Low Embodied Carbon Materials in Construction Resolution- 2nd Read

Lucca Henrion and Alexander Rees – Global CO_2 Initiative

Jan Culbertson – Ann Arbor 2030 District

GLOBAL CO_2 INITIATIVE
UNIVERSITY OF MICHIGAN

ANN ARBOR 2030 DISTRICT®

Goals of the resolution

- **Highlight the importance of embodied emissions**
- Develop local expertise in low embodied carbon materials
- Communicate methods to reduce embodied emissions

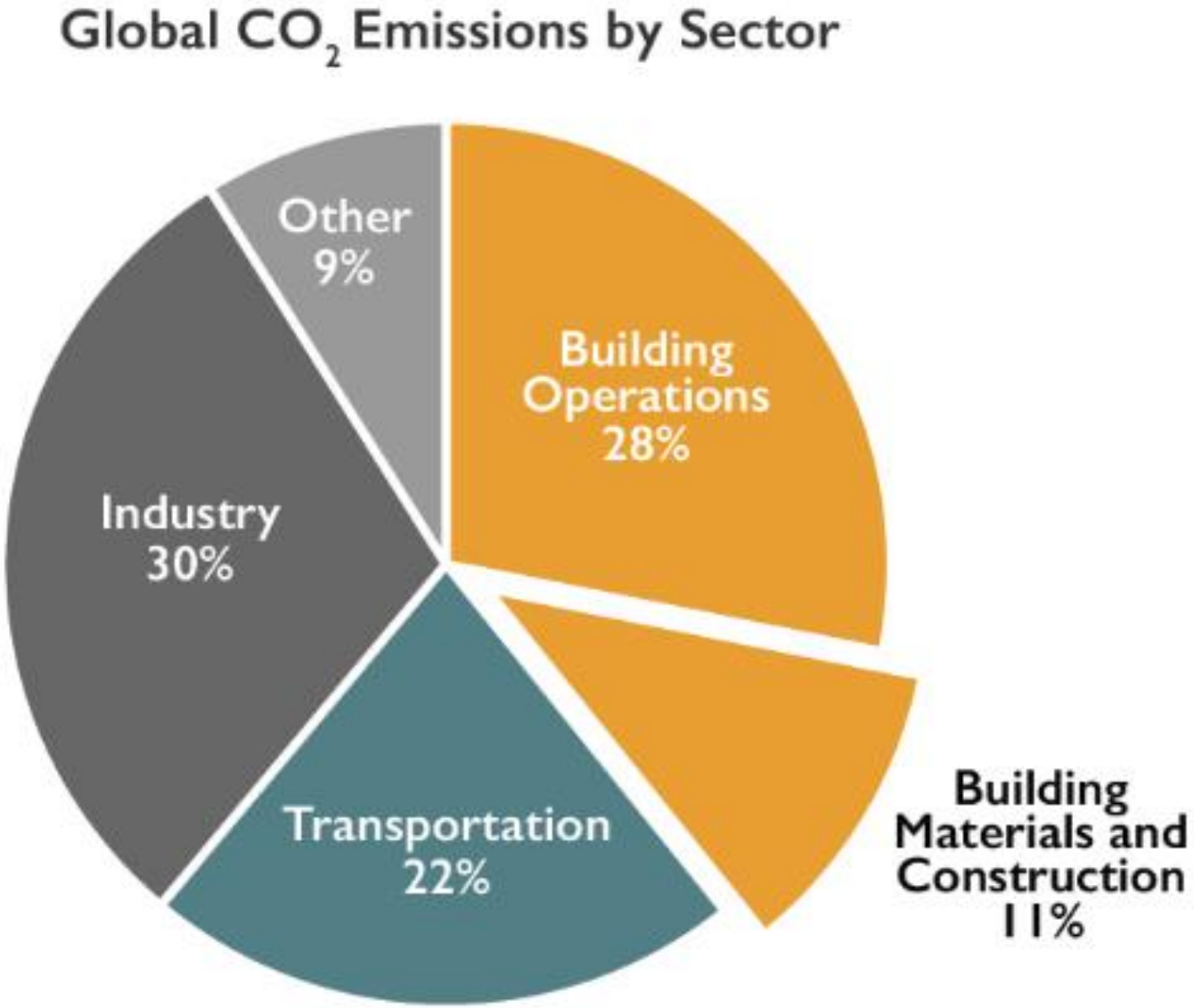
Understanding Carbon

Embodied Carbon

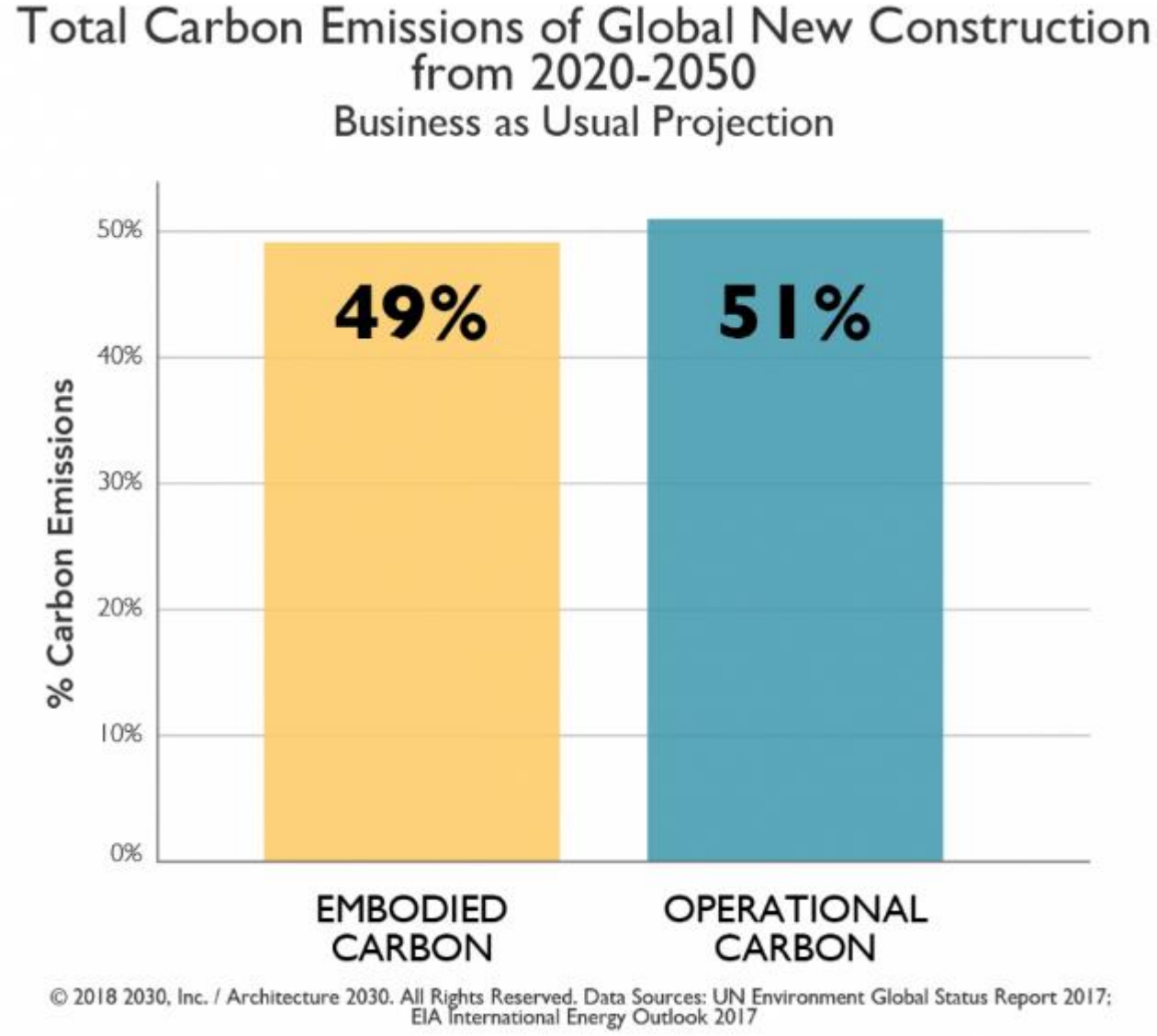
Manufacture, transport and installation of construction materials

Operational Carbon

Building energy consumption



Annually, embodied carbon is responsible for 11% of global GHG emissions and 28% of global building sector emissions.



Embodied carbon will be responsible for almost half of total new construction emissions between now and 2050.

