



3 Ways Precast Producers Can Profit from Sustainability

A guide to driving more profits in your business by delivering efficient and sustainable precast concrete.

Modern Precast Business Challenges

After water, concrete is the **most widely used** material on the planet. The very foundation of modern civilization, concrete builds our homes, provides a means for transport, and forms the very structures that house our healthcare, education, governments, and other industries.

By all accounts, concrete is a good business to be in; however, the industry is not without its unique challenges:

1. Rising Material Costs

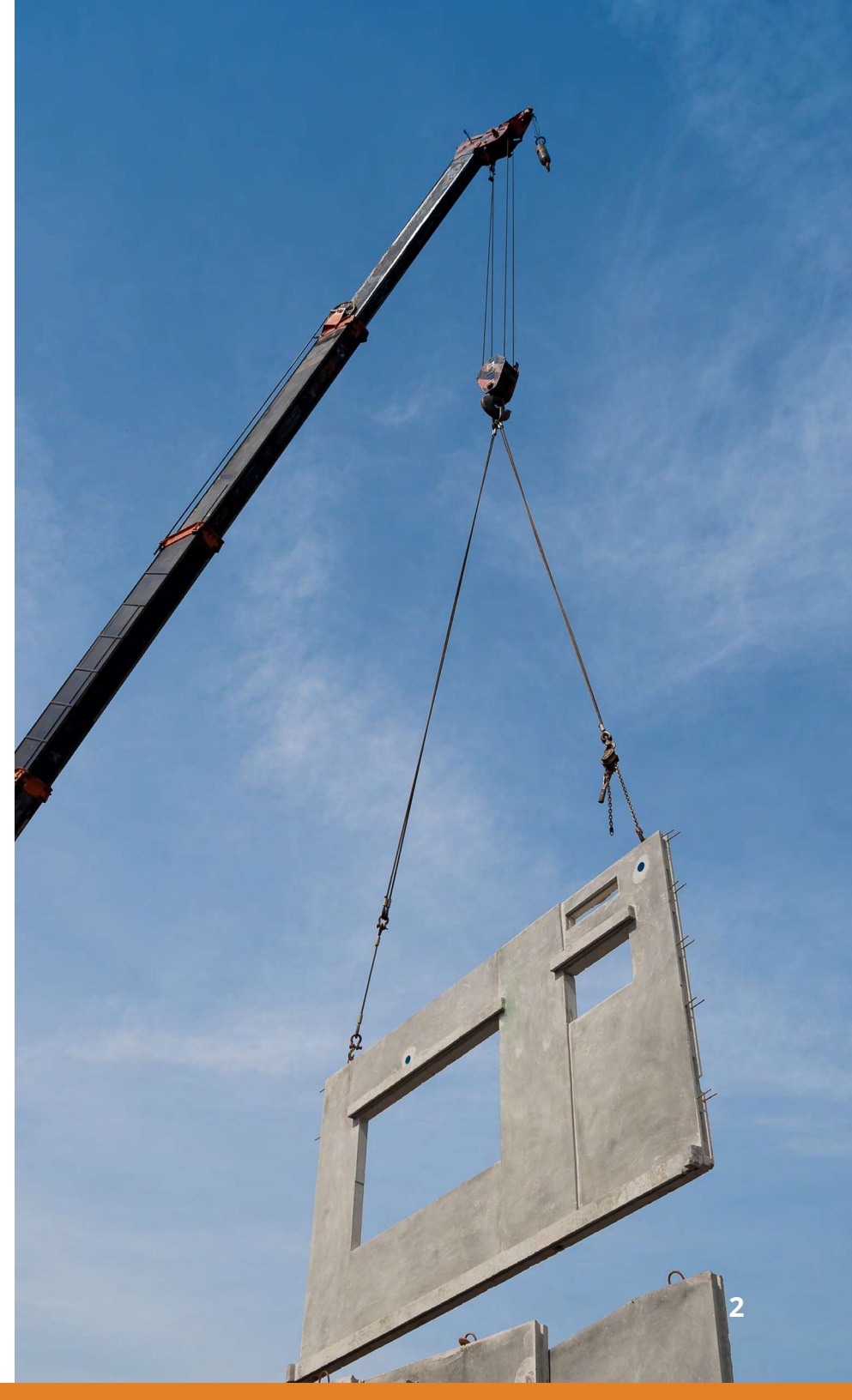
Activity in the construction sector is accelerating post-COVID. On top of the home improvement boom that occurred during the pandemic, many regions are experiencing a rise in commercial construction, a hot real estate market and a related growth in building activity.

