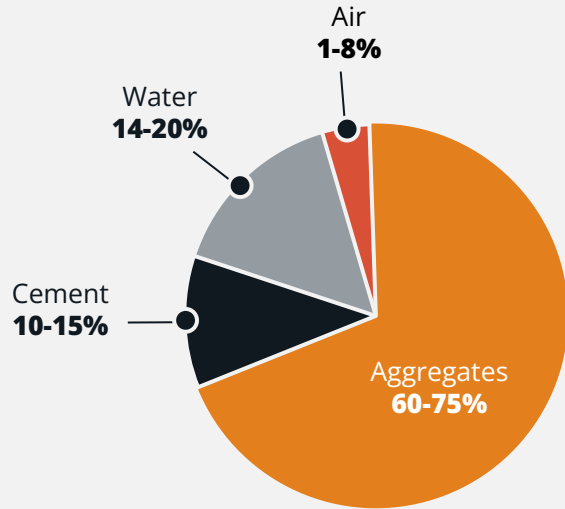
# Concrete LCA Boundary: Cradle to Gate



Reference: Adapted from K. Simonen, *Life Cycle Assessment*



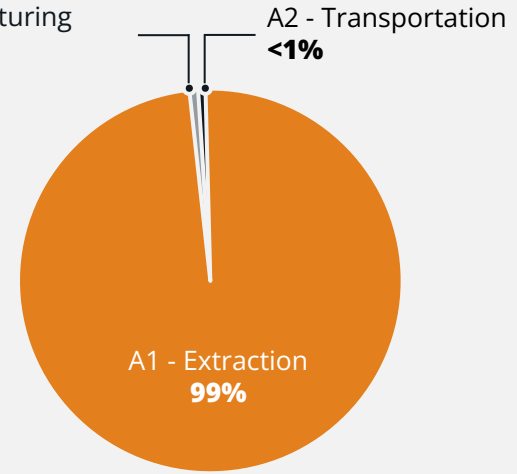
# Origins of Carbon in Concrete



**Constituent materials of concrete  
(by mix composition)**

Reference: Adams, M. P. (2020, November 16). Reducing the Embodied Carbon in Concrete. Presentation.

A3 - Manufacturing  
1%



**Emissions sources in concrete manufacturing  
(by life-cycle phase)**

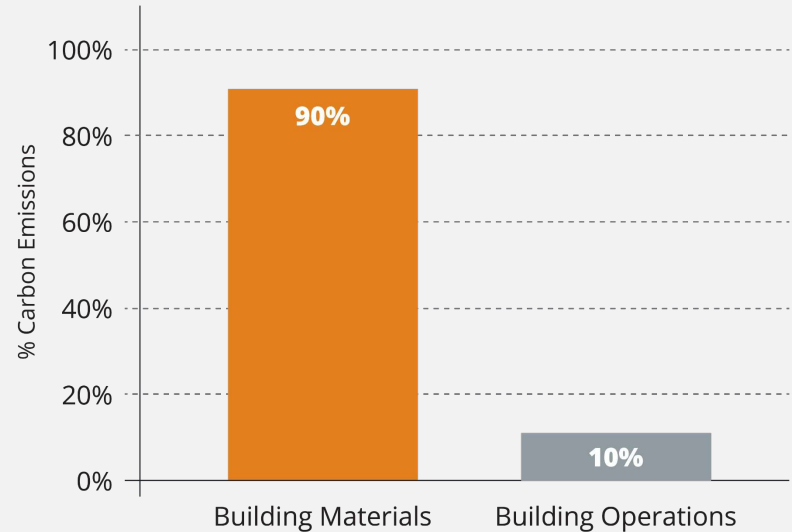
Reference: National Ready Mixed Concrete Association EPD Database

# Why Do We Need EPDs for Concrete?

- Decarbonization of this sector is especially important due to size of impact and need for continued growth
- Lack of clarity on current climate performance of concrete materials
- Diversity of concrete products limits value of industry averages
- Effective policy action depends on access to more accurate and granular information

## Building Sector CO<sub>2</sub> Emissions

New Construction: 2015 - 2050



Source: 2018 2030, Inc. / Architecture 2030. All Rights Reserved.  
Data Source: EIA (2011), Richard Stein, CBECS (2003), McKinsey Global Institute

# How are EPDs Created?



## 1. Follow PCR Guidance

Product Category Rule for Concrete defines how to perform LCA calculations and reporting.



