Build to Compete: Clean Procurement that Drives Investment in Pennsylvania

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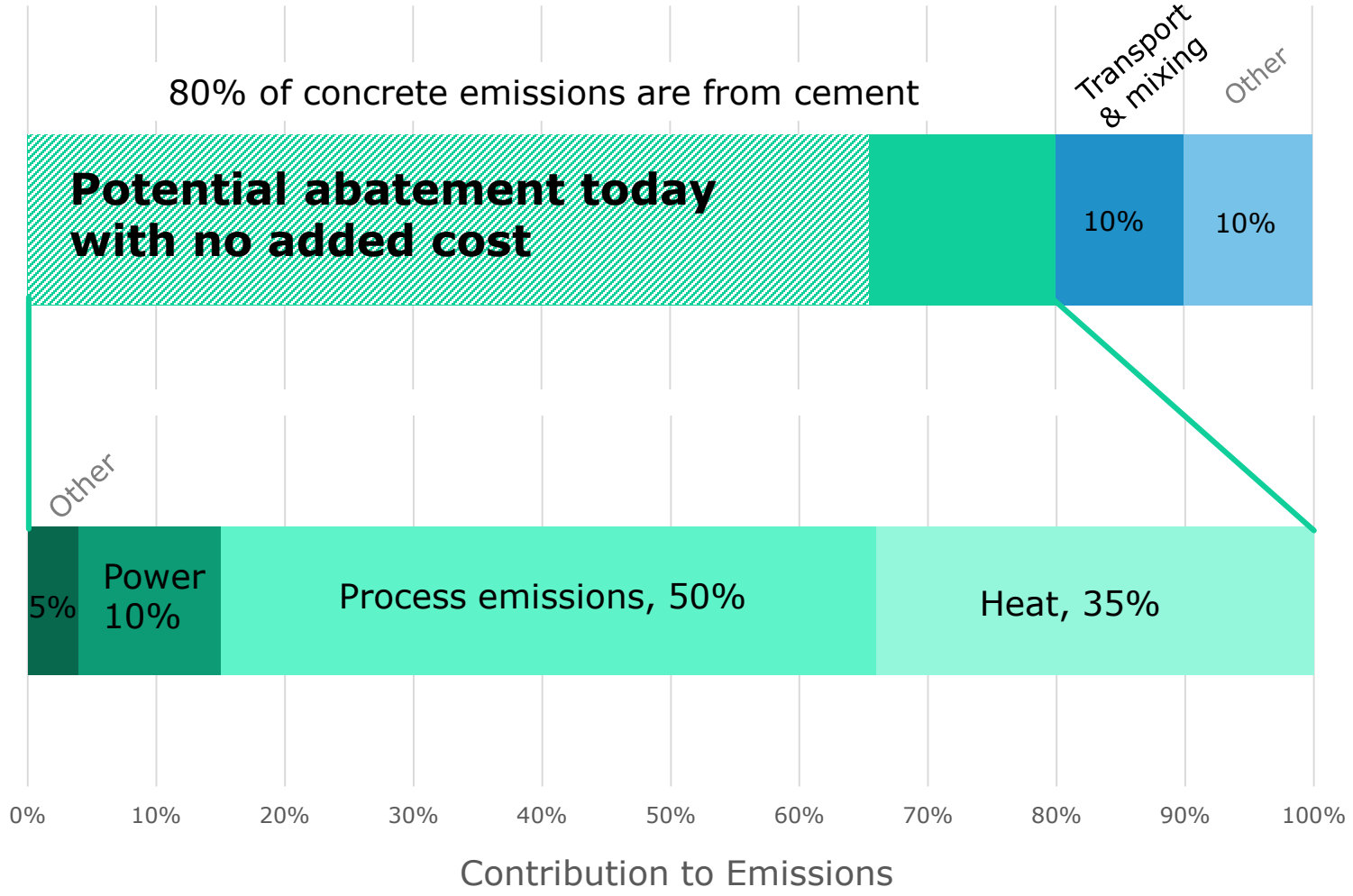
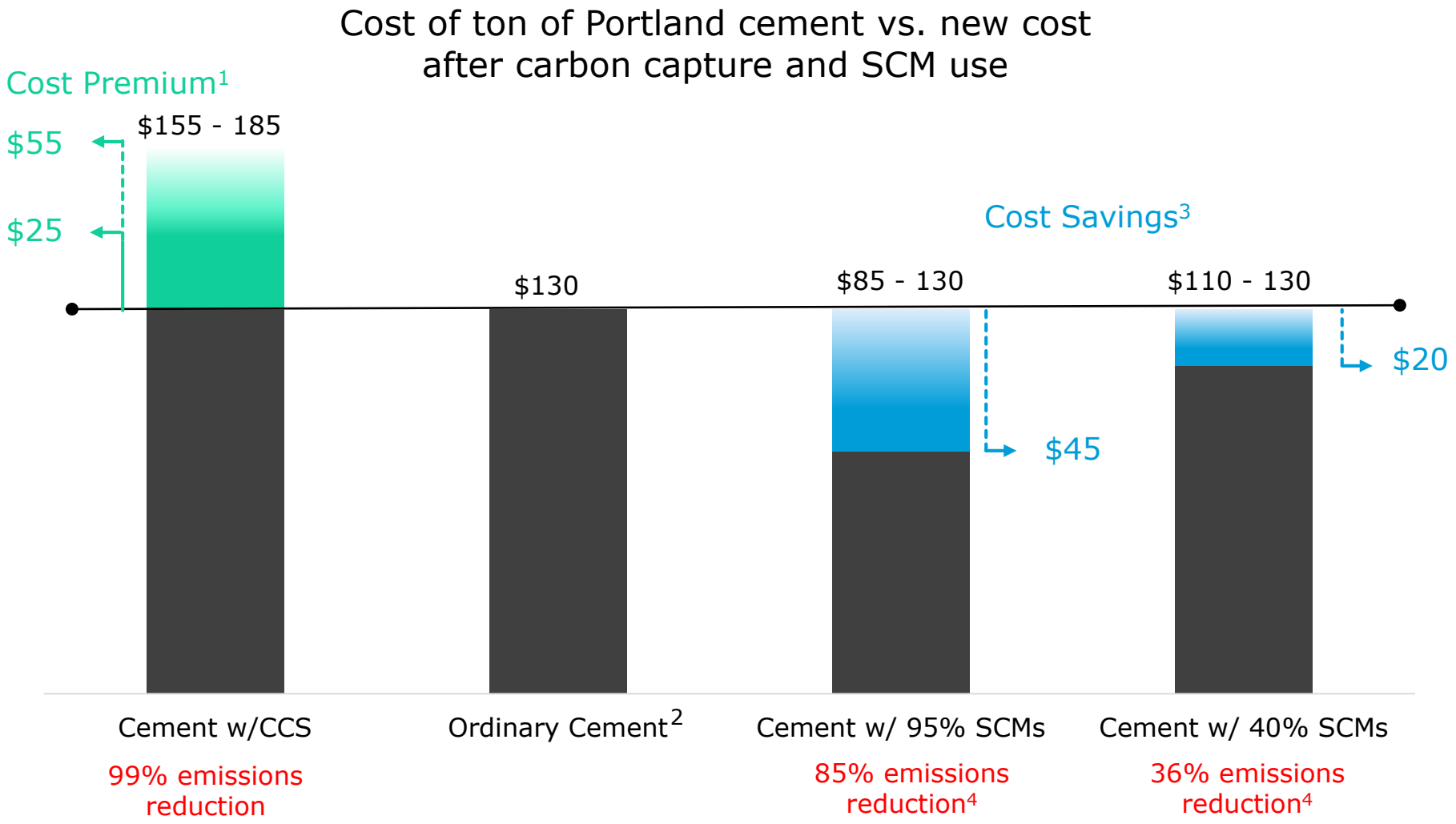
80% of concrete emissions come from cement