Goals of the resolution

- Highlight the importance of embodied emissions
- **Develop local expertise in low embodied carbon materials**
- Communicate methods to reduce embodied emissions

ANN ARBOR 2030 DISTRICT®

Low Embodied Carbon Concrete Task Force charge:

1) Develop recommendations for Concrete specifications that will lower embodied carbon in concrete that can be implemented immediately in SE MI

2) Develop recommendations that may need further research, market transformation or industry & professional education before implementing

3) Discuss policies that reinforce & promote these materials

For initial task force presentation:

https://wcaplanroom.app.box.com/s/mno2utkj3qvy0srl2kgo3wvd477gllit

Task Force Participants:

Owners

University of Michigan AEC

Marina Roelofs

Jerry Shulte

Patti Spence

Ann Arbor Public Schools

Emile Lauzzana

Jason Bing

City of Ann Arbor

Nick Hutchinson

Researchers

Lucca Henrion, U-M

Jeremy Gregory, MIT

Lawrence Sutter, MTU

Facilitator

Jan Culbertson, A2 2030 District

Engineers

Kevin Maillard, OHM Advisors

Jenna Bresler, Silman

Ian Schmellick, Silman

Christopher Kelley, Silman

Supplier

Christopher Kennedy, St. Mary's Cement

Contractors

Tom McCurry, Doan Companies

Kelli Jenness, Spence Brothers

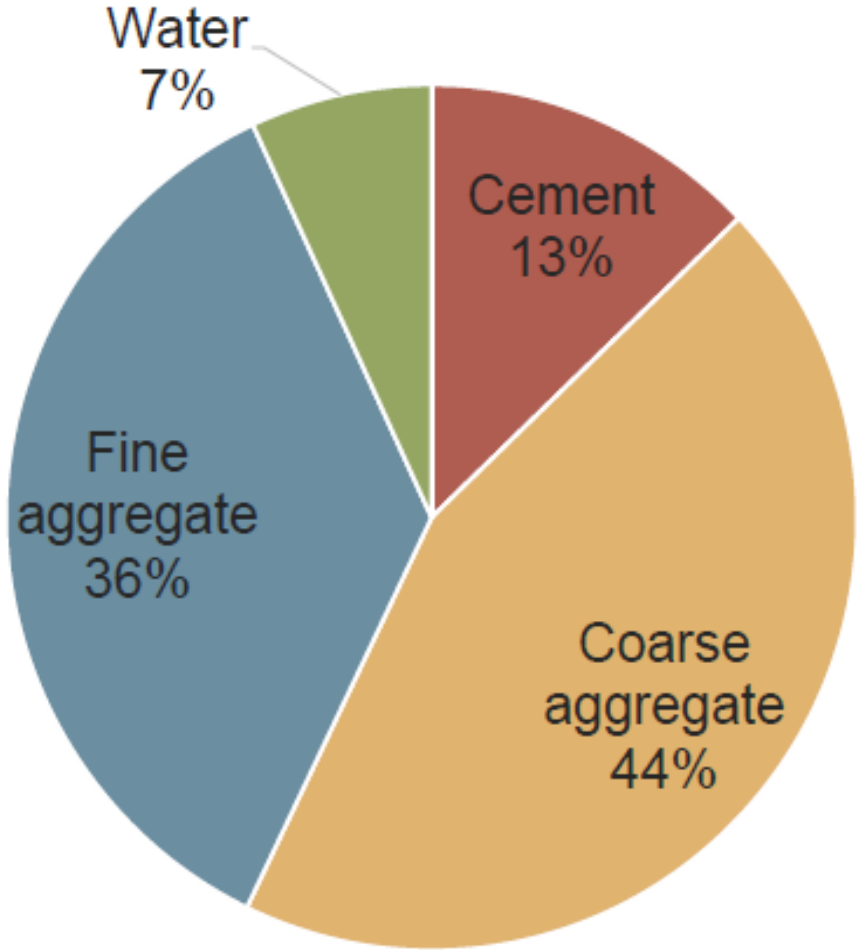
Stephanie Corona, Gilbane

Associations

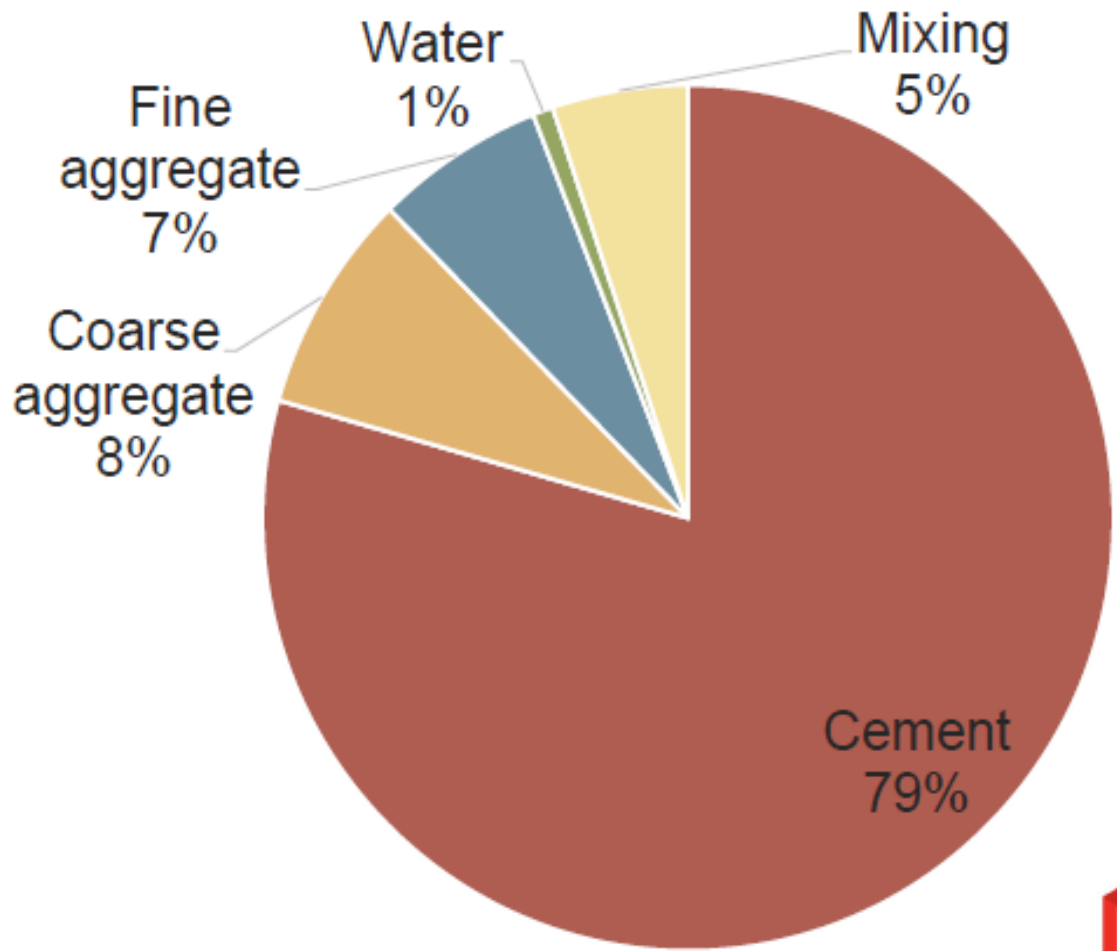
Dan DeGraaf, Michigan Concrete Assoc.

Kerry Sutton, American Concrete Institute

Constituent contribution by **mass**



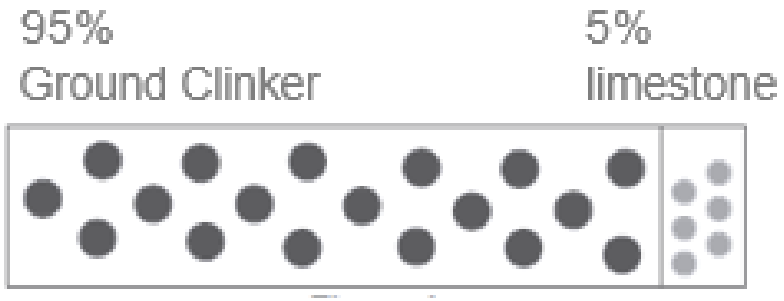
Constituent contribution by **GHG emissions**