## 2. Data Collection

Information on raw materials, suppliers, ancillary materials and other plant data is gathered.



## 3. Life Cycle Assessment

Analyses of emissions sources to quantify net climate impact of material.



## 4. Create EPD

Documenting the life cycle assessment results in a standardized reporting format.



## 5. EPD Verification

External assurance that the quantifications are reasonable / accurate.

# The US Federal Buy Clean Executive Order

# Catalyzing Clean Energy Industries & Jobs Through Federal Sustainability

- Executive Order issued December 8, 2021
- Section 303 established a federal Buy Clean Task Force for the first time
- Identifies concrete and steel as target sectors
- Directs Task Force to provide recommendations for use of EPDs for these materials
- Directs Department of Transportation to establish an Embodied Carbon Working Group



# GSA Maximum Carbon Limits

Industry Average Global Warming Potential Values (kg of carbon dioxide equivalent per cubic meter – CO <sub>2</sub> e kg/m <sup>3</sup> )		
Strength	Minimum	Maximum
<2500	178.72	279.56
2501-3000	197.09	311.39
3001-4000	238.71	383.60
4001-5000	288.10	468.89
5001-6000	302.75	493.67
6001-8000	349.15	574.10

Maximum Global Warming Potential Limits for GSA Low Embodied Carbon Concrete (kilograms of carbon dioxide equivalent per cubic meter – CO <sub>2</sub> e kg/m <sup>3</sup> )			
Specified compressive strength (f'c in PSI)	Standard Mix	High Early Strength	Lightweight
up to 2499	242	326	462
2500-3499	306	413	462
3500-4499	346	466	501
4500-5499	385	519	540
5500-6499	404	546	N/A
6500 and up	414	544	N/A

Reference: National Ready Mix Concrete Association *Industry Average EPD for Ready Mixed Concrete 2021*

Reference: General Services Administration *Low Embodied Carbon Concrete Standards 2022*

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# How Buy Clean Could Affect Your Business

1. **Type III EPDs** become a requirement for all federal projects
2. Bidders may be blocked from projects if their concrete mixes are above the **maximum specified limits**
3. Climate performance likely to be normalized as another **bid selection criterion**

*Note: Buy Clean policies are not restricted to the USA!*



# Low-Carbon Concrete in Canada

## Greening Government Strategy

- Commits Government of Canada to disclosing the quantity of embodied carbon in structural materials purchased for major projects
- Target of 30% reduction in carbon impact of structural materials by 2025
- Investigating alignment with US Federal Buy Clean requirements
- Awaiting publication of *Roadmap to Net-Zero-Carbon Concrete*





# How You Can Prepare

- 1. Understand your impact:** Investigate vendors and create EPDs for your mix designs
- 2. Be ready to communicate:** Ensure that your teams are ready to speak to the carbon impact of your mix designs
- 3. Invest in carbon reduction:** Implement options for lower carbon processes or technologies so that you are positioned for success



# Unanticipated Consequences

Small, family-owned, and independent concrete producers may face disadvantages in creating EPDs and lower carbon concrete products due to:

- Unequal distribution of, and access to, lower carbon materials like SCMs
- Unequal access to technology solutions
- Greater relative financial burden of EPD generation and maintenance

# What might the future hold?



# Carbon Baselines Lower Risk for Other Levels of Government

- Other levels of government are likely to copy federal requirements and carbon limits for concrete materials
- Several states are already compelling or have proposed requirements to track carbon impact of concrete and other materials
- Examples include California, New York, New Jersey, Colorado, and Illinois



