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Understanding Carbon Reduction Strategies

Emily Lorenz | Steve Kloos | Kimberly Wacker

9/29/2022

Your Sustainability Panel



Emily Lorenz

Consulting Engineer, PE, F-ACI Steve Kloos Senior Vice President – Quality **Kimberly Wacker**

Senior Vice President / Chief Strategy Officer





1300 +

employees



500+

Completed

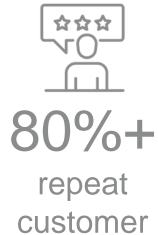
projects in 2021



70

years in

business



WELLS OFFICE OFFICE/PLANT



Learning Objectives

- 1. Understand embodied and operational carbon in the built environment
- 2. Learn how more efficient building designs can reduce the carbon and meet sustainability goals
- 3. Discover current tools and methods utilized in the prefabricated precast concrete industry on the path to carbon neutrality
- 4. Uncover new technologies and innovations being tested for advancements in the prefabricated building industry





Can you please provide an overview for our audience of **embodied** versus **operational** carbon? And why it is important to know the difference?

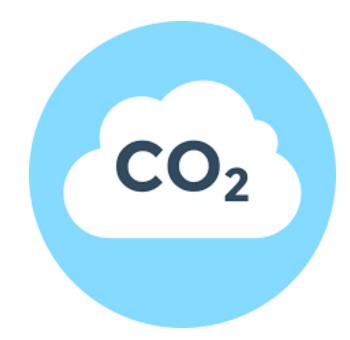




Definitions—Terminology

Embodied carbon

- Carbon footprint
- Carbon dioxide emissions
- Carbon dioxide equivalent emissions
- Greenhouse gas emissions





Definitions—Terminology

Embodied carbon (kg CO₂e): Carbon emissions associated with:

- Extraction and manufacturing of materials and products.
- In-use maintenance and replacement.
- End-of-life demolition, disassembly, and disposal.

Including transportation relating to all three.





Definitions—Terminology

Embodied carbon

Sum of GHG emissions and GHG removals in a product system, expressed as CO_2 equivalents and based on a life cycle assessment using the single impact category of climate change

From: ISO 14067-18, Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification



Operational versus Embodied Carbon

A1 - A3 PRODUCTION Stage (Mandatory)			A4 –A5 CONSTRUCTION Stage			C1 - C4 END-OF-LIFE Stage							
A1	A2	A3	A4	A5	B1	B2	B 3	B4 ^a	B5	C1	C2	С3	C4
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance (incl. production, transport and disposal of necessary materials)	Repair (incl. production, transport and disposal of necessary materials)	Replacement (incl. production, transport and disposal of necessary materials)	Refurbishment (incl. production, transport and disposal of necessary materials)	De-construction / Demolition	Transport to waste processing or disposal	Waste processing	Disposal of waste
			Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario
					B6 Operational energy use								
					Scenario								
					B7 Operational water use								
					Scenario	0							

Construction works life cycle information within the system boundary



Immediate Precast Manufacturing Focus

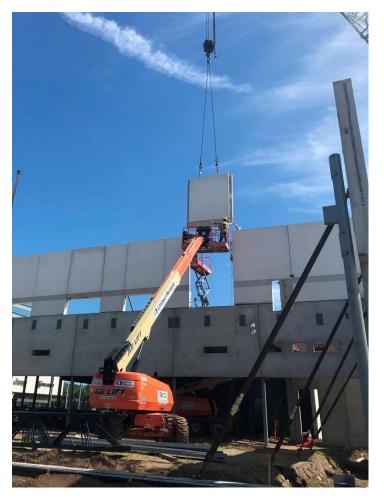
Construction works life cycle information within the system boundary													
	A1 - A3 A4 - A5				C1 - C4								
PRODUCTION Stage (Mandatory)			CONSTRUCTION Stage				END-OF-LIFE Stage						
Aı	A1 A2 A3		Δ4	А5	B1	B2	B3	B4 ^a	B5	C1	C2	C3	C4
Extraction and upstream production	Transport to factory	Manufacturing	Transport to site	Installation	Use	Maintenance (incl. production, transport and disposal of necessary materials)	Repair (incl. production, transport and disposal of necessary materials)	Replacement (incl. production, transport and disposal of necessary materials)	Refurbishment (incl. production, transport and disposal of necessary materials)	De-construction / Demolition	Transport to waste processing or disposal	Waste processing	Disposal of waste
			Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario
B6 Operational energy use													
						B7 Operational water use Scenario							
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Advantages of Prefabrication

