



Building Demand for Low-Carbon Concrete

How Public and Private Procurement
Can Unlock a Market

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About the EFI Foundation

The EFI Foundation is an independent, nonpartisan leader tackling the toughest energy challenges of our time. Under the leadership of Ernest J. Moniz, the 13th U.S. Secretary of Energy, the EFI Foundation conducts rigorous research to accelerate the transition to a low-carbon economy through innovation in technology, policy, and business models. The EFI Foundation maintains editorial independence from its public and private sponsors.



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Table of Contents

Executive Summary	1
Introduction.....	6
Low-Carbon Concrete Industry State of Play	10
Overview of State and Local Low-Carbon Concrete Strategies.....	16
Current Low-Carbon Concrete Policy Implementation Challenges	23
The Market Formation Pathway to Procure Low-Cost, Low-Carbon Concrete	27
Pennsylvania Low-Carbon Concrete Workshop	34
Conclusion	36
References.....	37

Executive Summary

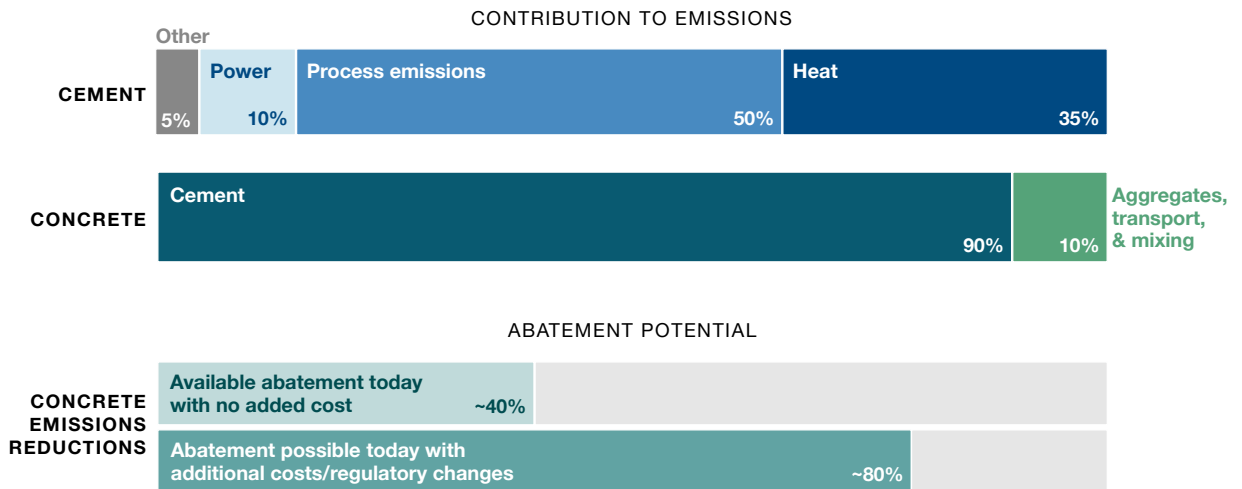
Concrete is the most manufactured material in the world and is used ubiquitously in modern infrastructure. Demand for concrete is expected to grow substantially in the coming decades, driven by population growth, infrastructure investment, and rapidly expanding demand sources like data centers. However, modern concrete production methods rely on expensive, emissions-intensive materials which account for an estimated 8% of global greenhouse gas (GHG) emissions. Future expanded concrete use will only increase this substantial negative environmental impact unless new, lower-carbon concrete mixtures are quickly scaled.

This report recommends a pragmatic, low-cost action plan to reduce concrete's carbon intensity today by leveraging the market-making potential of modernizing public and private procurement. Although scaling technologies to decarbonize traditional concrete mixtures will take time, mixtures can be modified today to reduce emissions while preserving performance and lowering costs.

Concrete is generally a mixture of water, sand, aggregates, and cement. While cement makes up less than 15% of most concrete mixtures by mass, it accounts for 90% of concrete's greenhouse gas emissions. Traditionally, cement is produced by the heating and calcination of raw materials, (e.g., limestone) and grinding them into a fine powder. Decarbonizing this traditional cement mixture requires reducing heating and process emissions through the use of more expensive emerging technologies such as carbon capture and kiln electrification. However, by instead modifying concrete and cement mixtures to use smaller quantities of traditional cement, over 40% reductions in emissions are achievable today with no added costs.



Figure ES-1. Concrete and cement greenhouse gas emissions and present-day cost-effective abatement potential



Data from: *Rocky Mountain Institute (2021)*, *Ozinga (2026)*, and *U.S. Department of Energy (2023)*.

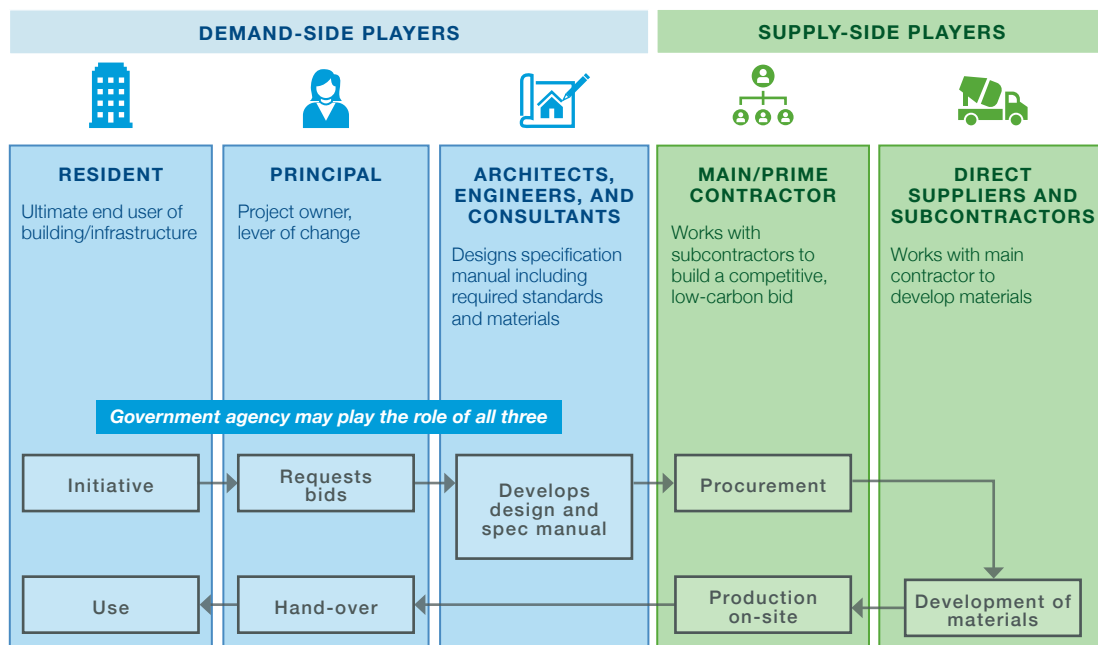
Low-carbon cement and concrete blends are produced by replacing a portion of traditional cement, called Portland cement, with supplementary cementitious materials (SCMs). SCMs are traditionally sourced from waste or byproducts from the fossil fuel industry and industrial processes (e.g., fly ash from coal combustion) and thus are available at much lower costs than Portland cement. These cement and concrete blends with low-carbon material substitution are commercially available and are cost-competitive with traditional blends today. **In fact, low-carbon concrete has already been used in the construction of data centers, skyscrapers, and residential buildings.**

Despite the widespread availability, cost competitiveness, and proven performance of low-carbon concrete, the market has been slow to scale. This is largely because of several market and policy impediments, including a lack of market transparency (i.e., inadequate data on the cost, performance, and carbon intensity of low-carbon concrete); reliance on outdated standards and specifications that prescribe the concrete mix as opposed to specifying performance-based metrics; and a fragmented value chain that dulls market signals. Combined, these challenges lead to a lack of clear demand signals and pathways for low-carbon concrete to penetrate the market at meaningful scales.

The structure of the cement and concrete market further complicates the scaling of low-carbon concrete. Cement production in the United States is relatively concentrated, with fewer than 10 cement companies supplying 75% of domestic production. In contrast, concrete production is highly fragmented and localized, with more than 2,000 ready-mix concrete companies nationwide. These concrete producers are embedded in a long and

complex construction value chain in which they typically do not contract directly with project owners, but instead operate several steps removed through designers, general contractors, and subcontractors. This fragmentation limits direct communication between buyers and producers and weakens demand signals for low-carbon materials. As a result, even when low-carbon concrete is cost-competitive and locally available, existing procurement and contracting structures often prevent it from being systematically valued or adopted at scale.

Figure ES-2. Example model of a typical construction project supply chain



Adapted from: [Vrijhoef and Koskela \(2000\)](#).

As major offtakers, state and local governments have the potential to unlock the low-carbon concrete market. Through their procurement for public projects, they purchase roughly one third of all concrete used in the United States. Because of their substantial buying power and role as setters of important material and infrastructure specifications, state and local governments command significant market influence. Recognizing this opportunity, several first-mover states and cities have begun to require or incentivize low-carbon concrete through their procurement policies. Large private sector offtakers, such as major data center companies, also have begun to signal demand for lower-carbon concrete.

While these early movers have made progress by requiring environmental product declarations (EPDs) and, in some cases, setting global warming potential (GWP) thresholds in public procurement and building codes, most policies fall short of driving

meaningful shifts in the valuation of the low-carbon concrete market, largely due to policy implementation challenges and outdated procurement models.