With materials supply chains still recovering from the disruptions caused by the pandemic, this uptick in activity is driving demand—and costs—for materials to record levels. Cement prices, in particular, have been and continue to be affected.

Around the world, costs are increasing, squeezing margins for producers in a highly competitive space:

- **United States:** Cement prices are **increasing steadily** year over year.
- **United Kingdom:** General construction material costs are **up 10-50%**.
- **India:** The price of cement has increased by **50-100%**.
- **Australia:** Concrete prices have increased **up to 10%** across the country.

Shortages of **fly ash**—one of the most common supplementary cementitious materials—is also contributing to the rising costs of concrete production.



2. Increased Competition

Increased competition from other building materials in the modular building space is also eroding market share for precast producers. **Wood and steel are gaining popularity** due to price, speed, and changes to building codes and regulations that allow these materials to be used for a wider range of structural use cases.

Mass Timber Construction (MTC), in particular, is gaining increased attention from designers and regulators around the world—and taking market share from precast concrete producers.

There's a misleading perception that wood's inherent ability to store carbon makes it a more sustainable building choice. However, the carbon costs associated with wood products are not fully understood. Some studies found that as little as **15 percent** of the carbon stored in a standing tree is sequestered in the final wood product. Regardless, the market thinks that wood is a more sustainable choice. This is creating more competition for precast from the MTC space.

3. Demand for Sustainability

It's estimated that up to **50 percent** of commercial building developers are currently looking for more sustainable construction solutions. This trend will continue to grow in the years ahead as the focus on preventing climate change intensifies.

Suppliers across the construction industry are feeling the pressure to lower their carbon footprint—especially concrete producers. That's because misconceptions about concrete's sustainability damage precast's reputation.

Precast plants have to consider things like water treatment and energy efficiency but above all, carbon reduction. Carbon performance is predicted to be the **defining competitive issue** for concrete producers in the foreseeable future. As a result, producers are seeking ways to reduce the global warming potential (GWP) of their operations and deliver greener concrete products to their markets.

While these challenges are significant, they are not insurmountable. Precast concrete producers are resilient and innovative—they constantly strive for profitability and productivity, all while ensuring the quality of the products their customers rely on.

Whether you're looking to **reduce material costs without impacting quality, discover new market opportunities, gain a competitive advantage, or deliver more sustainable precast products**, this ebook outlines ways to boost your company's profitability in 2022 and beyond.

Reduce Precast Production Costs

Every business seeks to decrease production costs to retain good profit margins, and the precast concrete industry is no exception. Modern material technologies and mix designs can significantly lower production costs, without sacrificing the strength and quality that precast and prestressed concrete is valued for.

Since **cement is the most expensive ingredient** in precast concrete mixes, many of the innovations aim to replace or reduce the quantity of cement required to produce the same quality concrete:



Supplementary Cementitious Materials (SCMs)



Portland-Limestone Cement (PLC)



Carbon Mineralization Technology





Supplementary Cementitious Materials (SCMs)

Supplementary Cementitious Materials (SCMs) are a common feature in precast mix designs today. They act as cement replacements in concrete for various performance-based reasons. However, some of them can significantly reduce the cost of production.

Since their introduction, **studies** and industry testing have proven that SCMs actually increase the strength of concrete over time to levels greater than that of traditional concrete mixes.

The most common SCMs are fly ash, a by-product of the coal industry; slag, a by-product of steel production; and silica fume, a by-product of the ferrosilicon metal industry. Since these SCMs take post-industrial waste from coal and steel and sequester it for the lifetime of the concrete structure, they have an environmental benefit too.

