Developments in Sustainable Precast Concrete Overview

Precast concrete is a durable and resilient material that provides many benefits to efficient, sustainable structures in the long term. While precast concrete has an upfront CO2 impact, the industry is working to reduce greenhouse gas emissions and increase the efficiency of its products.

On December 12, 2023, the National Institute of Building Sciences hosted a webinar on developments in sustainable precast concrete with Jim Schneider, Executive Director of PCI Mountain States. The webinar is part of the Building Innovation Webinar Series.

In his presentation, Schneider discussed technical innovations to reduce the carbon footprint of precast concrete and examined current process improvements that are pushing the industry forward to a more sustainable future.

Sarah Swango, Vice President, Corporate & Foundation Relations with NIBS, served as moderator.

Preparing for Inevitable Change

PCI’s Schneider opened his presentation with a definition of sustainable design, taken from the U.S. General Services Administration: “Sustainable design seeks to reduce negative impacts on the environment and the health and comfort of building occupants, thereby improving building performance. The basic objectives of sustainability are to reduce consumption of non-renewable resources, minimize waste, and create healthy, productive environments.”

According to the U.S. Green Building Council, buildings account for 13.6 percent of potable water use in the United States. That is the third-largest category behind thermoelectric power and irrigation.

Additionally, the building industry consumes 40 percent of the raw materials flow of the global economy every year.
This type of building impact means one thing, Schneider said. “We have to build with both sustainability and resilience in mind,” he said. “Any difference we can make in decreasing our part of the pie will make a difference worldwide.”

**What is Embodied Carbon?**

The concrete industry recognizes the need for immediate reductions in greenhouse gas emissions.

When it comes to embodied carbon, the definitions differ. Some view the embodied carbon of a building as including the entire lifecycle of materials, even the operational phase of the building. A full lifecycle view of embodied carbon would account for impacts of landfilling or recycling materials as well.

Others focus on initial embodied carbon, which are the impacts associated with extracting, manufacturing, and transporting materials to the jobsite.

All building materials contribute to the carbon footprint of a building in different ways, and the materials matter:

- Concrete contributes 6 to 11 percent of global carbon dioxide emissions.
- Manufacturing virgin steel from iron ore is very energy intensive.
- Wood produces fewer emissions than concrete and steel, but there’s much debate about the overall impact.

When it comes to precast concrete, there’s an upfront carbon impact, but this is mitigated through the delivery of a high level of performance over a building’s long lifecycle.

**The World of Concrete**

Schneider shared some information about concrete. This includes:

- Concrete is the most abundant manmade material in the world.
Site references and concrete industry resources:

- Precast/Prestressed Concrete Institute
- Build With Strength
- National Ready Mixed Concrete Association
- NEU Concrete – American Concrete Institute

**Building Innovation Webinar Series**

As part of our mission to continue conference education, NIBS launched a [new webinar series](#) to reach even more professionals on new technology, trends, groundbreaking tools, best practices, and workforce solutions.

It’s our way of extending the Building Innovation annual conference beyond the in-person meeting.