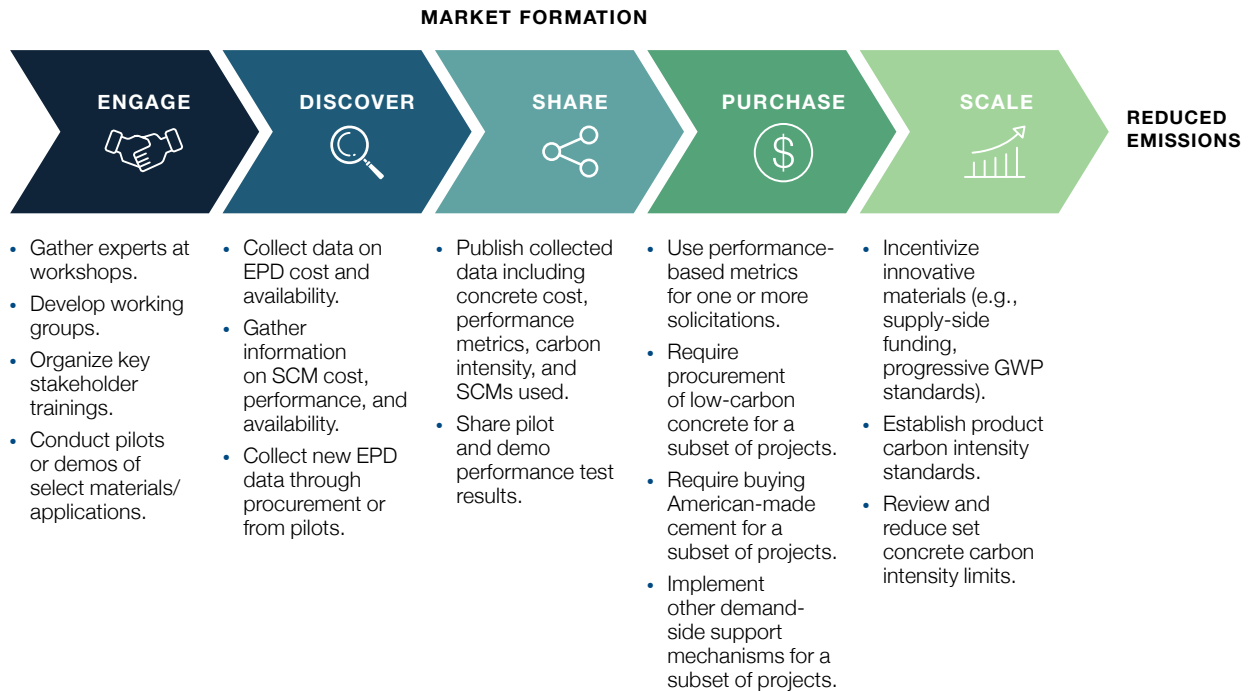
Through interviews with industry experts and state and local government officials, the EFI Foundation (EFIF) assessed existing state and local policies designed to increase the production and use of low-carbon concrete and identified common challenges that have limited their market-forming impact. Major implementation challenges identified through EFIF interviews include: capacity and knowledge gaps, fragmentation of efforts and lack of coordination, challenges with tracking and reporting, and a resistance to change. Many state and local government officials cited limited staff and technical expertise to design, implement, and update procurement requirements for concrete across complex and fragmented supply chains as a major implementation challenge. Their efforts are often further constrained by fragmented responsibilities across multiple agencies and limited coordination among policymakers, procuring entities, and industry, resulting in inconsistent signals to the market.

Without addressing these challenges to provide clearer demand signals and essential market data, these policies risk imposing administrative burdens without delivering their full potential to scale low-carbon concrete, reduce emissions, or mobilize private investment.

To address these challenges and unlock the market-making potential of public and private sector procurement, EFIF proposes a “Market-Forming Demand Action Plan” for public and private concrete buyers built around five progressive stages:

- 1. Engage** local producers, industry experts, local communities, labor groups, and other key stakeholders to build working relationships, test ideas, and conduct trainings and/or pilot projects.
- 2. Discover** relevant market and product information, including low-carbon concrete costs, availability, carbon intensity, and available SCMs.
- 3. Share** anonymized (if necessary) market and product data, insights from working group engagements, and pilot projects.
- 4. Purchase** low-carbon concrete with large-volume commitments across multiple projects.
- 5. Scale** actions to reduce concrete carbon intensity. This includes supporting innovative material development, procuring larger volumes of low-carbon concrete, and progressively reducing set carbon intensity limits.

Figure ES-3. Market-Forming Demand Action Plan for public and private sector purchasers of concrete



Source: *EFI Foundation.*

Through these steps, governments and private buyers can unlock the market-forming potential of their purchasing power, drive emissions reductions at minimal cost, and support domestic industrial sector competitiveness.

Expert interviews and insights gathered at a recent stakeholder convening in Pennsylvania illustrate that the cement and concrete industry is ready to respond when clear, durable demand signals from large offtakers are provided. Implemented effectively, demand-side policies such as changes in state and local procurement have the power to catalyze a budding low-carbon concrete market, achieve near-term emissions reductions, and accelerate future sector innovation.

Introduction

Concrete is the second most widely used material on Earth, surpassed only by water. It is used in almost every type of construction project, from roads and bridges to data centers and office towers. Around 30 billion tons of concrete are consumed annually, which is more by weight than oil and coal combined.^{1,a} Concrete demand is expected to grow over 40% by midcentury, driven by global population growth and industrialization.²

Although many use the terms cement and concrete interchangeably, each is a unique material with several important distinctions. Ordinary Portland cement (“cement”) is the primary binding ingredient in concrete. Cement is made by heating materials in a kiln at very high temperatures to form a substance known as clinker, releasing carbon dioxide (CO₂) in the process. The clinker is then ground into a fine powder and mixed with gypsum, limestone, and other additives to form cement.³ Typically, cement makes up less than 15% of concrete by mass, yet it accounts for 90% of concrete’s greenhouse gas (GHG) emissions.⁴

While Portland cement has been around for roughly 200 years, concrete has been made for millennia. In fact, the ancient Romans made and used concrete ubiquitously. Structures that are still standing, like the Colosseum and Pantheon, were built using mostly concrete roughly 2,000 years ago, without modern high-temperature kilns.⁵ While the exact mixture used is still debated, these durable structures provide early proof of concept for low-carbon concrete.

Today, cement accounts for roughly 8% of global GHG emissions. If it were a country, it would be the fourth-largest emitter.^{6,7} In the United States, cement accounts for approximately 1% of annual emissions. U.S. cement emissions come from just under 100 cement plants, which reported a combined 65 million tons of carbon dioxide equivalent (CO₂e) emissions in 2023.⁸ Significant decarbonization of Portland cement largely hinges on emerging technologies not yet at commercial scale, such as carbon capture and kiln electrification.⁹

However, innovative pathways for producing low-emitting and high-performing concrete and cement mixtures are cost-effective and commercially available today. These pathways often involve replacing a portion of traditional cement with supplementary cementitious materials (SCMs), offering cost-competitive concrete mixes with environmental benefits by leveraging existing materials. In addition to cost and carbon intensity reductions, supplementing traditional cement with SCMs can also offer air quality benefits by reducing the production of traditional cement, which emits large quantities of hazardous air pollutants.¹⁰

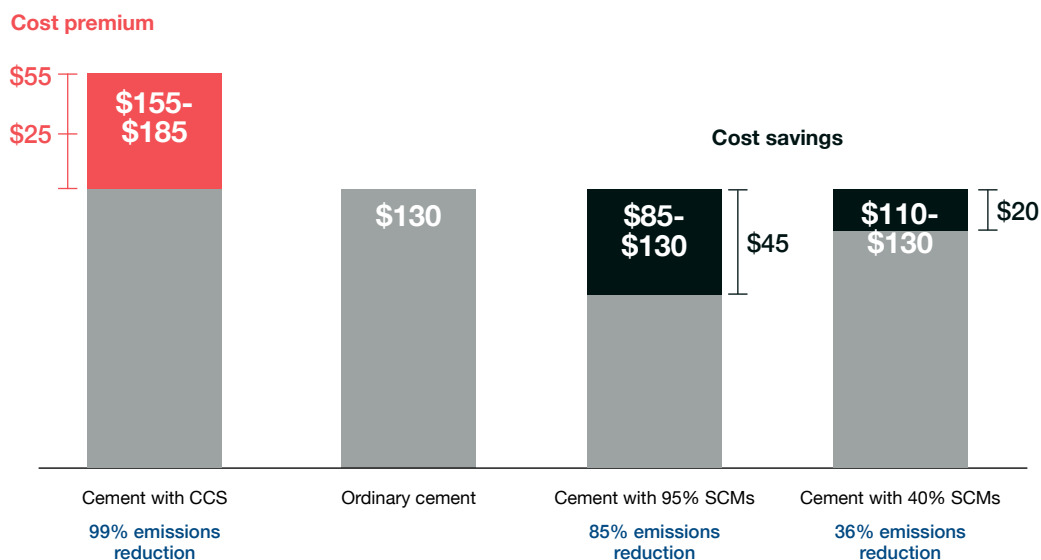
a Annual oil consumption in 2024 was estimated at approximately 5 billion tons using consumption estimates in barrels from the International Energy Agency (IEA) and barrel-to-ton conversions from BP. Annual coal consumption was estimated at 8.8 billion tons in 2024 by IEA.

95% of surveyed NRMCA member plants already use some amount of supplementary cementitious materials

A survey published by the National Ready Mixed Concrete Association (NRMCA) in 2022 revealed that over **95% of surveyed NRMCA member plants already use some amount of supplementary cementitious materials** in their concrete mixes.¹¹ According to Cemex, a global cement company, “SCMs are a partial replacement of Portland Cement to improve ... concrete properties, such as strength gain and durability.”^b Yet the carbon-reducing benefits of increased SCM use remain largely undocumented and unrealized.

Many SCMs are sourced from waste or byproducts from industrial processes (e.g., fly ash from coal combustion, ground granulated blast furnace slag from iron ore smelting, and silica fume from silicon metal production) and thus are available at much lower costs than cement.¹² As shown in Figure 1, SCMs have the potential to reduce the cost of cement mixtures by up to 35% while reducing life cycle emissions by up to 85%, compared to conventional mixes.

Figure 1. Cost per ton of ordinary Portland cement compared to estimated cost after two decarbonization measures



Data from: *U.S. Department of Energy (2023), U.S. Geological Survey (2025), Rocky Mountain Institute (2021).*

Notes: Carbon capture and storage (CCS) cost premium is from 2023 and includes the 45Q production tax credit. Cement baseline costs represent national estimates from 2021. Cement with SCM cost reductions assume substitution with ground granulated blast-furnace slag and upper-bound cost reductions.

b Quote from Cemex's website:
<https://www.cemexusa.com/w/what-are-supplementary-cementitious-materials-scms>.

Additionally, there are emerging technologies that can produce a product chemically identical to cement without high temperatures and almost zero emissions. These technologies are being piloted globally. For example, Sublime Systems developed a low-temperature cement-making process that uses electrical energy and widely available feedstocks.¹³ Sublime and Brimstone Energy, another low-carbon cement company, recently signed large offtake agreements with data center developers, demonstrating a growing demand for low-carbon concrete and cement.¹⁴

However, the emissions-reduction potential of low-carbon concrete that is available at commercial scale today is not being sufficiently realized. According to a producer interviewed by the EFI Foundation (EFIF), low-carbon concrete is everywhere; we just need a way to track it and value it.

Two related factors are slowing the scale-up of the low-carbon concrete market:

- 1. State and local governments—which represent more than one-third of the U.S. concrete market—rely on outdated procurement models that ignore or disqualify low-carbon mixes.** These standards often prescribe the concrete mix (e.g., minimum cement limits, maximum SCMs allowed), as opposed to specifying the performance requirements (e.g., compressive strength, durability, workability, etc.), allowing industry competition to design the appropriate material composition.
- 2. Government support focuses on supply-side incentives, such as pilot testing, grants, and sometimes production tax credits to incentivize new low-carbon concrete projects.** However, supply-side incentives alone do very little to help new projects attract adequate infrastructure financing, a gap often called the “missing middle” or the “valley of death.” These efforts will fall short unless governments become active buyers of low-carbon concrete—in part by fixing outdated procurement models.