However, the manufacturing activities of SCMs have been hampered partially or completely for several reasons:

- The **closure of facilities** during COVID due to lockdowns and decreased production demand
- Supply chain disruptions and other related raw material shortages
- The implementation of the **Clean Air Act** which requires the injection of activated carbon into the combustion steam at coal plants (which makes the fly ash unusable in concrete)

While SCMs will continue to play an important role in precast concrete production, the writing is on the wall regarding the sustainability of some of the industries that produce them. Modern technologies should be explored in tandem to keep costs under control.





General Use Portland-Limestone Cement

There is an opportunity to reduce the total cementitious content of precast with Portland-Limestone Cement (PLC) which would lower the mix cost as compared to general portland cement mixes designed for the same criteria.

PLC replaces up to **85 percent of the clinker** used in regular concrete with interground limestone and results in up to 10 percent less carbon dioxide (CO₂) emissions so it is also more sustainable than general portland cement, yet it offers the same performance benefits.

Today, PLC is being heavily adopted along the west coast of North America. It is suitable for all applications from cast-in-place and masonry to precast. When blended with SCMs, PLC and regular Portland cement perform similarly.





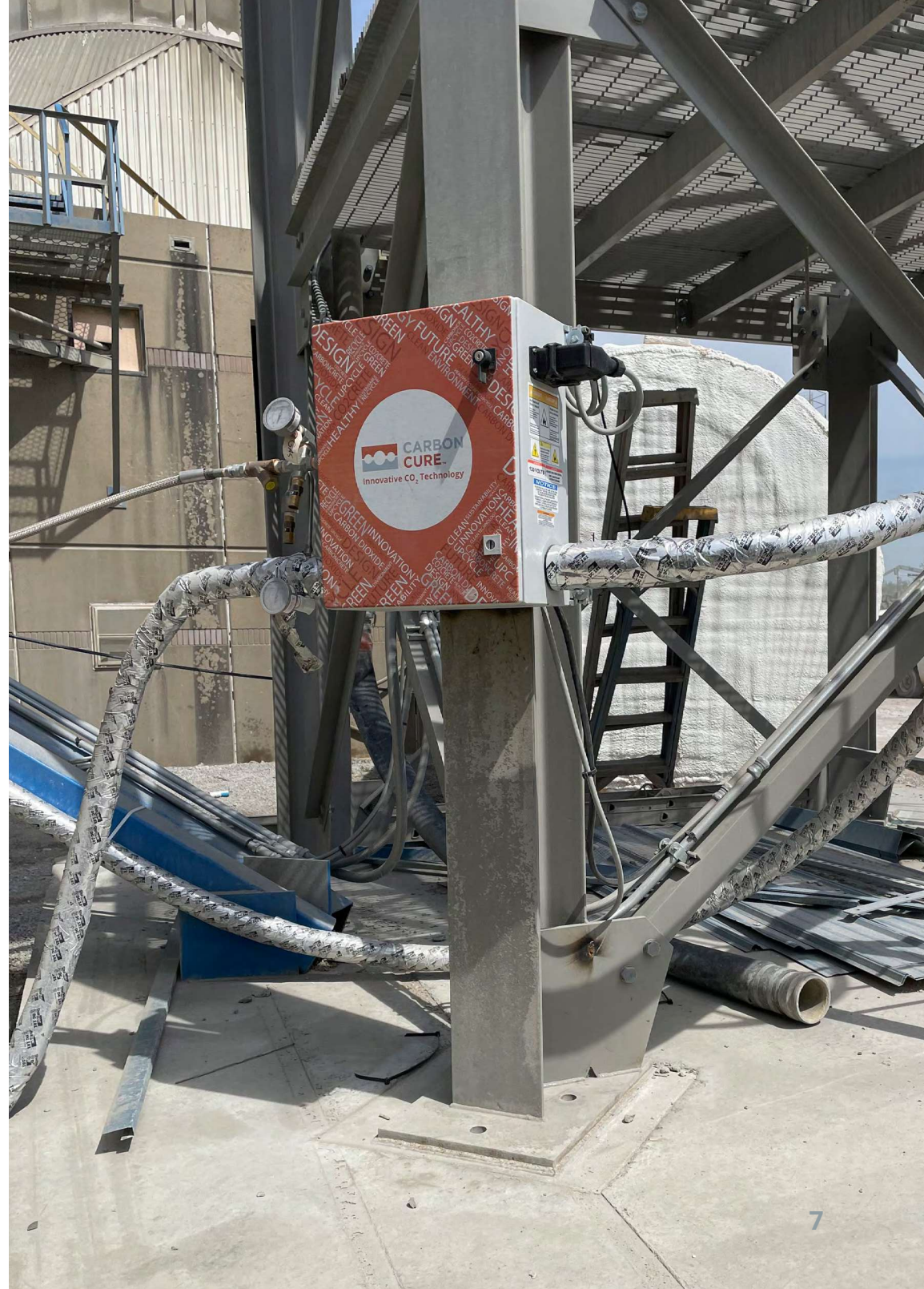
Carbon Mineralization Technology

CarbonCure's groundbreaking mineralization technology is now available to precast and prestress concrete producers. CarbonCure for Precast works by injecting recycled carbon dioxide (CO₂) into fresh concrete during mixing where it is permanently sequestered.

Once injected, the CO₂ undergoes a chemical reaction where it transforms into a mineral. This improves the compressive strength of the concrete, similar to an SCM, allowing for the reduction of cement content in mix designs.

Cement production is a carbon-intensive process so reducing its use can significantly improve the carbon footprint—and profitability—of precast and prestressed concrete.

While this approach is relatively recent, it is already used in 400 concrete plants around the world—and that number increases every month as more and more producers realize their potential to win more business from the growing green building market and reduce cement costs to improve overall profitability.



Compete for Greater Market Share

Under increasing public pressure for sustainable building materials and changes to regulation favoring green building practices, the precast concrete industry is undergoing a transformation.

To weather these significant challenges, producers are strategically planning for the future, looking to **new innovations** so they can effectively:



Position sustainability as a competitive advantage



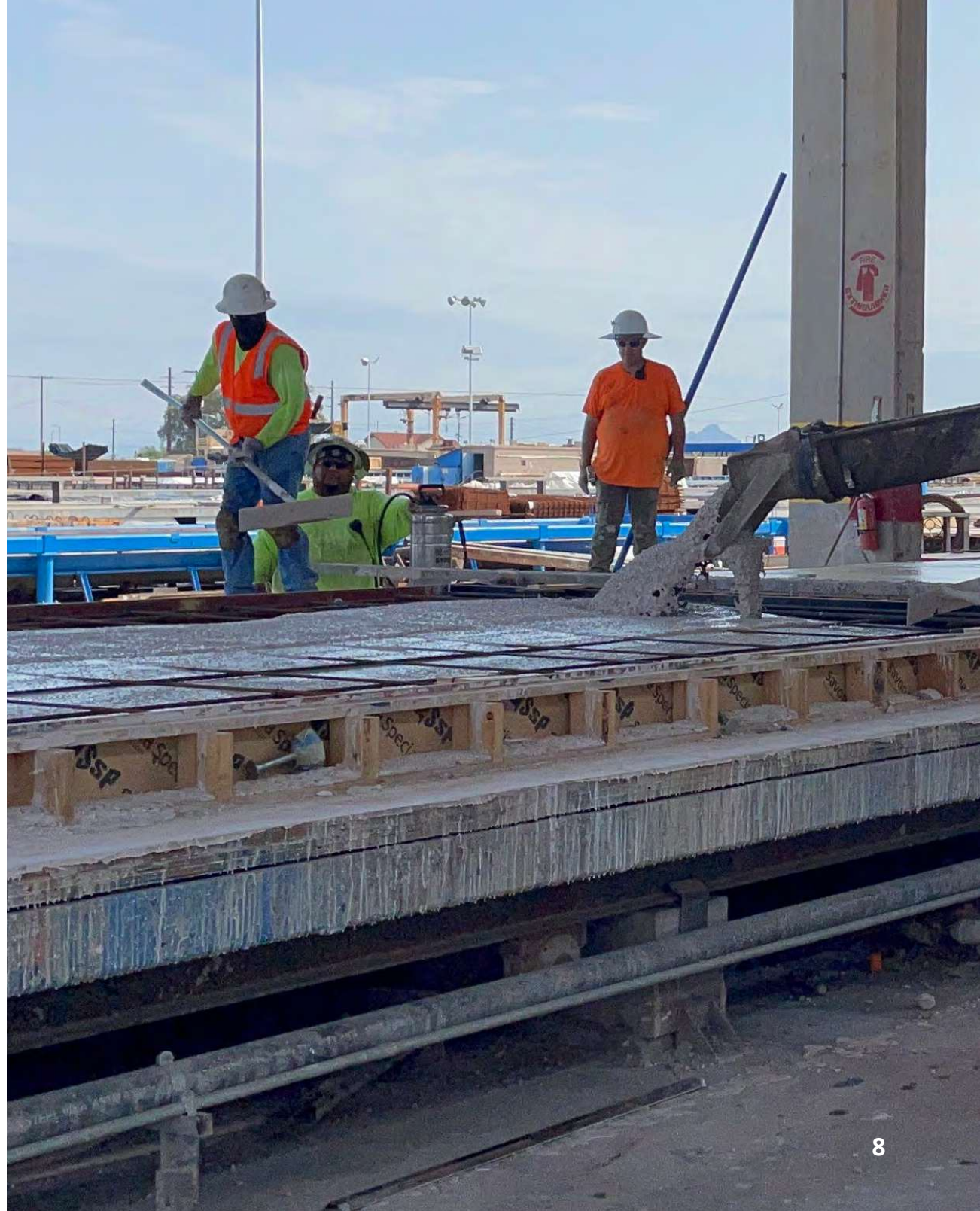
Position precast concrete as the most durable construction material



Collaborate with local structural engineers and concrete procurers to permit innovation in precast specifications



Be ahead of the game when new regulations on sustainable materials are enforced



Position Sustainability as a Competitive Advantage

Traditional concrete **produces** more CO₂ than the aviation industry. That's because cement, the key ingredient that gives concrete its strength, has a large environmental footprint. According to the International Energy Agency, cement is responsible for up to **7 percent of the world's CO₂** emissions and 7 percent of industrial energy consumption.