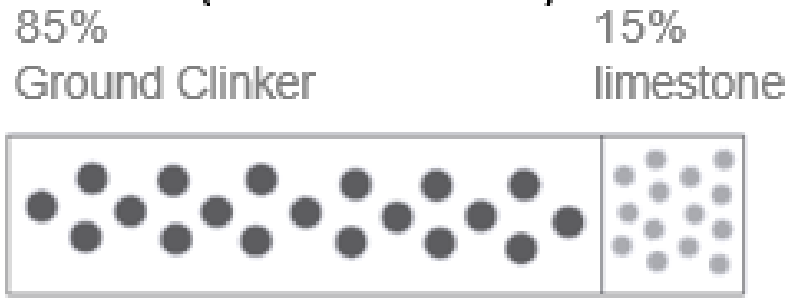
3000 psi mixture with no SCMs

Specify Portland Limestone Cement

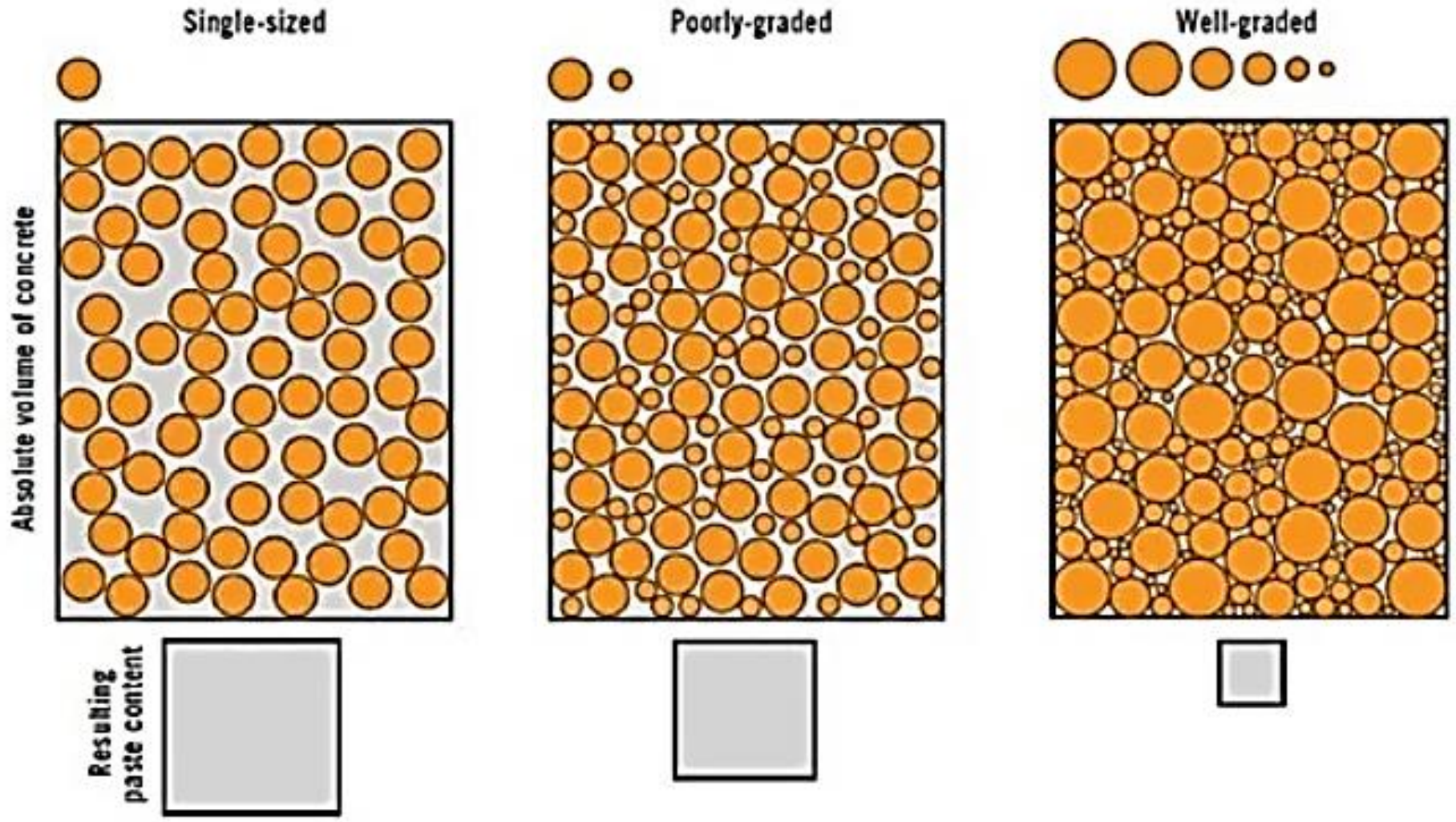
- Type I Portland Cement (ASTM C 150)



- Type IL Portland Limestone Cement (ASTM C 595)



Specify Well Graded Aggregate



Add Supplementary Cementitious Materials (SCMs)