As the largest single buyer of concrete and setters of important material codes and specifications, state and local governments hold a unique and powerful position in the concrete market. Although governments are not direct buyers of concrete—they purchase projects from contractors who purchase concrete—the standards set through their procurement can have large market implications. Through use of demand-side policies (e.g., procurement practices), state and local governments can drive the development of low-carbon concrete markets today with minimal expense. Public procurement that requires and/or incentivizes concrete with reduced carbon intensity sends clear market signals to industry that low-carbon concrete is preferred in a significant share of the local market.

State and local governments can realize multiple economic benefits from the growth of low-carbon concrete activities, in addition to decarbonizing an emissions-intensive industry. First, there are new job training and employment opportunities in low-carbon concrete. While the final product is nearly identical in most cases, there may be different drying times and techniques for finishing, requiring new training. Second, expanding domestic low-carbon concrete production can reduce reliance on emissions-intensive imported cement, helping to preserve U.S. market share and support American producers. Finally, one of the fastest-growing industries—AI and data centers—is actively buying as much low-carbon concrete as it can find. This means that building a regional market for low-carbon materials can help attract new private sector investment.

In the following report, EFIF surveys existing state and local policies supporting low-carbon concrete and recommends pragmatic actions for public and private sector stakeholders to support demand-side policies. These actions can unlock the low-carbon concrete market with minimal costs and incentivize continued innovation to further decarbonize the sector.



Low-Carbon Concrete Industry State of Play

Pathway to GHG Emissions Reductions

Concrete's carbon intensity, often referred to as its global warming potential (GWP), is typically a measure of cradle-to-gate greenhouse gas emissions per cubic meter (m³) or cubic yard (yd³). The average concrete GWP across the United States, according to estimates from the National Ready Mixed Concrete Association (NRMCA), sits at an average of 308 kilograms of carbon dioxide equivalent per cubic meter (kg CO₂e/m³) of concrete.^{c,15} The NRMCA also calculates GWP for eight regions across the United States, ranging from 286 kg CO₂e/m³ in the South Central region to 323 kg CO₂e/m³ in the Pacific Southwest region.^d Regional ranges in GWP can stem from differences in things like mix designs, fuels, and mixing/transportation practices across regions and production facilities. However, for all traditional concrete mixtures, the main source of GHG emissions is the production of cement. Cement makes up less than 15% of the concrete mixture by mass but accounts for 90% of the greenhouse gas emissions.¹⁶

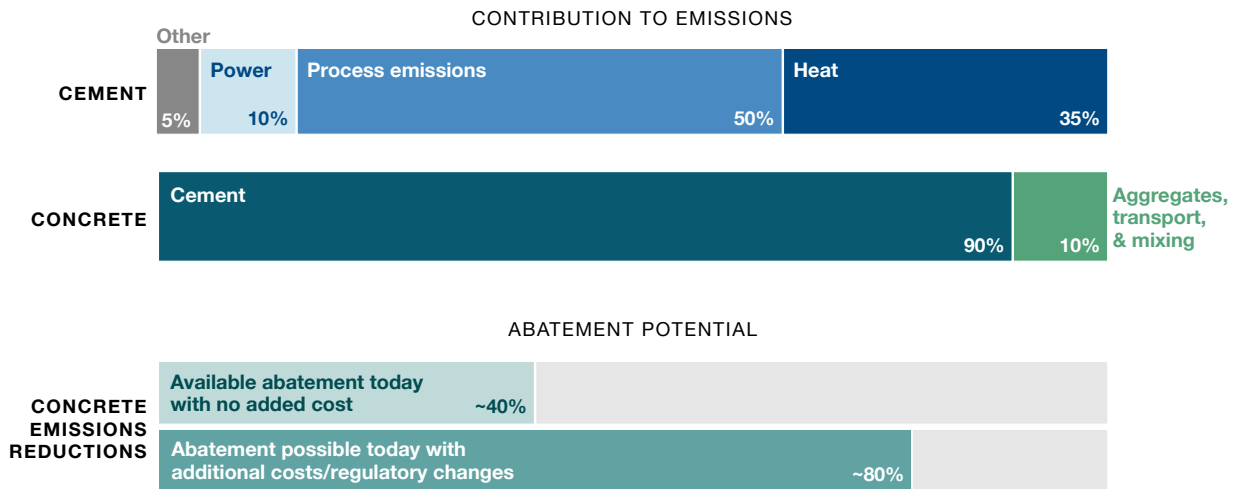
On average, cement plants across the United States emit 0.8 tons of CO₂e per ton of cement produced, with a total annual emissions rate of 65 million metric tons (Mt) of CO₂e per year—just over 1% of annual U.S. greenhouse gas emissions.¹⁷ These emissions largely come from generating high heat for kilns and the processing of limestone for clinker production, which releases carbon dioxide. Combined, these two steps in the cement production process account for 85% of production emissions (Figure 2).

***Cement makes up less than 15% of the concrete mixture by mass
but accounts for 90% of the greenhouse gas emissions.¹⁶***

c National average for concrete with a 28-day strength of 4,000 pounds per square inch (psi). Reported carbon intensity includes only cradle-to-gate emissions (A1-A3: raw material supply, transportation, and manufacturing) and excludes construction/installation and use emissions.

d All values given for concrete with a 28-day strength of 4,000 psi.

Figure 2. Concrete and cement GHG emissions and present-day cost-effective abatement potential



Data from: *Rocky Mountain Institute (2021)*, *Ozinga (2026)*, and *U.S. Department of Energy (2023)*.

Concrete’s embodied carbon has been reduced by up to 40% today with no added costs, but estimates suggest upward of 80% abatement is possible for certain applications and with additional regulatory changes (Figure 2). These significant embodied carbon reductions are possible when SCMs are used to replace a portion of traditional cement in concrete mixtures and cement blends. Because many SCMs in concrete are currently sourced from waste products of the fossil fuel industry, only transportation and processing emissions add to the embodied carbon of concrete or blended cement. Portland limestone cement, which blends limestone with traditional Portland cement for an approximately 8% reduction in GWP, was relatively recently introduced into the market and scaled quickly, making up approximately 35% of the market share in 2023.¹⁸ However, much greater abatement potentials are possible today. A 40% cement substitution with SCMs available today could abate 27 MtCO₂ in the United States annually with little to no added costs.¹⁹ Currently, SCM blending ratios for many projects are constrained by state government-set cement substitution limits. However, substitution with SCMs under the ASTM C595^e standard could deliver a more than 80% reduction in embodied carbon.^f

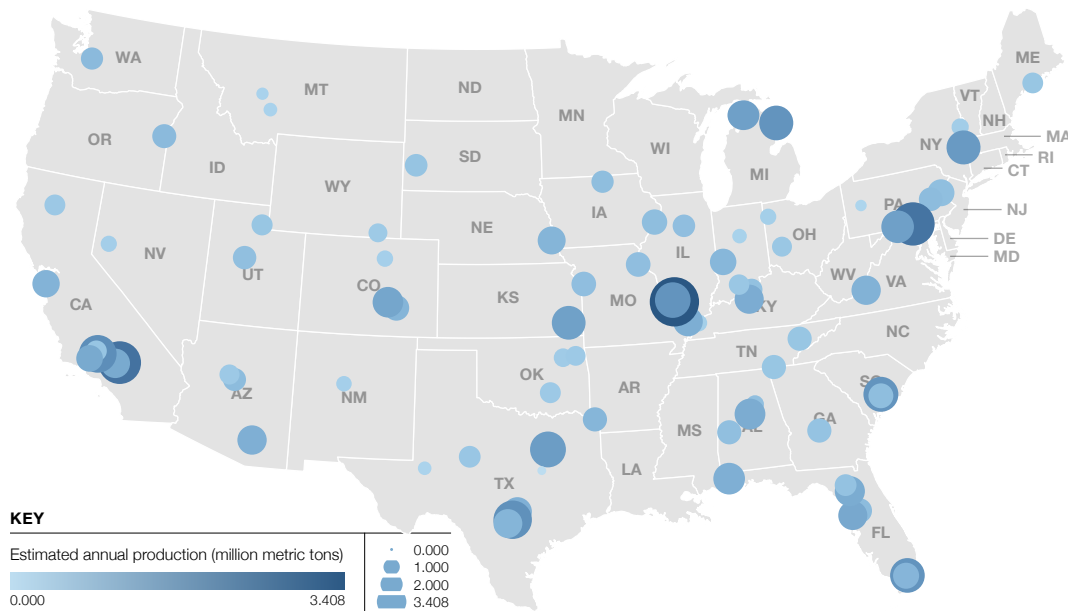
e ASTM C595 is the American Society for Testing and Materials standard specification for blended hydraulic cements.

f Assumes a 95% replacement of cement with SCMs. RMI, *Concrete Solutions Guide (2021)*, <https://rmi.org/insight/concrete-solutions-guide/>.

Concrete's Long and Fragmented Value Chain

While the cement and concrete industries are deeply connected actors in the industrial sector, they are vastly different in terms of market concentration and business models. The cement industry in the United States is heavily concentrated, with just under 100 plants supplying 86 million tons of cement across the country in 2024 (Figure 3). In fact, 75% of U.S. cement production is handled by fewer than 10 companies.²⁰ Cement can be shipped long distances and is thus also exposed to trade, with U.S. import reliance growing to 22% in 2024.²¹

Figure 3. Map of U.S. cement plants sized by annual production



Data from: Sierra Club's *Coming Clean on Industrial Emissions* report database (2023)
<https://www.sierraclub.org/industrial-transformation/industrial-decarbonization-climate-jobs-justice>.

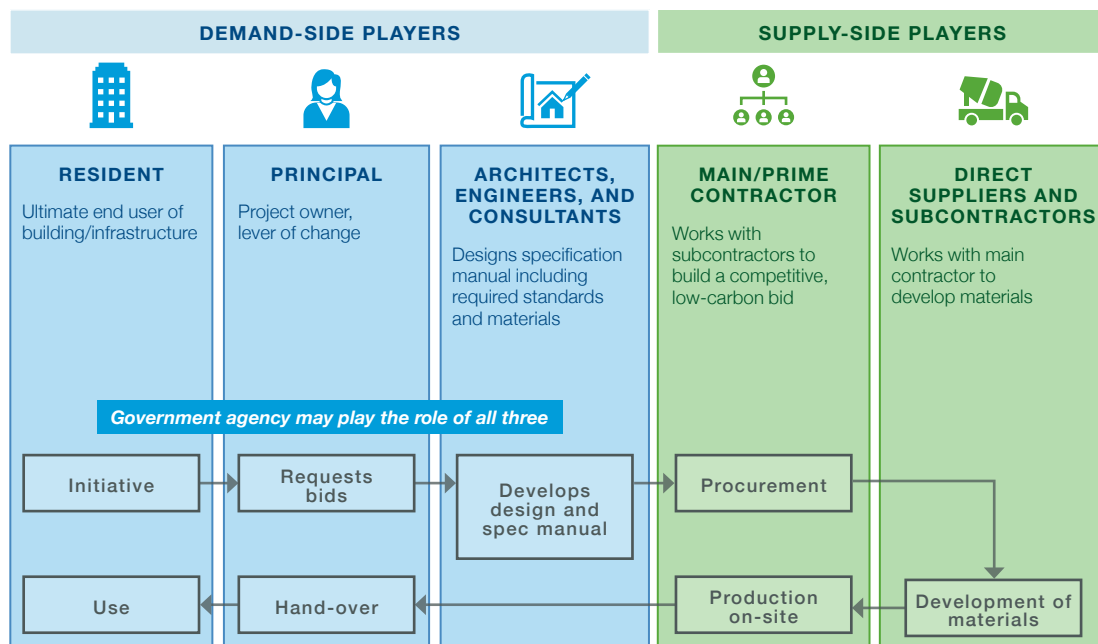
In contrast, concrete is a heavily localized industry because of the weight and time-sensitive nature of ready-mix concrete. U.S. Census Bureau and NRMCA estimates suggest there are over 6,000 ready-mix concrete plants owned by more than 2,000 companies across the nation. Although some ready-mix concrete producers are vertically integrated with large national and multinational cement suppliers, many plants (75%) are small operations with fewer than 20 employees.²²

Ready-mix concrete producers are just one player in a long, fragmented supply chain in public and private sector construction projects (Figure 4). There often are many degrees of separation between the project owner (e.g., a government agency) and the ready-mix concrete supplier, making communication challenging.