The increasing focus on climate change is pushing government bodies and industries to take action against the CO₂ produced in construction:

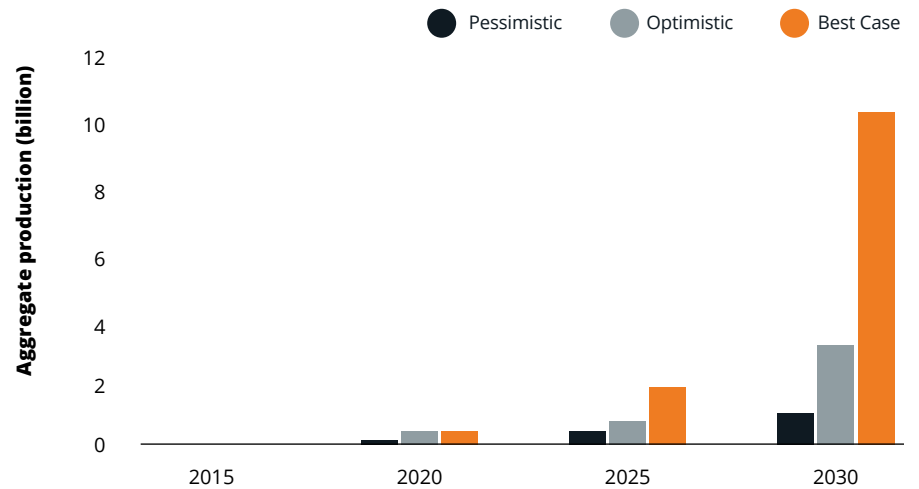
- The **Structural Engineers 2050 Challenge** aims to inspire structural engineers to contribute towards the global vision of Zero Carbon buildings by 2050.
- The **American Institute of Architecture 2030 Challenge** sets out targets for all new buildings, developments, and major renovations to be carbon-neutral by 2030.
- State and local governments in Oregon, New York, and other areas are requiring producers to have third-party-verified, product-specific Type III Environmental Product Declarations (EPDs).

