



DOE Cement & Lime Decarbonization Workshop

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Regulatory/Standards Panel

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Portland Cement Association

Since 1916, PCA has been the premier policy, research, education, and market intelligence organization serving America's cement manufacturers

Represents majority of domestic cement production capacity

Mission: promote safety, sustainability, and innovation in all aspects of operations, foster continuous improvement in cement manufacturing and distribution, and generally promote economic growth and sound infrastructure investment

Cement and concrete manufacturing, directly and indirectly, employs over 600,000 people and contributes over \$100 billion to economy

PCA Roadmap to Carbon Neutrality

- Roadmap to Carbon Neutrality released in October 2021
- Industry committed to goal of carbon neutrality across cement and concrete supply chain by 2050
- Low-embodied carbon cements key to industry decarbonization using additional supplementary cementitious materials

2050 Carbon Neutrality Policy Levers



Research, Development & Innovation



Regulations, Permitting & Guidance



Financial Incentives & Support



Performance-Based Material Standards



Market-Based Carbon Pricing



Market Acceptance



Community Acceptance



Cradle-to-Cradle Life Cycle-Based Procurement



Low-Carbon Infrastructure



Level Playing Field

Role of Technical Standards/Policy

- Essential for coordination of development of technical standards and policy for deployment of sustainable low-carbon cement and concrete
- This coordination necessary to increase availability of products and acceptance from end users
- PCA actively working with federal agencies and technical standards organizations to develop standards for low-carbon cements

PCA Role

- PCA and the industry support an all-of-the-above approach on materials and specifications for low-carbon cements
- Accelerate acceptance and adoption by marketplace, users, code authorities, and construction space
- PCA role is education and awareness
- Also advocating to federal agencies for whole life-cycle based procurement policies to drive market for low-embodied carbon building materials

Current State of SCMs and Cement

- Cement actively using SCMs as decarbonated raw materials:
 - Fly Ash (ASTM C618 – Provisions for Reclaiming Fly Ash for Concrete)
 - Slag
 - Silica Fume
 - Ground limestone
 - Natural Pozzolans
 - Calcined Clay
- Prescriptive limits for certain SCMs
- Further research is needed to test whether increased SCMs can be utilized to reduce clinker factor in cement and maintain strength, durability and resilience characteristics

Portland-Limestone Cement (PLC)

- Remarkable shift in manufacture and acceptance PLC, cement with 5-15% limestone addition
- Reduces CO2 emissions by 10% on average compared to traditional portland cement
- Acceptance by 44 State DOTs
- Cement plants have transformed to 100% PLC production
- PLC currently 32% of total U.S. cement consumption



Procurement Policy

- White House, GSA, FHWA, EPA, and States developing “Buy Clean” and other procurement policies to drive market acceptance of low-carbon materials
- PCA actively engaged with federal agencies on developing policies of building materials from cradle-to-cradle, rather than cradle-to-grave



GSA Concrete Standards for Land Ports of Entry

- **March 2022:** Requires contractors to provide cradle-to-gate EPDs for each concrete mix design specified and used for land ports of entry using NSF International’s product category rules for concrete
- Requires contractors to provide concrete that meets specific global warming potential limits for specified mix types and strength classes

Maximum Global Warming Potential Limits for GSA Low Embodied Carbon Low Embodied Carbon Concrete (kilograms of carbon dioxide equivalent per cubic meter)			
Specified compressive strength	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

GSA Interim Concrete Standard for 11 Pilot Projects

May 2023

GSA IRA Limits for Low-Embodied Carbon Concrete (EPD-Reported GWPs, in kilograms of carbon dioxide equivalent per cubic meter – kg CO ₂ e/m ³)			
Specified concrete strength class (compressive strength (f' _c) in pounds per square inch, PSI)	Top 20% Limit	Top 40% Limit	Better Than Average Limit
≤2499	228	261	277
3000	257	291	318
4000	284	326	352
5000	305	357	382
6000	319	374	407
≥7200	321	362	402

Add 30% to these numbers for GWP limits where high early strength concrete mixes are required for technical reasons, with written approval from GSA's IRA Program Management Office.

GSA Interim Cement Standard for 11 Pilot Projects

- Where the provision of concrete that qualifies is impractical, the limits for cement may be applied to the concrete being used in the concrete mix
- Construction product assemblies can qualify where at least 80% of the assembly's total costs or total weight comprises low embodied carbon cement

GSA IRA Limits for Low Embodied Cement (EPD-Reported GWPs, in kilograms of carbon dioxide equivalent per metric ton– kg CO₂e/m³)		
Top 20%	Top 40%	Better Than Average
751	819	858

EPA Low-Embodied Carbon Labelling Program

- IRA provided EPA with \$100M to develop a program in coordination with GSA and FHWA 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
- EPA December 2022 “Interim Determination” defines “substantially lower embodied carbon construction materials as:
 - Best performing 20% Global Warming Potential (GWP)
 - If not available in project location, best performing 40%
 - If not available in project location, better than estimated industry average
- PCA provided response to RFI from EPA on May 1:
 - EPA must take “whole life-cycle approach” to calculating embodied carbon
 - Account for regional differences and performance characteristics of required concrete mix



QUESTIONS?