For example, when a new project is initiated, the project owner or “principal” solicits bids (“tendering”) for design and construction. Concrete producers do not directly respond to these bids. Rather, a prime contractor works with multiple subcontractors and suppliers to develop a competitive bid for the entire project. Often concrete is procured through a subcontractor who works directly with the concrete supplier on proving mixture designs to meet project goals and specifications.

This traditional model offers very little direct communication between concrete suppliers who produce low-carbon mixtures to meet a required threshold and the principal who sets the threshold. In between them are several contractors and subcontractors whose priority is to hand over a quality final project on time and on budget. Oftentimes, in their view, requirements for low-carbon concrete create additional unnecessary risk by introducing unfamiliar materials. However, as noted previously, many U.S. concrete producers use carbon intensity-reducing SCMs in their mixtures for major projects; the mixtures have only recently begun to be valued for their carbon emissions reductions.

Figure 4. Example model of a typical construction project supply chain



Adapted from: [Vrijhoef and Koskela \(2000\)](#).

Examples of Low-Carbon Concrete Production and Use Today

BOX 1. CONSTRUCTION PROJECTS THAT HAVE USED LOW-CARBON CONCRETE

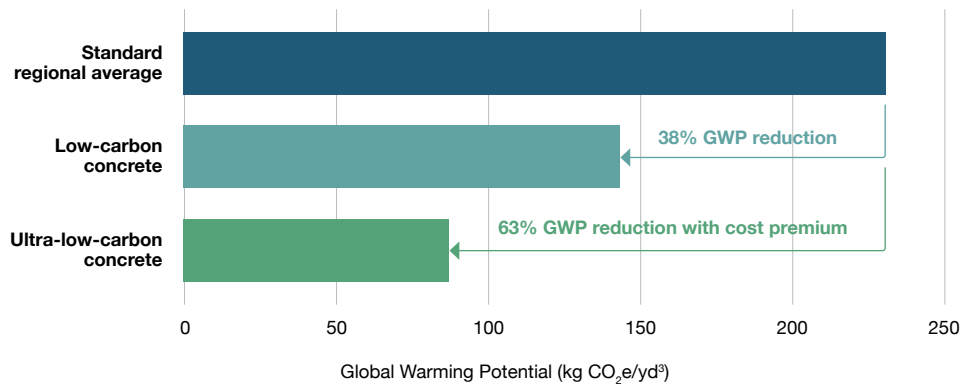
A HIGH-RISE APARTMENT BUILDING IN CHICAGO	A FRENCH MIDDLE SCHOOL	A DENVER HOTEL	NORTH AMERICAN DATA CENTERS
was built with Ozinga low-carbon concrete in 2021, reducing emissions by 30%.	was built with Holcim ECOPact low-carbon concrete with 40% fewer emissions in 2022.	was built with Amrize ECOPact low-carbon concrete with 30% fewer emissions in 2024.	have worked with multiple low-carbon concrete producers to purchase concrete with >60% reduced emissions.

Data from: *Ozinga (2021, 2025)*, *Holcim (2022)*, and *Amrize (2024)*.

Major cement and concrete suppliers already produce low-carbon concrete with an up to 60% reduction in embodied carbon for large private sector projects in the United States and abroad (see Box 1). Low-carbon cement and concrete blends have been used in full-scale projects around the world, including a middle school in France, a high-rise in Chicago, and new data center construction in the U.S. Midwest, to name a few.

These first movers in low-carbon concrete and cement production are tracking and advertising the carbon intensity reductions available with SCMs and other emissions-reducing levers in the concrete blends they sell. Companies like Ozinga, for example, currently offer concrete mixtures with up to 40% reduced GWP at price parity with traditional blends and over 60% reduction with a price premium (Figure 5).²³

Figure 5. Carbon intensity for standard and low-carbon concrete available today



Data from: *Ozinga*, “CarbonSense Ready Mix Sustainable Concrete,” <https://ozinga.com/product/carbonSense/>, accessed January 26, 2026.

Note: Example given for a mixture with compressive strength of 4,000 psi.

Across the United States, public and private project owners are signaling increased market demand for lower-carbon concrete. In the private sector, hyperscalers (such as Google and Amazon Web Services [AWS]) that are looking to offset Scope 3 emissions are working directly with low-carbon concrete producers to develop mixes for use in construction of new data centers. These companies are willing to pay green premiums for deeper reductions in embodied carbon and have even circumvented the fragmented concrete procurement value chain to do so.

Ozinga, for example, has partnered directly with Meta and AWS to develop even lower-carbon concrete mixtures than it currently has on the market, for use in new data centers. In the public sector, several states, cities, and counties are starting to require or incentivize lower-carbon concrete through their procurement and building codes. (Additional details on these strategies can be found in the next section.)

Despite the availability of low-carbon concrete at price parity with traditional mixtures and clear demand signals from major offtakers, the market has been slow to scale.

State and local governments can catalyze the low-carbon concrete market through their procurement process. The following sections of this report explore state and local governments' market formation potential for low-carbon concrete by (1) assessing current attempts of first-mover states, cities, and counties to decarbonize cement and concrete, (2) identifying common strengths and weaknesses of these first-mover strategies, and (3) proposing a new market formation pathway for public and private concrete buyers to decarbonize concrete through their procurement models.

Despite the availability of low-carbon concrete at price parity with traditional mixtures and clear demand signals from major offtakers, the market has been slow to scale.

Overview of State and Local Low-Carbon Concrete Strategies

First-mover states and cities are beginning to signal demand for low-carbon concrete through their procurement models and building codes. To EFIF's knowledge, as of November 2025, nine states and six cities/counties have taken action to require or encourage low-carbon concrete within their jurisdictions (Figure 6).

Several states also have seen bills introduced in their legislatures to support low-carbon concrete, including Connecticut (HB 6784, HB 6027), Illinois (SB 2484, HB 5461), and Pennsylvania (HB 1711). The 119th U.S. Congress also has proposed legislation to support low-carbon concrete (HR 1534, HR 2122, and S 1067). If passed, HR 2122—or the Innovative Mitigation Partnerships for Asphalt and Concrete Technologies (IMPACT) Act 2.0—may provide federal support for state transportation departments to transition to low-carbon materials. Internationally, the EU Carbon Border Adjustment Mechanism (CBAM) is expected to accelerate decarbonizing cement production, creating incentives for the industry to reduce emissions by putting an actual price on carbon based on the carbon intensity of cement products (Box 2).

This report focuses on reviewing and improving implementation of active policies at state and local levels in the United States.

Box 2. EU CBAM and cement products

The EU Carbon Border Adjustment Mechanism became fully operational on January 1, 2026, initiating the definitive phase in which financial obligations apply. Since 2023, CBAM has been phasing in required reporting where importers of covered goods, including cement, are required to report embedded greenhouse gas emissions for imports. However, starting in 2027, importers of CBAM-covered goods, including cement, will be required to report embedded emissions in the imported goods and surrender CBAM certificates corresponding to embedded emissions for 2026 imports.

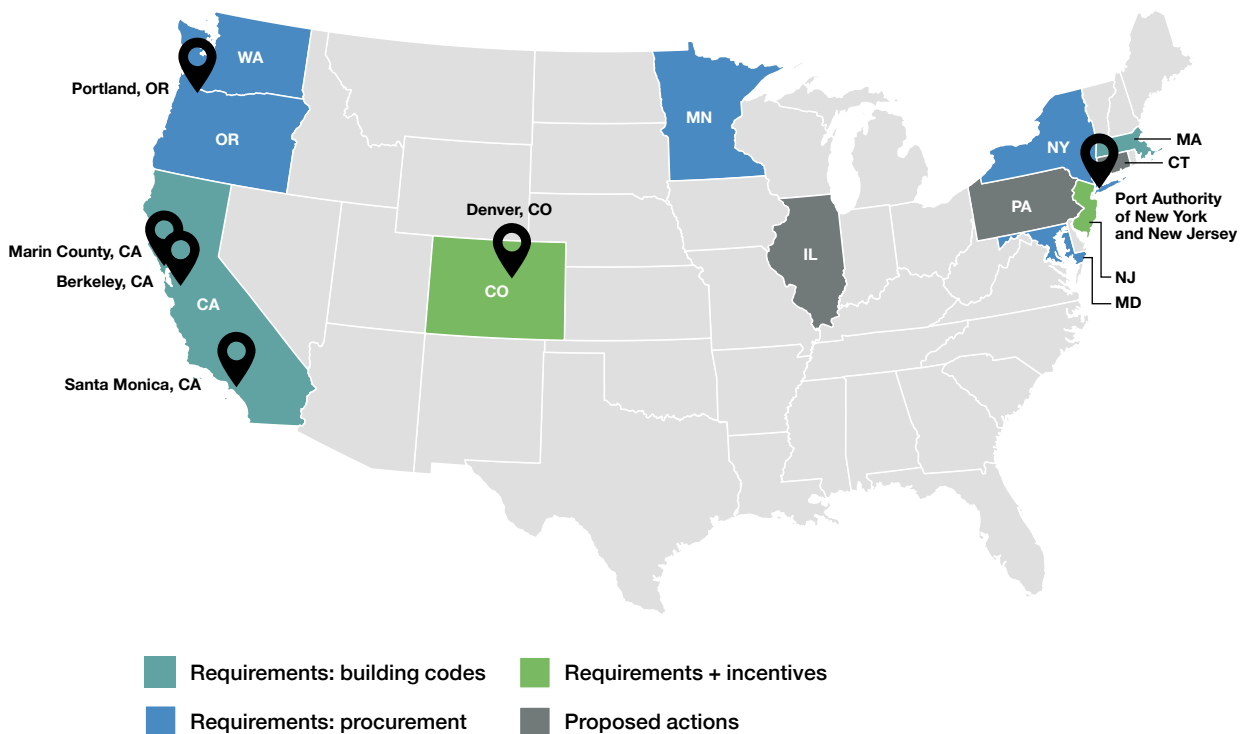
When calculating the number of associated CBAM certificates for imported cement, the EU accounts for direct production emissions, indirect emissions (e.g., electricity), and any carbon price paid in the country of origin. These data are reported by EU importers, based on information supplied by cement producers, and then used to calculate CBAM certificates on an annual basis. According to S&P Global, cement producers are already increasing prices in anticipation of CBAM impacts.