New innovations in concrete production present a great opportunity for precast producers to be first to market with sustainable products.

CarbonCure offers one such solution. When concrete producers inject CO₂ into concrete using CarbonCure, CO₂ emissions that were once in the atmosphere are used to produce sustainable concrete. The strength gained from the added CO₂ enables producers to reduce a percentage of cementitious content in select mix designs, while still maintaining strength requirements from the specifications.

Further, due to the chemical reaction that occurs between the CO₂ and the concrete mix, the CO₂ becomes a mineral and therefore is permanently embedded within the concrete, never to be re-released into the atmosphere.

This CO₂ mineralization in concrete is not only sustainable — it makes good business sense. **Analysts say** it has the potential to become a USD \$800 billion global industry by the year 2030.



Global Roadmap for Implementing CO₂ Utilization | CO₂ Sciences and The Global CO₂ Initiative

Producers that are not thinking about developing sustainable concrete mixes will miss out on this business opportunity and lose significant market share to competitors, as more industry associations and government bodies set standards for carbon-reducing building practices.

"The use of precast concrete in construction contributes to sustainable practices by its inherent thermal efficiency, recycled materials and aggregates, and reduced waste."

Charles Stone
Quality Control Supervisor, Coreslab Structures (TEXAS) Inc.

Collaborate with Local Specifiers to Permit Concrete Mix Innovation

We know that cement is the most expensive and least environmentally-friendly ingredient in concrete. However, there are certain construction market segments, such as infrastructure, that are understandably risk-averse.

As a result, mix designs for these projects are often dramatically over-specified, requiring cement content that achieves much higher strength performance than needed, leading to higher costs and higher carbon emissions.

Many prescriptive specs exist simply due to legacy, and engineering firms and government bodies are actively working to remove these unnecessary barriers. Other firms are unaware of the cost and environmental impact created by their outdated specifications. By engaging in dialogue and sharing expertise, concrete producers can support the engineering and concrete procurement community in its objectives to build more sustainably, while maintaining high-quality standards.

CarbonCure provides a great sustainability narrative that acts as a launching pad for dialogue about concrete specification best practices. Engineers and government procurement officers are excited to talk about CarbonCure and are therefore motivated to remove prescriptive specification barriers.

For example, Compass Datacenters partnered with CarbonCure and committed to performance-based specs for ready mix and precast suppliers. All their suppliers today must be able to meet their requirements for low-carbon concrete.

"We love the fact that we can be dried on six megawatts worth of space in a month. The exciting part for us now is making concrete a more environmentally-friendly product to go along with its other benefits like durability and speed to market."