# Private Sector is Ahead of Federal Procurement Requirements

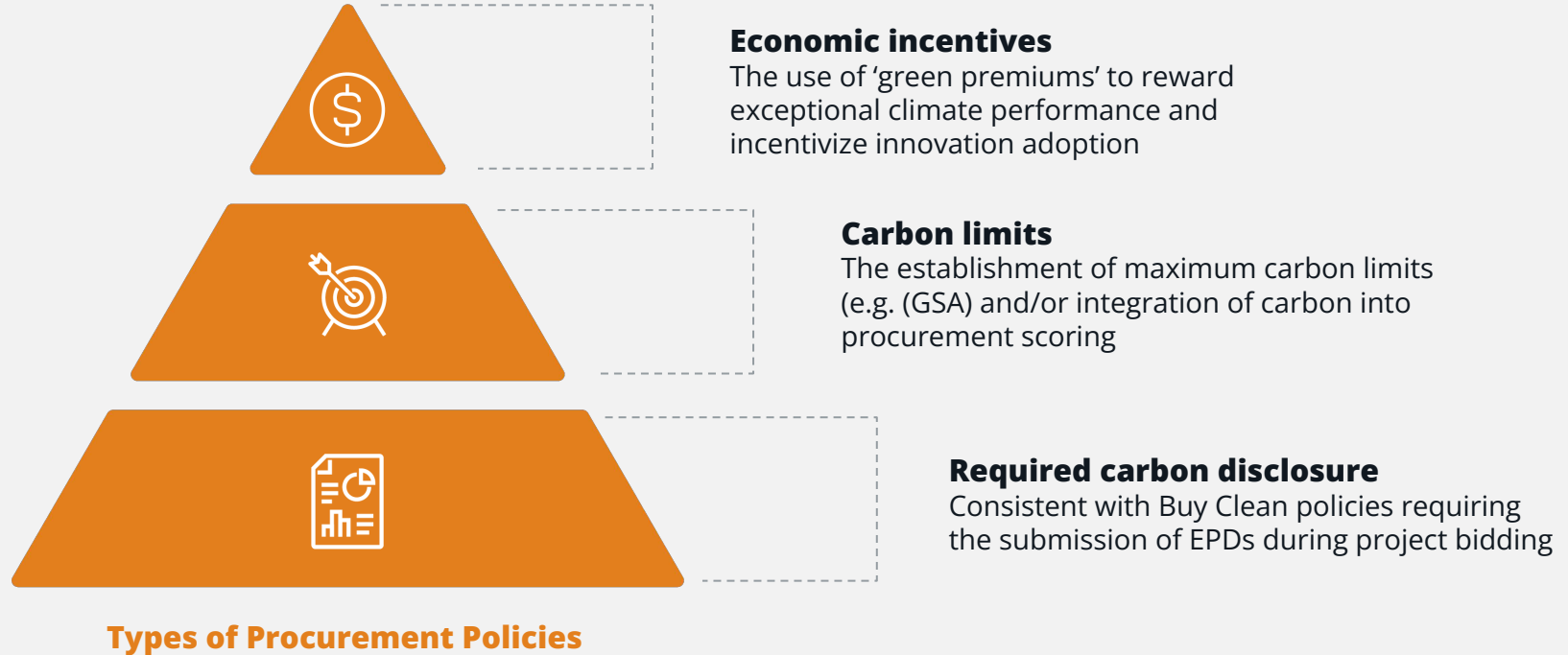
- Likely that private sector buyers will mimic and accelerate federal Buy Clean policy
- Example: First Movers Coalition – 55 corporations working with government to procure low-carbon steel, aviation fuel, and carbon dioxide removal
- Direct experience suggests private sector is moving faster and setting more ambitious targets



# How Else Could EPDs be Used?

- Reporting and baseline creation is just the first step in policy development
- What is the purpose of a baseline?
- Decarbonization roadmaps demand successive reductions in carbon intensity of construction materials over time
- Reasonable to expect that disclosure requirements will be followed by more stringent standards for carbon reduction

# How Else Could EPDs be Used?





# Thank You!

## Questions?

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