- Plant efficiency
- Jobsite efficiency
- Recycle and reuse of components





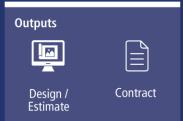


Efficient Building Design Facilitates Sustainability Goals

Preconstruction and Design

Sales & Estimating supports customer with virtual design to establish project scope.

- Project kick-off
- Pre-design assistance
- Finish selection
- Project finalization
- Legal & Finance complete
 paperwork



Design + Engineering

Project transitions to internal teams to come to life.

- Design & Engineering creates final Revit drawing for approval
- Construction Services coordinates the schedule

Mfg Que

Prefabrication Manufacturing

Product is manufactured.

- Quality reviews throughout manufacturing
- Materials stored on-site until project onset
- Project Management & Scheduling coordinate project timing



Prefabricated Building Solution

Construction Services

Product is delivered and project is built.

- Product is delivered
- On-site installation
- Sealants & restoration services performed
 Client Feedback program





Given your background and years of experience in both Redi-mix and Precast, how do the two industries differ in relation to their approach to carbon and sustainability?







What are some industry best practices you have seen in the past couple of years to understanding your carbon footprint?



Understanding Carbon Footprint

You can't know if you are improving if you don't measure!

- Full LCA of precast production
- Development of PCR
- Industry-average EPD
- Plant-, Producer-, or Product-specific EPDs



what are the scopes of carbon emissions?

PFCS SF6 CH4 HFCS CO2 GREENHOUSE GAS N20

EMISSIONS

Scope 1 emissions are direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles).

SOURCE: EPA.GOV





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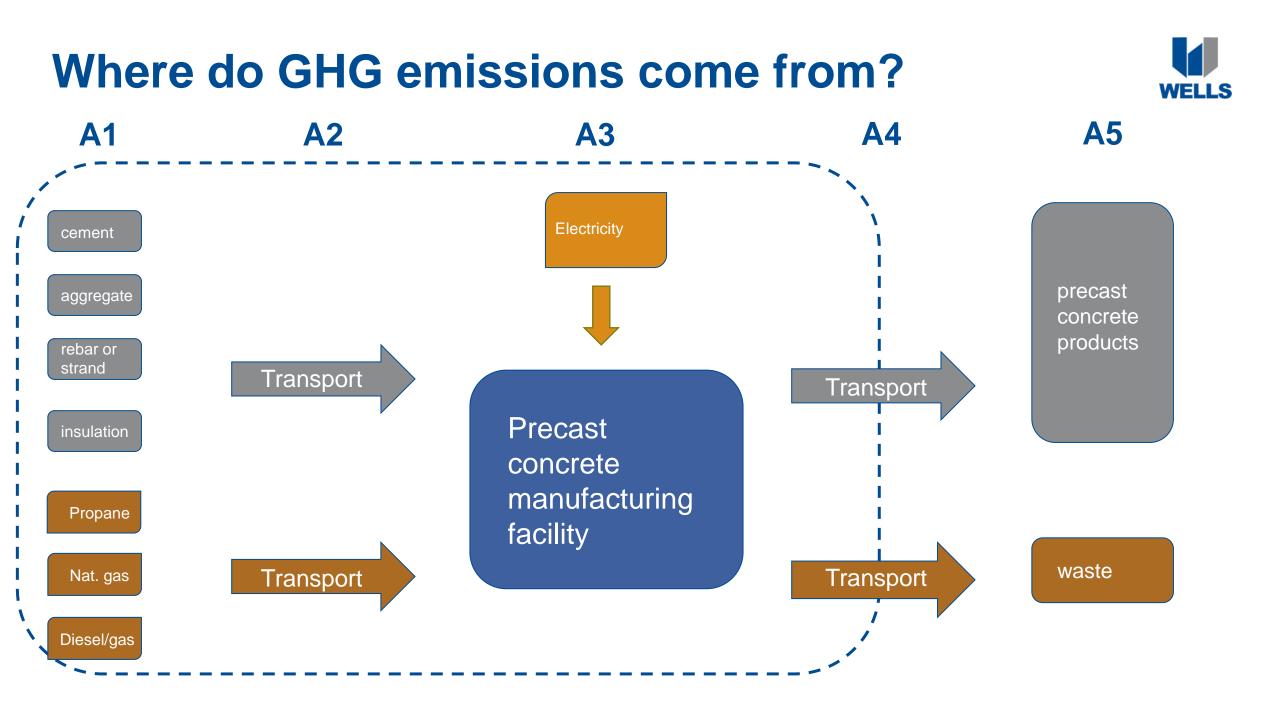
SCOPE 2 Indirect Emissions from Upstream Activities