Source: [European Commission Taxation and Customs Union \(2026\)](#) and [S&P Global \(2025\)](#).

Current Policy Designs to Support Low-Carbon Concrete

Through assessment of active state policies and interviews with state and local officials, EFIF found that strategies to reduce concrete carbon intensity typically fall into one of three broad categories: requirements, incentives, and pilots, with some states using a combination of these approaches (Figures 6 and 7).

Figure 6. State and local government action on low-carbon concrete



Data from: Carbon Leadership Forum, "CLF Embodied Carbon Policy Toolkit," Policy Tracking Map, accessed November 2025, <https://carbonleadershipforum.org/clf-policy-toolkit/>.

Notes: Requirements include requirements for environmental product declarations (EPDs) as well as global warming potential (GWP)-based low carbon concrete requirements. Building code requirements include states/cities which have set concrete GWP limits as an optional compliance pathway in mandatory building codes. This map does not include grants for the creation of EPDs nor established advisory committees/councils. Cities and counties are included only if they have set GWP limits for concrete or cement in their public procurement or mandatory building codes. This map may not be exhaustive and represents a snapshot in time.

Figure 7. Types of active low-carbon concrete policies in state and local governments

	Policy structure	Policy type	Example jurisdictions	Benefits	Challenges
Incentives	Tax credits	Supply-side (production)	Colorado, New Jersey	Uses existing credit structure and distribution mechanisms	Requires coordination across multiple agencies
	C-PACE financing	Supply-side (projects)	Colorado	Uses existing funding structure in use across several states	Not specific to low-carbon concrete and thus may not increase demand unless used with other policies/ programs
	EPD grants	Supply-side (production)	Oregon, Minnesota, Massachusetts, Maryland	Offsets compliance costs where EPDs are required; EPD results could be public and reused, reducing costs over time	Does not help catalyze clean concrete on its own, unless associated with required reporting and max GWP limits
	Permitting incentives	Supply-side (projects)	Massachusetts, Seattle	Can ease regulatory burdens for preferred (i.e., low carbon) projects	Often focuses on whole-building embodied carbon, diluting the incentive for individual low-carbon materials
Requirements	EPD requirements for public procurement	Demand-side (production and projects)	Oregon, Washington	Provides useful data for procuring agencies and the market writ large if shared publicly	Places costly reporting burden on producers; does not encourage increased production of lower-carbon concrete
	Max GWP limits for public procurement	Demand-side (production and projects)	New York, Colorado	Large demand; opportunity to track and measure reduced GWP in government procurement	Limits are often set high to start with no clear plan to reduce; proving GWP is costly for producers
	Max cement limits for public procurement	Demand-side (production and projects)	Port Authority of New York and New Jersey (PANYNJ)	Does not require expensive EPDs	Total reduced GHG emissions uncertain
	Max GWP/ cement limits in building codes	Demand-side (production and projects)	Marin County, CA; Berkeley, CA; Santa Monica, CA	Uses existing regulatory structure	Higher-risk application for more novel concrete mixes
Pilots	Grants	Supply-side (production and projects)	Portland, OR; Minnesota; Washington	Allows testing of more novel mixes and educational opportunity for practitioners	One-time use of clean concrete, need to incentivize/require further use

Data from: Carbon Leadership Forum, "CLF Embodied Carbon Policy Toolkit," Policy Tracking Map, accessed November 2025, <https://carbonleadershipforum.org/clf-policy-toolkit/> and EFIF.

Note: EDP refers to environmental product declarations and C-PACE refers to commercial property assessed clean energy.

Requirements

State and local governments have used a few strategies to advance low-carbon concrete from the demand side through procurement and building code requirements. Generally, these demand-side policies include requiring Environmental Product Declarations (EPDs), setting GWP thresholds, setting maximum cement limits for concrete mixtures, or a combination of these approaches.

When used to their full potential, requirements for low-carbon concrete in public procurement or building codes provide a clear demand signal to industry. Requiring verified low-carbon concrete mixtures with EPDs in the procurement process also provides valuable market data for the state and the market writ large if shared publicly. Moreover,

as lower-carbon concrete has minimal price premiums compared to standard mixtures, instituting low-carbon requirements does not call for significant public funds beyond the workload to adjust procurement structures and verify mixtures as low carbon.

However, many state and local governments with low-carbon concrete procurement and building code requirements have struggled to maximize the market-making potential of modernizing their procurement models.

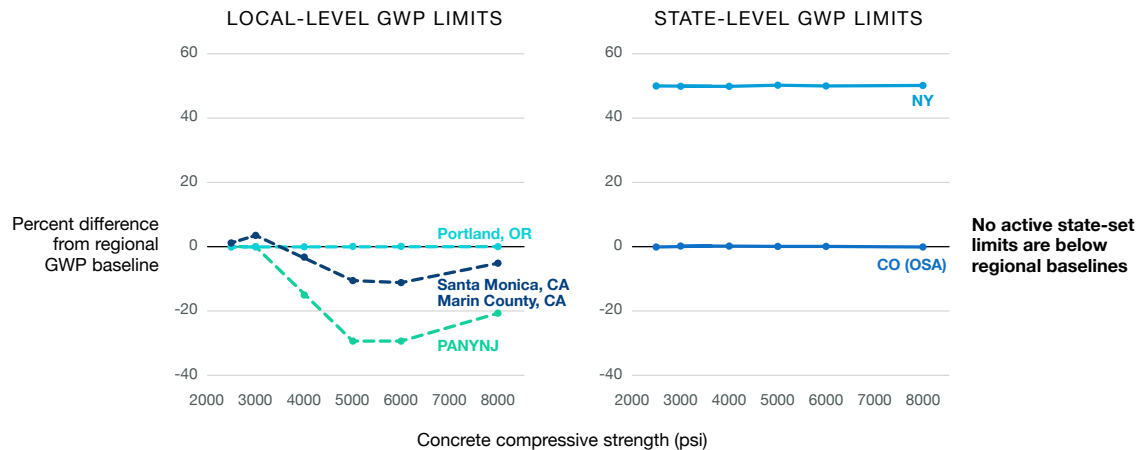
Public Procurement Requirements in State and Local Governments

Low-carbon concrete procurement requirements, often called “buy clean” laws, have largely been implemented in a phased approach with set timelines defined in statute, with most states still in early stages. The standard process is as follows. First, a procuring state agency (e.g., Department of Transportation, Commerce Department, Department of General Services) requires EPDs for concrete used in public projects above a certain size. Next, a GWP limit for concrete is implemented in public procurement. Finally, some laws require revisiting the set GWP limit every two to four years with an option to reduce the GWP threshold.

Most states with buy clean laws for concrete have not surpassed the first step of EPD requirement. As of November 2025, at least five states require or have plans to require EPDs for concrete used in public roads and/or buildings, yet Colorado and New York are the only states with active GWP thresholds for public procurement. Both states have set GWP thresholds at or above NRMCA regional average GWP estimates (Figure 8). Washington and Oregon have active EPD requirements for public procurement, but have no public plans to set GWP limits. Stopping at the step of requiring EPDs places a costly reporting burden on producers while not encouraging increased production of lower-carbon concrete. EPDs do provide valuable market data, but this data cannot benefit the broader market unless shared publicly. To EFIF’s knowledge, no state has announced plans to share EPD data collected through the procurement process publicly. However, Massachusetts publishes a list of low-carbon concrete mixtures available across the state with associated GWPs.^g

^g These data are available on the state’s building energy codes webpage, <https://www.mass.gov/info-details/2025-massachusetts-building-energy-codes>.

Figure 8. Concrete global warming potential (GWP) limits for public procurement and building codes across compressive strength categories



Data from: *National Ready Mixed Concrete Association (2022)* and *Carbon Leadership Forum (accessed November 2025)*.

Notes: Solid lines represent states while dashed lines represent local governments or interstate agencies. Regional baseline refers to National Ready Mixed Concrete Association (NRMCA) regional global warming potential (GWP) baseline estimates. OSA stands for Office of the State Architect and PANYNJ stands for the Port Authority of New York and New Jersey. Proposed or non-mandatory limits are not included.

Beyond the state level, Portland, Oregon, and the Port Authority of New York and New Jersey (PANYNJ) currently have active GWP limits for public procurement. PANYNJ has set maximum cement limits, in addition to GWP limits, as embodied carbon thresholds for concrete used in public projects. While using maximum cement limits removes the requirement for concrete producers to pay for costly EPDs, determining verifiable carbon intensity reductions for procured products becomes more difficult without EPDs. In addition to following state-set GWP limits, New York City also requires that EPDs for concrete used in public projects be made publicly available in the public-facing EPD reporting database, the EC3 tool.^h

Building Code Requirements in State and Local Governments

To EFIF’s knowledge, no state currently sets concrete-specific low-carbon requirements in their building codes. While the state of California has low embodied carbon limits in its CALGreen building code, submitting EPDs to demonstrate compliant GWP is one of several possible pathways to comply with required embodied carbon reductions. The current GWP limit for concrete, if a project owner selects that compliance pathway, is set at 175% of the NRMCA regional GWP baseline estimates.²⁴ Massachusetts also has GWP thresholds (set at the NRMCA regional GWP baseline estimates) in its building codes, but they are one of many compliance pathways to meet required Home Energy Ratings.²⁵

^h Building Transparency, “EC3 tool: Embodied Carbon in Construction Calculator,” <https://www.buildingtransparency.org/tools/ec3/>.

However, several cities and counties have set GWP limits for public and private buildings through building codes and ordinances (Figure 8). In California, the city of Santa Monica and Marin County require buildings, swimming pools, and spas to comply with set GWP or maximum cement limits for concrete. The city of Berkeley instead requires the use of concrete blends with a reduction of 25% or more in cement levels.²⁶ In Colorado, the Denver 2022 Green Code requires eligible projects reduce the carbon intensity of materials and resources and includes an optional compliance pathway of demonstrating new concrete meet GWP limits set at the average GWP for EPDs submitted to EC3.²⁷

Incentives

Active state and local government incentive structures for low-carbon concrete largely consist of supply-side support, incentivizing production of low-carbon concrete or projects that use it within the state. Policy structures for incentives implemented thus far include tax credits, Commercial Property Assessed Clean Energy (C-PACE) financing, grants for generating EPDs, and permitting/building rating incentives. One benefit of incentives such as tax credits and C-PACE financing is that they fit into existing structures. However, they can require coordination across multiple government agencies. EPD grants and permitting incentives are helpful tools to ease financial and regulatory burdens and encourage the use of low-carbon concrete.