~65% reduction in concrete emissions can be achieved with increased SCM use with no additional cost

Emissions reductions over 50% achievable with significant costs/new investments

There are cost-effective solutions deployed today to lower concrete emissions

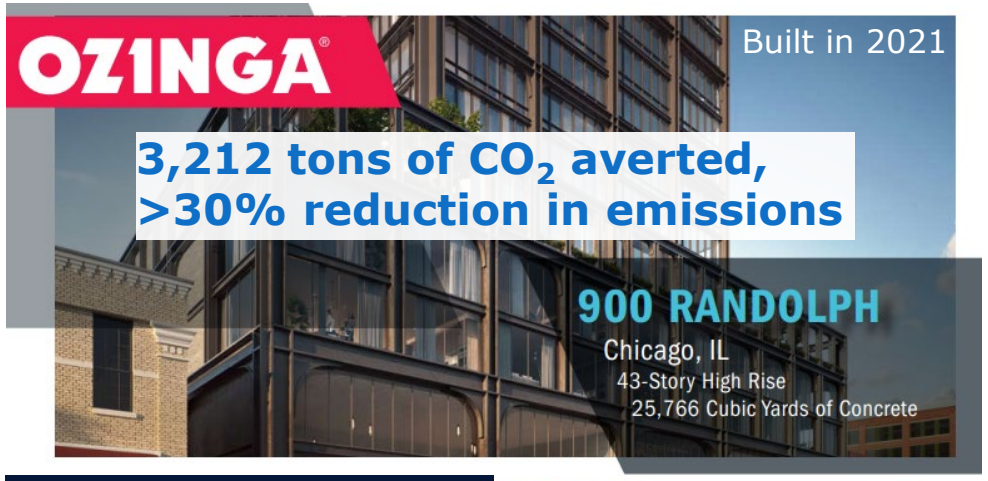


Max 95% Slag allowed under ASTM C595

Max 40% Slag allowed in PA pavements and structures[5]

Sources
[1]Values from U.S. DOE, 2023
[2]USGS cement costs in PA, 2023
[3]EFIF estimates based on RMI data
[4]RMI estimates, 2021
[5]National Academies Survey of State DOTs, 2025

Low-carbon concrete – not just theory!