*Nancy Novak
Chief Innovation Officer, Compass Datacenters*



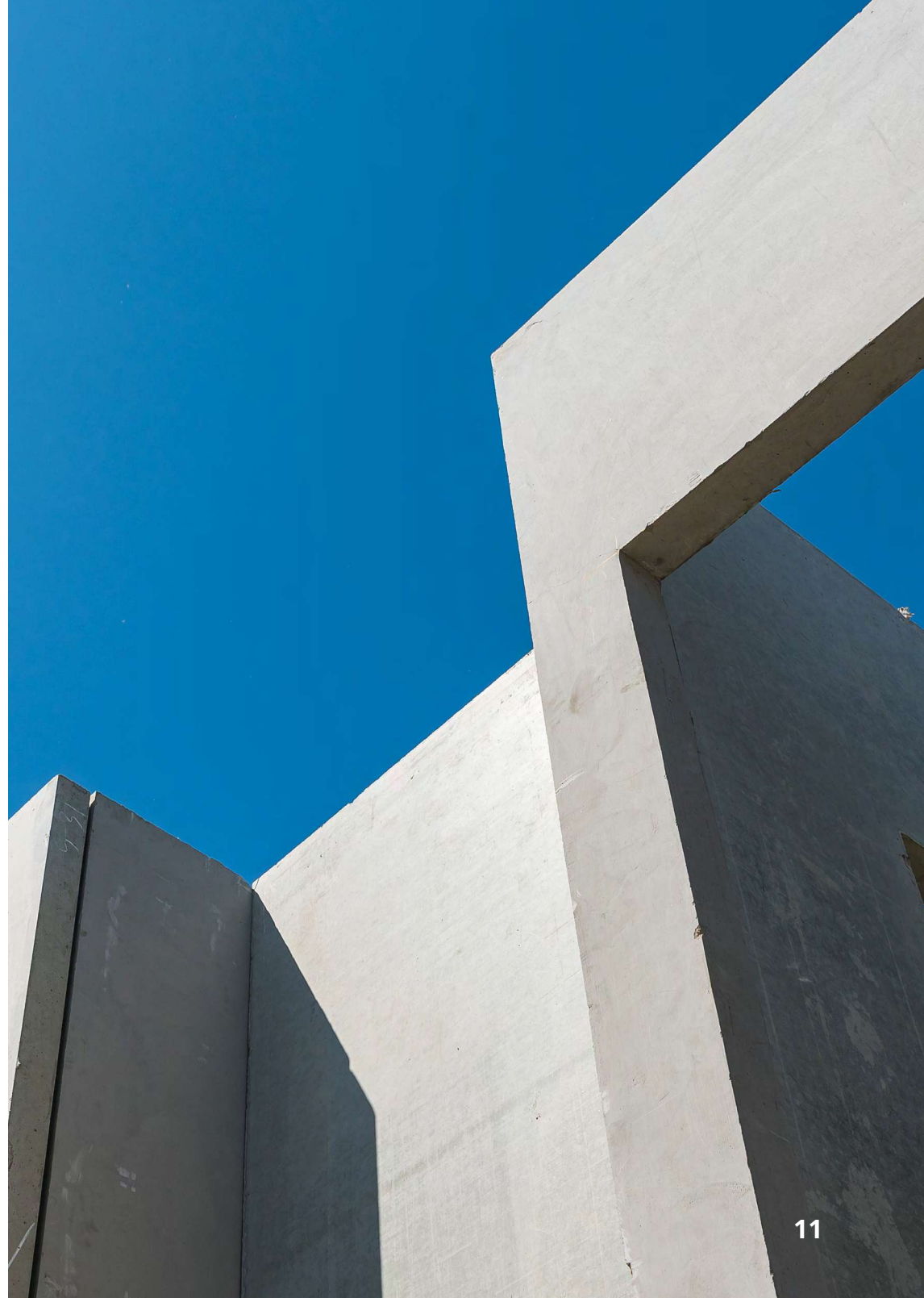
Boost Your Profitability with Sustainable Tech

Improving your operations while growing your precast business within the green building market.

Every cubic yard of precast concrete produced with CarbonCure saves an average of 25 pounds of CO₂ emissions per cubic yard (15 kilograms per cubic meter) from entering the atmosphere.

“CarbonCure has allowed us to reduce costs, yet retain high strength. In addition, it is helping our customers who are looking for sustainable solutions for their projects.”

*Charles Stone
Quality Control Supervisor, Coreslab Structures (TEXAS) Inc.*





Build for the Future. Build with CarbonCure.

CarbonCure has been used on thousands of projects ranging from healthcare to higher education, residential developments, and corporate campuses.

If you have any questions about CarbonCure for Precast — or how it can help you unlock more profits in your business — visit carboncure.com. To get in touch with a CarbonCure representative, send us an email at info@carboncure.com or give us a call at [+1 \(902\) 448-4100](tel:+19024484100) (Worldwide) or toll-free at [+1 \(844\) 407-0032](tel:+18444070032).