However, these supply-side incentives alone are insufficient to scale the low-carbon concrete market. Nearly every state with an incentive program also has procurement requirements. Only Massachusetts has incentives in place for low-carbon concrete without active procurement requirements, but the state's legislatively mandated Embodied Carbon Intergovernmental Coordinating Council is currently developing recommendations on procurement requirements for the state legislature to be released in 2026.

Grant programs to offset the cost of producing third-party-verified EPDs are likely the most common incentive for low-carbon concrete production and use. At least four states currently offer this assistance to concrete producers. Increased development of EPDs, if made public, helps provide valuable information to a budding market. However, third-party-verified, product-specific EPDs can cost upward of a thousand dollars, which can be a large barrier for small ready-mix concrete businesses to comply with state procurement requirements.²⁸

Two states offer tax incentives for low-carbon concrete production and/or use. New Jersey offers a production tax credit to concrete producers that supply state-funded projects with EPD-verified concrete whose GWP falls below a set threshold, providing up to 8% of the total contract cost and capped at \$1 million per producer per year.²⁹ Colorado offers two tax incentives that include reducing concrete's carbon intensity: First, a sales and use tax exemption is available for certain cement and concrete mixtures that meet state-specified

GWP standards.³⁰ Second, industrial facilities that make investments to reduce their embodied carbon are eligible to apply for a “Colorado Industrial Tax Credit Offering” via a competitive application process where awarded projects receive a tax credit that covers up to 30% of qualified expenses.³¹

In 2025, Colorado also expanded the eligibility of its C-PACE financing to include improvements using low-carbon materials. The C-PACE program is a state policy-enabled financing tool that provides low-cost, long-term financing for building owners and developers to make energy-related upgrades. C-PACE financing has been enabled by nearly 40 states as of 2022.³² However, Colorado is the first state to expand the program’s eligibility to embodied carbon reductions in building materials.

Currently, only a few state and local governments are providing permitting incentives for embodied carbon reductions, including the use of low-carbon concrete. For example, Seattle’s Green Building Permit Incentives program provides additional development capacity in certain zones for projects that meet green building goals and certifications, including an optional pathway to provide EPDs for concrete that demonstrates a 10% or greater reduction in GWP compared to NRMCA regional baselines.³³

Pilot Projects

Several states and cities have used pilot projects to test low-carbon concrete mixes in various applications as a preliminary step before setting procurement requirements. Pilots often serve as an educational tool for stakeholders across the long concrete value chain and can help identify adjustments that may need to be made when using a new concrete mixture (e.g., different curing times). When made publicly available, data from pilots can also educate broader audiences beyond those involved with the pilot itself.

While pilots are a useful tool for state and local agencies, especially in the early stages of low-carbon concrete policy development, they offer only a small one-time use of low-carbon concrete and do not alone accelerate the market. To maximize the potential of pilots to impact the low-carbon concrete market, pilot data, including cost of the concrete and embodied carbon, should be shared widely. This ensures the learnings from the pilot can inform other state and local agencies and provide essential data for the broader low-carbon concrete market.

State and local government low-carbon concrete pilot projects have included a wide array of applications, from sidewalks to portions of state highways. For example, the city of Portland, Oregon, conducted 18 pilot tests of lower-carbon concrete mixes for different applications across the city from 2020 to 2022 before setting GWP limits for public procurement, which took effect in 2023. The city also published detailed data from each pilot including mix descriptions and performance metrics.ⁱ

i Public data is hosted at <https://www.portland.gov/procurement/sustainable-procurement-program/sp-initiatives#toc-low-carbon-concrete-initiative>.

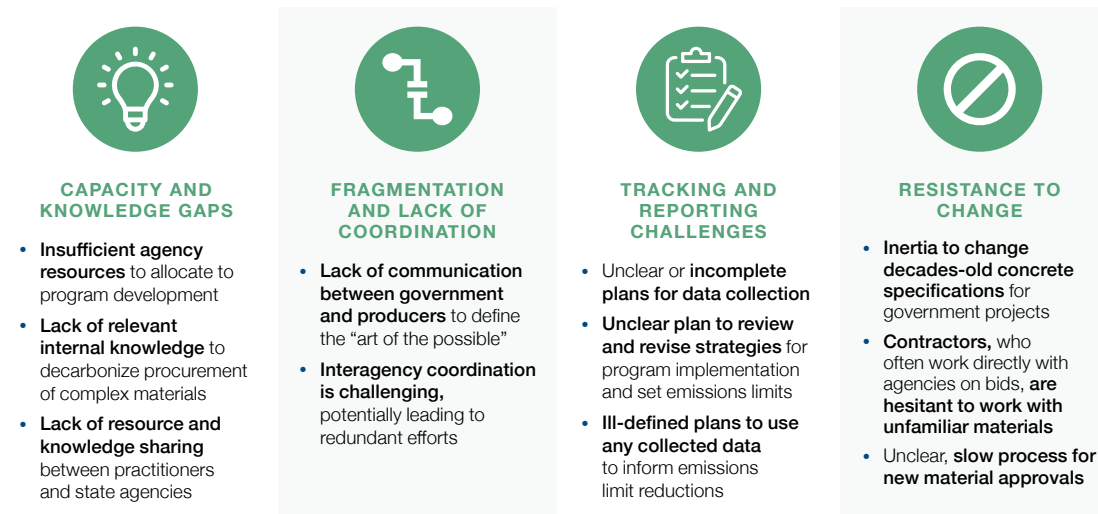
Current Low-Carbon Concrete Policy Implementation Challenges

While many of the above policies create a foundation for demand-side policy supporting low-carbon cement and concrete, implementation challenges have prevented them from achieving their full market-formation potential.

To understand these challenges, EFIF spoke with state and local government officials working to implement policies supporting low-carbon concrete. Four key challenges emerged from these discussions:

1. Limited capacity and knowledge gaps for implementing technical policies.
2. Fragmented efforts and lack of coordination.
3. Unclear tracking and reporting strategies.
4. Resistance to change.

Figure 9. Challenges states and industry partners experience when working to decarbonize concrete through procurement policies



Source: *EFI Foundation.*

1. Limited Capacity and Knowledge Gaps in Implementing Technical Policies

The government officials interviewed by EFIF frequently said that limited resources and internal knowledge gaps challenge their ability to implement procurement changes to support low-carbon concrete. Several interviewees noted that states don’t have the

internal capacity to just take up and run with buy clean policy. Recent analysis by the Carbon Leadership Forum revealed that the funding and staffing provided for buy clean programs are slim. Many local programs have no new staff nor funding, while state programs in Oregon, Colorado, and Washington had limited funding and, at most, one full-time employee to staff the program.³⁴ The complexity of concrete mixtures, procurement structures, and the long, fragmented value chain for concrete used in building and infrastructure projects is daunting for the few employees typically tasked with implementation.

In states with active buy clean laws that include GWP requirements, the specification of GWP limits for public procurement was left to the discretion of the procuring state agency (typically a transportation or general services department). Although potentially allowing for easier passage of these buy clean laws, passing on the task of specifying initial GWP limits to already resource-constrained state agencies can lead to drawn-out implementation timelines. Moreover, many states that have finalized or proposed GWP limits have opted to use the regional GWP baseline estimates currently available from the NRMCA as their initial threshold (Figure 8).

A lack of knowledge and resource sharing between academics, industry, and government officials further exacerbates these challenges. The federal government previously helped facilitate this communication through several working groups, including the Federal Highway Administration Sustainable Pavements Technical Working Group and the Federal-State Buy Clean Partnership. Several state and local officials working on buy clean initiatives noted in EFIF interviews that they are struggling to fill the gap left by these and other programs.

2. Fragmented Efforts and Lack of Coordination

State and local officials interviewed by EFIF also noted fragmented efforts and a lack of coordination—both within government and with potential industry partners. Interviewees said many buy clean policies have been legislature driven, and in some cases the executive side was not well engaged, leading to fractured coordination efforts.

State procurement of concrete usually falls under the jurisdiction of multiple agencies. Typically, state transportation departments procure concrete for transportation infrastructure, while General Services Administration-equivalents procure it for public buildings. However, several states, such as Colorado, have policies that cross both agencies. As states add additional policies to support low-carbon concrete (e.g., a tax incentive), even more agencies will become involved.

Without a clear leader of all state “buy clean” actions, these efforts can become fragmented, duplicative, and confusing to businesses attempting to comply with and benefit from the programs.

Without a clear leader of all state “buy clean” actions, these efforts can become fragmented, duplicative, and confusing to businesses attempting to comply with and benefit from the programs.

Beyond a lack of communication within the government, state and local government officials also suffer from a lack of communication with cement and concrete producers to understand low-carbon mixtures. Public sector procurers of concrete (e.g., PANYNJ and Portland, Oregon) and those in the private sector (e.g., data centers) that have been most successful in achieving significant reductions in concrete carbon intensity at no cost premium have worked directly with their concrete suppliers. These groups contact concrete producers directly to define the “art of the possible” with regard to carbon intensity reductions in concrete for specified purposes. This communication bridges the long, fragmented concrete value chain before procurement officially begins on a project. This strategy serves a dual purpose. It gives suppliers confidence that the government or building owner is interested in purchasing lower-carbon products, and it provides the purchaser/spec setter confidence that the carbon reductions they write into a contract or policy can be met at no added cost.

3. Unclear Tracking and Reporting Strategies

Unclear tracking and reporting of the valuable market and carbon intensity data that state and local governments receive via contract bids hinders future policy implementation and scaling of the low-carbon concrete market. Before beginning to work on procuring lower-carbon products, many states have little internal information on the carbon intensity of the concrete mixtures they purchase. As one local official noted, **they were not tracking any concrete carbon intensity metrics and had no idea what was being poured.** Often, governments that aim to reduce the carbon intensity of their concrete begin by collecting this data through third-party-verified EPDs. However, capacity-constrained government officials sometimes use this data only to approve contract bids with no broader data collection or use.

The value of carbon intensity and cost data for states looking to decarbonize and to the low-carbon concrete market writ large cannot be overstated. As mentioned previously, many states begin by setting GWP limits for their concrete procurement at or above regional baseline estimates. Without data on the actual carbon intensity of procured concrete, the government has no ability to compare these somewhat arbitrary initial limits to their actual procurement.

Furthermore, the broader low-carbon concrete market currently struggles with a lack of transparent cost, performance, and carbon intensity data. As mentioned previously, hyperscalers and agencies looking to procure low-carbon concrete have called individual

producers just to access basic market and carbon intensity data. State procurement offices, especially those requiring EPDs, collect a lot of this data already. If made publicly available, even in an anonymized or aggregated way, this information has potential to catalyze the budding low-carbon concrete market.