State-of-the-art school outside Bordeaux reduces CO_2 by 40% with ECOPact

Movement on Low-Carbon Concrete in Pennsylvania:

Policy/Strategy:

- PennDOT Carbon Reduction Strategy
- PennDOT announced requiring EPDs for asphalt beginning this year.
- PA HB1711 – establishes Performance Incentive Program for embodied carbon reductions in concrete for state projects

Procurement:

- Up to 40% SCMs allowed in PA procurement (2025 National Academies Survey) – increase use?
- Approved use of Portland Limestone Cement under ASTM C595 – expand uses of ASTM C595?

Additional actions? We want to hear from you!

Procuring low-carbon concrete: the path from planning to reduced emissions

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Planning	Data Gathering	Data Reporting	Incentives & Requirements	Reduced Emissions
Development of strategic plans	Require EPDs with procurement bids Collect reported GWP from all bids Pilots to test new low carbon mixes	Determine GWP average for state procurement Publicly report CIs and costs for state-procured concrete	Provide incentives for bids with GWP below set threshold Require state contracts use concrete below set GWP threshold	

Example states along the policy development pipeline

Pennsylvania	Oregon, Washington	New York, New Jersey, Minnesota

Questions for discussion

1. What is something you heard in the previous session that was new to you or made you reconsider your perspective on low-carbon concrete?
2. Was there anything from the session that didn’t align with your previous experience with low-carbon concrete?
3. What barriers have you experienced for adopting low-carbon concrete in PA? Which are most relevant in the near term vs longer term?
4. What would give you confidence to use/procure low-carbon concrete tomorrow?
5. What is your perspective on the size and readiness of the opportunity space for low-carbon concrete production and use in PA?

Table Discussion: Opportunities for Low-Carbon Cement and Concrete in PA

Breakout group discussion questions

What opportunities could PA pilot in the next 12 months for lower carbon concrete procurement?

- What momentum/lessons learned could be leveraged from today?
- What's the minimum set of conditions (policy, technical, financial) needed to unlock each opportunity?
- Who should be responsible for pursuing the opportunities you identify?

What barriers need to be addressed before these opportunities can be realized?

- Who is responsible for addressing these barriers?
- What is a realistic timeline to reducing these barriers?

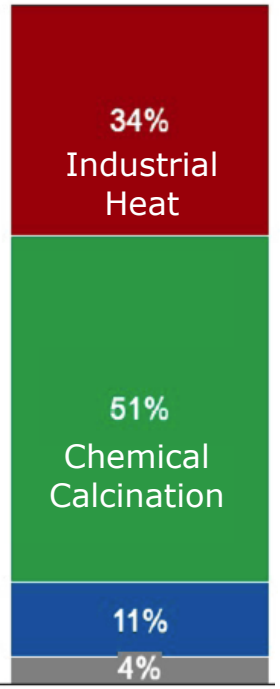
Supplemental Slides

Cement and concrete GHG emissions breakdown and decarbonization levers

While the largest decarbonization levers for cement remain nascent today due to higher costs or emerging technologies, concrete producers can significantly decarbonize their products at low cost by just using less cement.

Portland Cement

GHG Emissions

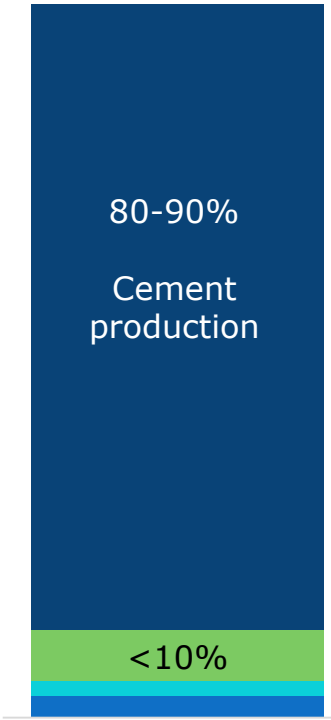


Decarb Levers

Lever	Abatement Potential[1]	Cost[1] ($/ton)
Electrification	Up to 35%	*Emerging tech*
CCUS (with 45Q)	99%	25-55
Alternative Fuels	Up to 8%	-5 – 5
Material Substitution	5-50% (material dependent)	(5-25)

Concrete

GHG Emissions



Decarb Levers

Lever	Abatement Potential[2]	Cost[2] ($/ton)
SCM use: Limestone, 15%	Up to 15%	(82,42)
SCM use: Fly Ash, 40%	Up to 40%	(58,0)
SCM use: Slag, 95%	Up to 85%	(48,0)
Carbon Uptake	TBD	TBD

[1]Values from 2023 DOE Pathways to Commercial Liftoff Report
[2]Values from RMI Concrete Solutions Guide, 2021