Investments

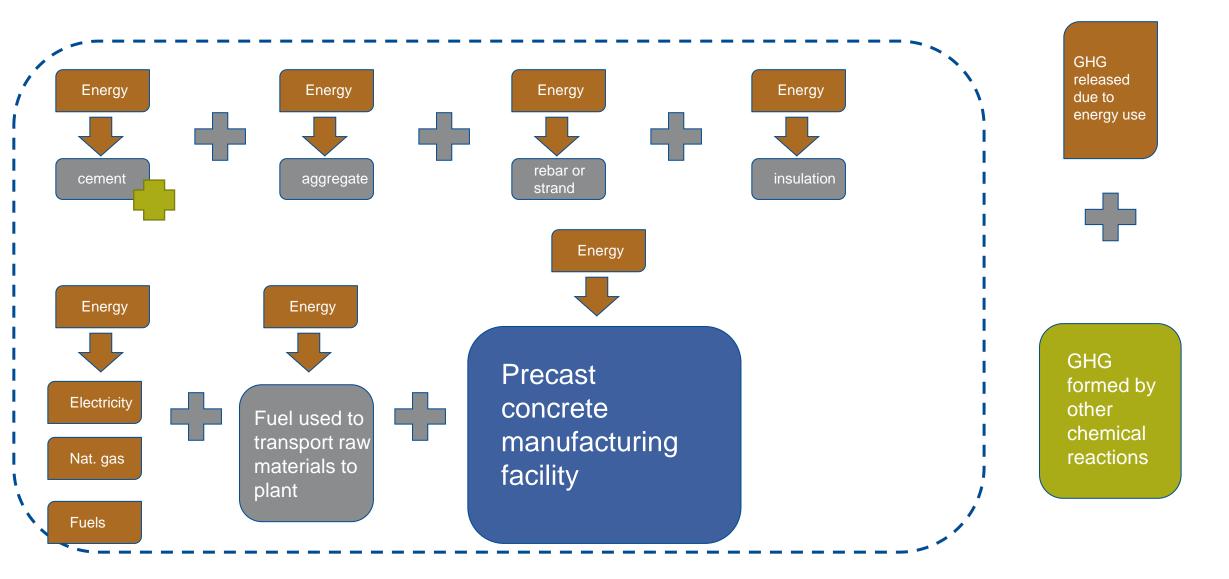
greenworldwide*

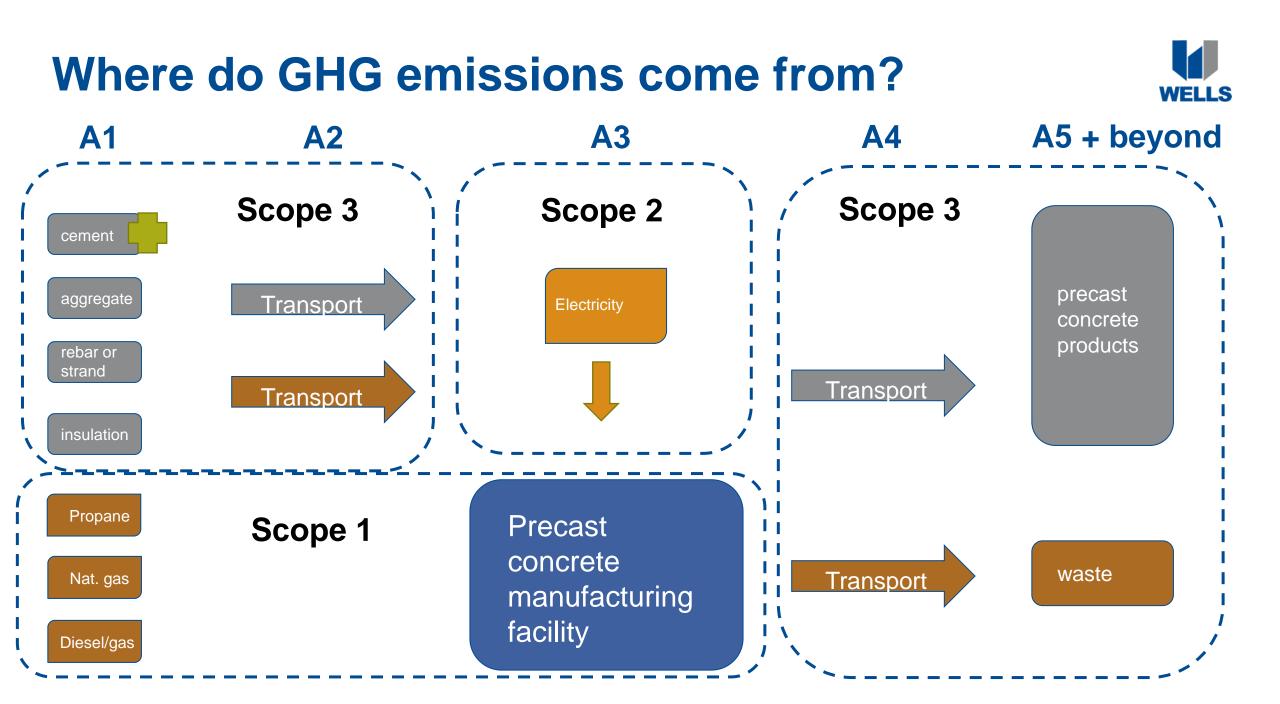
GAS



Where do GHG emissions come from?







What are some innovations, technology advancements and other changes you see within the built community to address carbon emission reduction?



Industry Trends

- Product and plant-specific EPDs for constituent materials are more-readily available.
- More tools that allow for project-specific EPDs.
- Greater focus on repurpose or reuse of structure.





Industry Trends

- Optimized mix design and manufacturing process (operational carbon reduction)
 - Investing in improvement in outdated production facilities
 - Capacity replaced with newer facilities energy efficient, automated and focused on reduction in raw material waste.
 - L1 Cement, Admixture
- Reduction/Replacement of Portland Cement (embodied carbon reduction)
 - Slag, Metakaolin, Silica Fume, Natural Pozzolans, Geopolymer Mixes
 - Our production facilities using fly ash as portland cement substitute to reduce the amount of embodied carbon in the concrete mix by up to 15%
 - Our production facilities are also using a ready-mix cement that has additional limestone added to the mix which reduces the portland cement content by 10%



Industry Trends

- Leadership focus and commitment to process improvements
- Carbon capture and sequestration
- Energy management
- Water management
 - Recycling and repurposing process water
- Recycling methods for waste concrete, steel, rebar, insulation and other consumable materials



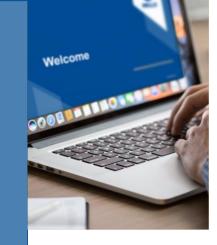


Questions? Please contact. steve.kloos@wellsconcrete.com kimberly.wacker@wellsconcrete.com

Thank you.



October 19, 2022 at 11am CDT



K12 Design Solutions

An integral part of educational building design is providing a safe learning space. Precast offers unique and resilient structural and architectural solutions that not only provide protection, but also meet budget restrictions and ensure on-time completion. Even though these structures are built to be safe, it doesn't mean they need to look uninviting; an evolving variety of finishes are creating modern K-12 school designs, that are woven into the fabric of their communities.

Speakers: Reid Mordhorst | Jace Rossow