4. Resistance to Change

Finally, the cement and concrete industry is hundreds of years old with significant inertia to change. Many in the cement and concrete industry, particularly construction and concrete contractors, are understandably risk-averse and hesitant to adopt unfamiliar materials. While not unwarranted, too much risk aversion will stifle innovation in the industry.

Many state and local governments, collectively the largest buyer of concrete, are riddled with outdated, decades-old specifications for public procurement. An estimated 44 states have long-standing prescriptive procurement regulations that inadvertently prohibit the use of the available low-carbon concrete by setting some level of maximum cement substitution limits.³⁵ Moreover, just seven of 36 surveyed states (20%) allow for the use of the performance-based standards (ASTM C1157)—rather than prescriptive standards—for cement in concrete, which allows low-carbon concrete mixes to compete while also addressing critical safety concerns.³⁶

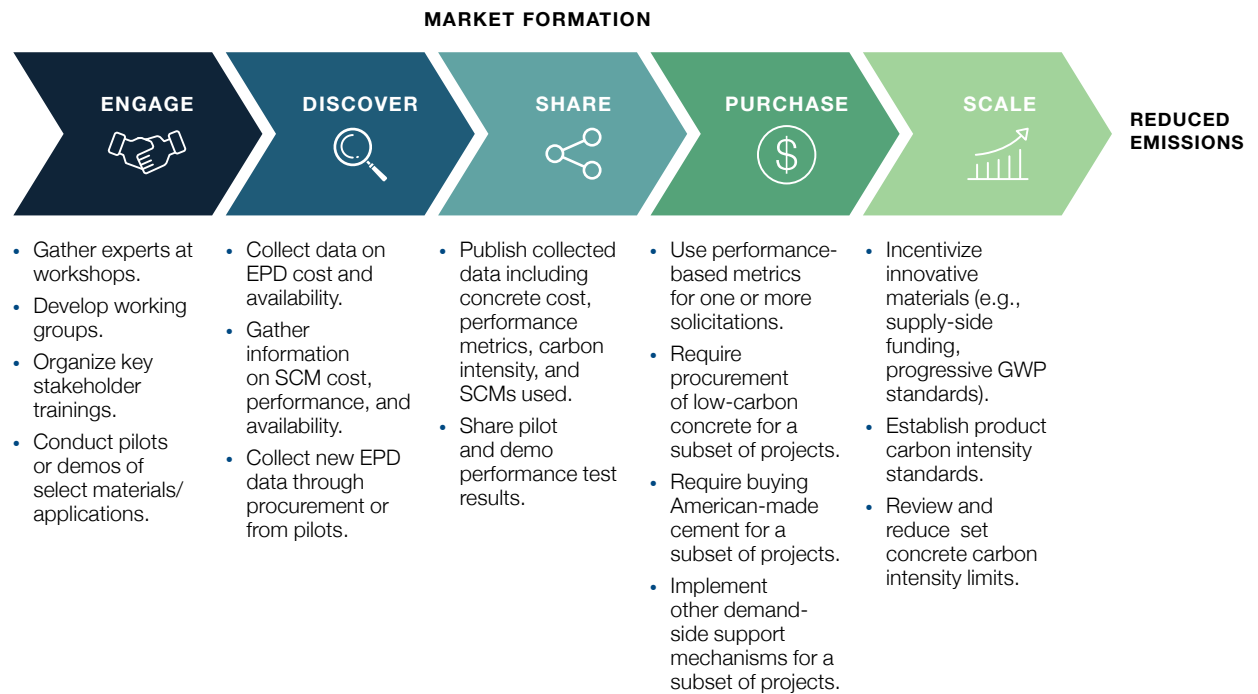
Current state-set prescriptive specifications can be 20-plus years old, inhibiting innovation and the use of newer materials. As one industry expert put it, **“why would we invest in making new products if we’re being undercut by the action of our own state regulator?”** It is imperative for states to work closely with producers and the industry to address any concerns surrounding unfamiliar materials and modernize these standards.

The Market Formation Pathway to Procure Low-Cost, Low-Carbon Concrete

Revising the pathway by which public and private actors procure low-carbon concrete can unlock the market formation potential of demand-side support. While current state and local policies and private sector procurement provide a pathway to procure lower-carbon concrete and encourage production, they fall short on supporting the broader growth of a budding market.

EFIF’s proposed Market-Forming Demand Action Plan, described in the following section, has been built through interviews with state and local government officials, key industry players, and policy experts. The action plan incorporates the best practices identified by first movers in the low-carbon concrete market and seeks to address persistent challenges. This proposed plan is intended to not only inform ongoing implementation of active buy clean laws, but also to guide states without buy clean legislation and private sector project owners interested in procuring lower-carbon concrete. By following the progressive steps outlined below, public and private buyers of concrete can leverage their buying power to catalyze growth of the low-carbon concrete market.

Figure 10. Market-Forming Demand Action Plan for public and private sector purchasers of concrete



Source: EFI Foundation.

The action plan is divided into five progressive stages:

- 1. Engage** local producers, industry experts, local communities, labor groups, and other key stakeholders to build working relationships, test ideas, and conduct trainings and/or pilot projects.
- 2. Discover** relevant market and product information including low-carbon concrete costs, availability, carbon intensity, and available SCMs.
- 3. Share** anonymized (if necessary) market and product data, insights from working group engagements, and pilot projects.
- 4. Purchase** low-carbon concrete with large-volume commitments across multiple projects.
- 5. Scale** actions to reduce concrete carbon intensity. This includes supporting innovative material development, procuring larger volumes of low-carbon concrete, and progressively reducing set carbon intensity limits.

1. Engage

The first and foundational component of the Market-Forming Demand Action Plan is to engage experts and important stakeholders. Essential groups to engage include current and/or local concrete suppliers, industry experts, local communities, and labor groups. For both public and private actors this could be accomplished by hosting a workshop and establishing working groups to identify opportunities and challenges to procuring low-carbon concrete for a specific project, government agency, or company.

The goal of the engagement stage is not a series of one-time meetings, but rather to create a working relationship that lasts throughout the procurement design and implementation process. Establishing trust and open communication among key players in the low-carbon concrete value chain is essential to maximizing carbon intensity reductions while maintaining confidence in product performance. Once relationships are established, the public or private procuring actor could use this network to test ideas for procurement strategies, identify barriers to scale, or organize educational materials and trainings for additional players along the value chain.

During the engagement stage, procuring actors can also work with relevant stakeholders to run pilot or demo uses of different low-carbon concrete mixtures for unique applications. Although a pilot represents just a small, one-time use of low-carbon concrete, it can be a valuable “proof of concept” and provide useful data on material performance in specific applications. Furthermore, pilots can be used alongside trainings for additional actors along the value chain. For example, many concrete pourers and finishers are hesitant to work with low-carbon concrete mixtures because the mixtures can behave differently when

poured. Pilots could be used as a component of workforce trainings on low-carbon concrete and build confidence in using the new materials. The city of Portland, Oregon, used several pilots as a knowledge-sharing tool for concrete finishers and government officials, with performance results and feedback from finishers published online.

2. Discover

In the discovery stage, the procuring actor collects valuable low-carbon concrete market and product data. Essential data to collect includes concrete carbon intensity, costs, and performance as well as SCM costs, performance, and availability from local or previous suppliers.

In some cases, data on concrete carbon intensity and SCM levels in mixtures can be found publicly in the EC3 reporting tool. This data could also be gathered by working with industry groups who may already collect it, such as the NRMCA. When this data is not yet publicly available, private sector buyers have sometimes acquired it by directly contacting individual suppliers that offer lower-carbon concrete. This can be highly inefficient.

As large buyers of concrete, government agencies can play a pivotal role in gathering concrete market data by leveraging their procurement and bidding process. Government agencies procure concrete for a diverse set of projects across every corner of their jurisdiction. Through the bidding process for these projects, governments can request cost, SCM use, carbon intensity, and performance data on concrete produced across an entire state, city, or county. To gather this data, government actors should first audit their existing concrete procurement data to collect any relevant information and identify gaps. When gaps are identified, the state or local officials can modify bid requirements to fill the identified gaps. For example, many states with buy clean laws have filled gaps in concrete carbon intensity data by requiring EPDs on concrete bids for public projects.

In the discovery stage, state and local governments also should audit their current concrete specifications for public projects and any additional SCM or cement limits set by procuring agencies. Specifications that are too restrictive limit availability of low-carbon concrete allowed for government use.

It is essential that both public and private actors collecting low-carbon concrete market data retain it for informing future procurement decisions and the broader low-carbon concrete market, as is discussed in later stages.

3. Share

To advance the market, public and private low-carbon concrete buyers need to publish data on concrete costs, performance, SCM use, and carbon intensity. Sharing this data in an

accessible format, even if anonymized and aggregated, will help scale the budding low-carbon concrete market for several reasons. First, knowing how widely low-carbon mixes are used and how they perform increases confidence. Second, sharing the data reveals the true costs of low-carbon mixes, which are often falsely assumed to be more expensive than traditional blends. Finally, it drives competition for improved mixture performance, lower embodied carbon, and lower costs.

State and local governments can benefit by sharing relevant market data on low-carbon concrete because it can help attract business to the state. Sharing even aggregated and anonymized data on low-carbon concrete costs, performance, and carbon intensity from state contracting bids makes it easier for interested private buyers, such as data centers, to procure concrete from businesses within the state. While nearly every state with policies to decarbonize concrete collects some level of relevant market data in their bidding process, very few make it public. To EFIF's knowledge, only New York City requires EPDs submitted in contract bids be made public through the EC3 tool.

4. Purchase

By committing to purchase specified volumes of low-carbon concrete, public and private project owners provide a clear demand signal to producers.

There are many potential mechanisms by which public and private buyers of concrete can signal demand for lower-carbon concrete (Figure 11). For example, interested low-carbon concrete offtakers, especially those anticipating smaller offtake volumes, can join a “buyers club” to aggregate demand. In 2025, the Rocky Mountain Institute (RMI) and Center for Green Market Activation launched the Sustainable Concrete Buyers Alliance. Founding members include Amazon, Prologis, Meta, and several other organizations.³⁷ Large data center developers also have supported emerging low-carbon concrete companies by offering to purchase a set amount of concrete, akin to the offtake backstop demand-side support mechanism (e.g., the May 2025 fixed offtake contract between Sublime Systems and Microsoft).³⁸

Figure 11. Mechanisms by which public and private buyers of concrete can signal demand for lower-carbon mixtures

Type	Description	Applications	Advantages
Fixed-price subsidy	Fixed \$/unit of support	Any	Cost certainty for funding
Capex buydown	Support for % of capital costs for end users switching to clean commodity	Any, especially fuel-switching	Helps fuel-switching projects reach FID
Price ceiling	Price ceilings for offtakers procuring clean commodity; funding limits delta between contracted price and ceiling	Industrial clusters, transport, ports	Supports price discovery, can de-risk multiple small projects
Capacity reservation	Funding supports midstream infrastructure by paying for capacity not yet sold to private offtakers	Power and pipelines, storage, bunkering	Support for shared infrastructure
Offtake backstop	Funding commits to purchasing a set amount of supply or to support if offtake falls through	Any	Financial certainty for supplier
Grant or loan	Direct low-interest loan/loan guarantee or cost-shared grant to offtakers	Any, especially fuel-switching	Simplicity, familiarity
Carbon price hedge	CfD or other support indexed to regional carbon price to smooth out price shortfalls	Power, biorefining, refining	Support for projects that can leverage other funding
Contract for difference	Subsidy for difference between market and reference price; can include price floor/ceiling	Any	Financial certainty for offtaker
Letters of credit	Funding offers credit guarantees on behalf of projects in order to de-risk and improve bankability	Any	Supports early stages (pre-FID) of project development
Platform development	Creation of digital platforms and marketplaces for buying, selling, and trading clean commodities	Any	Streamlines market access and data exchange
Contract templates	Drafting of contracts, term sheets, or MOUs to serve as a model for industry	Any	Jump-starts market, provides a neutral starting point
Demand aggregation	"Buyers club" creation and program management	Any	Smaller offtake volumes can participate in market

Source: EFI Foundation.

Notes: FID refers to final investment decision, CfD refers to contract for difference, and MOU refers to memorandum of understanding.

As major concrete offtakers, state and local governments can create demand signals by incorporating low-carbon requirements into their procurement and building codes, as has been done by several first movers discussed previously. Requirements for low-carbon concrete in public procurement can be achieved by adding GWP limits to the bid solicitation, incorporating GWP limits directly into concrete specifications, or by creating incentive structures to select bids with lower GWP as has been done by Colorado, PANYNJ, and New Jersey, respectively.

States could further incentivize the use of low-carbon concrete in public projects through government-controlled processes such as expedited permitting and GWP limits in building codes. These government actions broaden the demand signal beyond state procurement to include private uses of concrete as well.

In order to set GWP limits for procurement, public and private actors could either rely on

NRMCA-estimated regional GWP baselines, as several states have proposed, or leverage data collected during the discovery phase to calculate appropriate limits. While regional baselines provide a good starting point to initiate demand signals, particularly in cases where other data is scarce, public and private concrete buyers should seek to ultimately set GWP thresholds based on EPD data gathered through their own procurement process.

In addition to procurement limits and building codes, state and local governments must take additional actions to maximize the impact of their low-carbon concrete demand signals.

First, governments should revise their concrete specifications for public procurement to use performance-based metrics, rather than mixture-based metrics. Performance-based specifications allow for expanded private sector innovation in producing low-carbon concrete mixtures for state projects, while ensuring required performance and strength requirements are met. Second, states should consider revising minimum cement and maximum SCM limits or removing them and fully move to performance-based specifications. Data gathered in the discovery phase and working groups established in the engagement phase can help inform these decisions. Finally, states often have a list of preapproved materials and mixtures that can be slow to update when new low-carbon materials or mixtures have become available. States should consider pathways to expedite approval of these materials. These actions will help maximize the impact of state-led demand signals for low-carbon concrete.

Public and private concrete buyers can also create demand for low-carbon concrete by requiring use of American-made cement. While a buy-American requirement may not directly appear to support low-carbon cement and concrete, industry experts producing American-made low-carbon cement have reported being undercut by international suppliers selling more carbon-intensive products. In fact, reliance on imported cement has grown by nearly 50% over the past five years.³⁹ This type of policy also may have wider appeal compared to carbon intensity requirements.

5. Scale

Once public and private buyers of concrete have implemented requirements to purchase low-carbon concrete, additional actions can be taken to support meaningful reductions in the carbon intensity of the cement and concrete industry. These actions include incentivizing innovative materials, establishing product carbon intensity standards, and reviewing and reducing set carbon intensity limits.

Initial procurement standards should be set with the intention of reviewing and reducing embodied carbon thresholds on a regular cadence based on gathered procurement data and insight from the working group. Procurement models also could be designed

to favor lower-carbon bids that are further below set thresholds, rather than requiring bids to simply comply with thresholds. Ensuring that GWP thresholds are progressive incentivizes ongoing innovation to decarbonize concrete, supporting the scaling of deep decarbonization technologies (like carbon capture and storage) that are not yet ready for market. Several states and cities have stated plans to regularly review limits but have been hindered by limited data and resources. Consistent data gathering and sharing as well as ongoing working group relationships initiated in earlier stages of the action plan can help mitigate these challenges.

Public and private actors also can directly incentivize the development of deeply decarbonized concrete through supply-side incentives. For example, governments could develop production tax credits, and public and private actors could provide financial support to bring innovative technologies and projects to market.

Finally, governments can expand the reach of set GWP limits in procurement by implementing them as product carbon intensity standards for concrete. This market-wide action, if properly implemented, could more quickly shift the market away from concrete mixtures with higher carbon intensity.

The market formation pathway to procuring low-carbon concrete is designed with the intent that each stage, once reached, continues throughout the public or private procurement process. For example, while a public procuring agency is designing progressive standards, they should maintain their education efforts (e.g., working groups, trainings, etc.), gathering data and ensuring data transparency. It is through all of these efforts that quantifiable emissions reductions can be achieved.



Pennsylvania Low-Carbon Concrete Workshop

Pennsylvania is the birthplace of U.S. cement production and remains one of the largest cement producers in the country today. This legacy gives the commonwealth a unique platform for leadership in low-carbon cement and concrete. Though many neighboring mid-Atlantic and Northeastern states have begun adopting low-carbon procurement practices for concrete, Pennsylvania has not yet taken similar steps. This gap presents a near-term opportunity, and the EFI Foundation (EFIF) has partnered with Team Pennsylvania (Team PA) to identify actionable pathways for low-carbon concrete in Pennsylvania.

In October 2025, EFIF and Team PA co-hosted a convening of stakeholders titled “Scaling Up: A Discussion of the Investment-Enabling Opportunities of Low-Carbon Concrete Policy in Pennsylvania.” The workshop gathered cement and concrete producers, state officials, academic experts, and labor representatives for a candid discussion on practical, near-term strategies for scaling the low-carbon concrete industry. The discussion focused on identifying opportunities for low-carbon cement and concrete in the state and finding alignment on next steps to accelerate deployment and reduce market and investment risk.

A consistent theme throughout the workshop discussion was support for a demand-side strategy that

Pennsylvania could implement using existing authorities to create predictable demand signals while maintaining cost competitiveness. Given the scale of public procurement, participants emphasized the commonwealth’s ability to influence markets through targeted administrative action. Cement and concrete producers noted that they are ready to deliver lower-carbon products when the state signals a clear, durable demand signal. Government representatives expressed interest in approaches that create value for public projects and can be put in place without additional legislative action. Moreover, participants highlighted that Pennsylvania already has useful experience through its asphalt EPD effort, which launched in 2025 after a collaborative process between the Pennsylvania Department of Transportation and industry. This model was described as relatively easy and successful, and participants saw value in adapting it for concrete.

From the workshop, it was clear that both industry and government see practical opportunities to advance low-carbon concrete in Pennsylvania. With continued collaboration and focused administrative action, workshop participants agreed the state can take meaningful steps toward cleaner concrete while supporting long-term competitiveness across Pennsylvania’s construction materials value chain.

Through insights gathered from cement and concrete stakeholders at the October workshop, Team PA and EFIF have identified four possible opportunities for progress on low-carbon concrete in Pennsylvania:



Scale innovation through procurement and policy alignment. Pennsylvania can

scale low-carbon concrete by aligning procurement policies to provide clean, multi-year demand signals for lower-carbon concrete. This includes requiring EPDs, setting GWP limits for public procurement, and revising prescriptive specifications.



Unlock circular supply chains for SCMs.

Pennsylvania's power and industrial sectors already produce byproducts that can be used to decarbonize cement and concrete. Clarifying and expanding beneficial use pathways can encourage increased use of these materials.



Support market development through advanced procurement

tools. In addition to aligning state procurement policies to enable low-carbon concrete market growth, the state could explore additional advanced procurement

tools such as book-and-claim systems to de-risk private investment and accelerate commercial-scale deployments.



Streamline permitting and demonstration pathways.

Under current procedures, new materials can take up to two years to be approved for state use. Aligning existing Pennsylvania Speed to Market goals with interagency coordination can reduce approval times, lower project risk, and accelerate the use of low-carbon cement and concrete mixtures.

To catalyze on the momentum from the October workshop, Team PA and EFIF are actively developing a statewide initiative to scale low-carbon concrete across the commonwealth. The initiative will begin with the establishment of a task force composed of stakeholders across government, industry, academia, labor groups, and other nonprofit organizations that will refine priorities and map strategic actions for each stakeholder group. Through these efforts, Pennsylvania aims to modernize its leadership in one of its most historic industries and model how states can link innovation, economic growth, and carbon reduction in practical, measurable ways.

Conclusion

Concrete is both a cornerstone of modern infrastructure and, due to the use of Portland cement, a major source of industrial greenhouse gas emissions. While substantial emissions reductions are achievable today through commercially available low-carbon concrete produced with SCMs, the low-carbon concrete market has struggled to scale because of a lack of market transparency and outdated procurement strategies. As described in this report, public and private buyers of low-carbon concrete can leverage their procurement to scale the budding low-carbon concrete market, achieve near-term emissions reductions, and drive continued innovation in the sector.

The Market-Forming Demand Action Plan presented here offers a pragmatic pathway for public and private offtakers to catalyze the low-carbon concrete market. By engaging suppliers and labor groups early, collecting and publicly sharing market data, committing to large-volume purchases, and progressively strengthening carbon intensity standards, buyers can send clear, durable demand signals that accelerate the production and use of low-carbon concrete. Implementing these demand-side strategies not only enables offtakers to reduce barriers to the production and use of cost-competitive low-carbon concrete for their own projects, it also builds the low-carbon concrete market writ large.

As a major purchaser of concrete and setter of widely used material specifications, state and local governments are uniquely positioned to accelerate the low-carbon concrete market. Early movers have laid an initial framework for governments to support low-carbon concrete through procurement and building code requirements. The strategies outlined in the Market-Forming Demand Action Plan presented here, including publishing anonymized procurement data and increasing use of performance-based specifications, can unlock the full market-making potential of these demand-side policies. In addition to reducing emissions, state and local governments can realize additional benefits from implementing these market-forming strategies, including new job training and employment opportunities, supporting local suppliers in expanding to new markets, and attracting new investment from early private sector offtakers like data centers.

The role that public and private procurement can play in enabling early-stage market development for low-carbon materials is hard to overstate. For many emerging low-carbon materials, including low-carbon concrete, properly implemented demand-side policies can help bridge the gap between proven technologies and broad market acceptance. Strategic modernization of public and private concrete procurement described in this report can unlock the market-making potential of demand-side policies and build a strong, lasting market for low-carbon concrete.

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