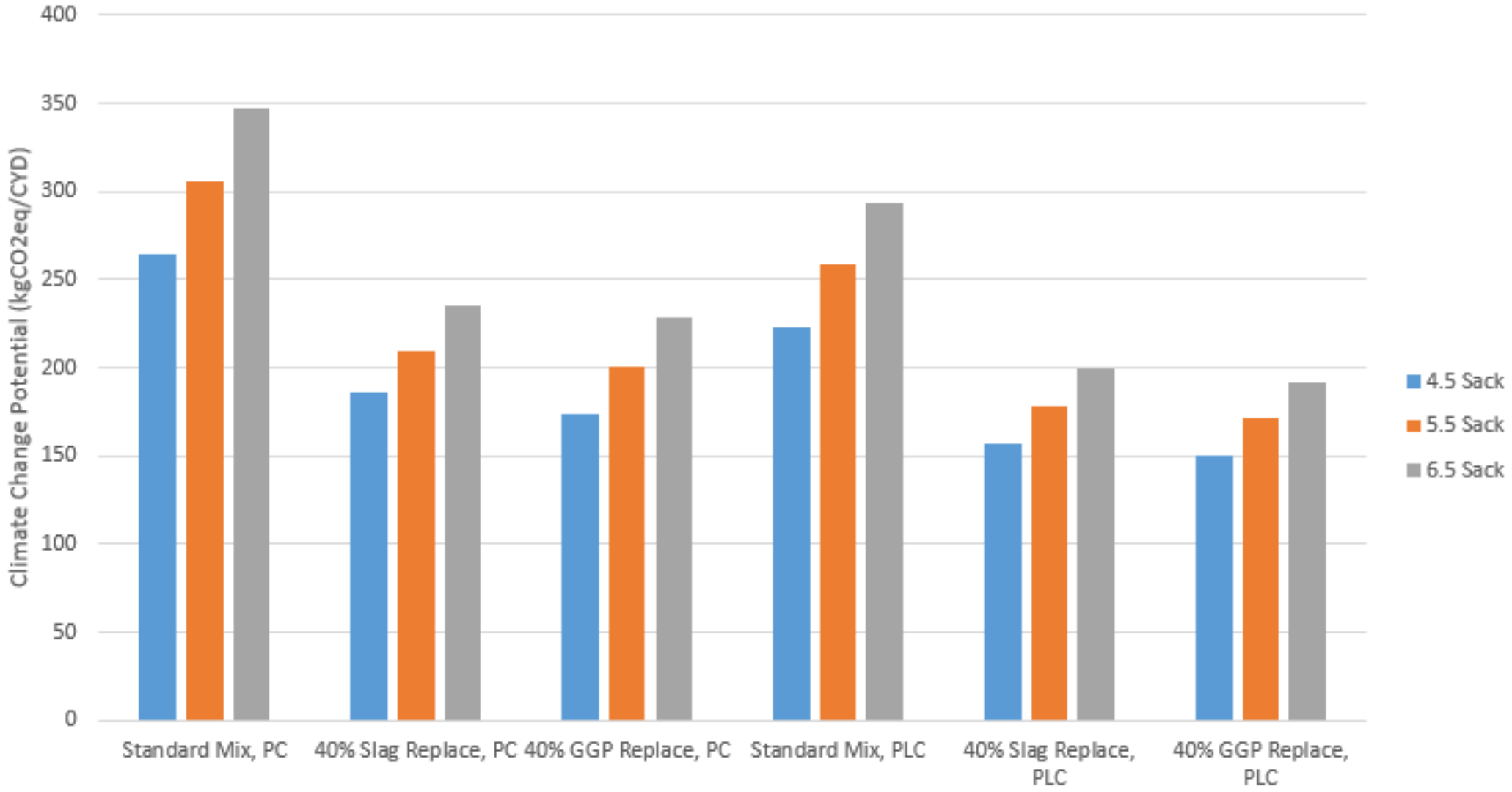
Fly Ash is a by-product of coal combustion—reduced availability as coal plants are closed

Slag is a by-product of steel production. Slag Cement is ground granulated blast furnace slag—reduced availability as steel production moves to Electric Arc Furnaces. Even now some slag is imported from overseas.

Evolve to use Recycled Materials

Ground Glass Pozzolan can be produced from 100% post-consumer glass, harvested and processed regionally.

Embodied Carbon Projections for Mixes:
37% reduction now; 50% projected reduction



LECC Pour at the Tri Delta Sorority (07/09/21)

A LOT of savings

- Appx. 3000 CYD in a ten-story building
- 40% cement replacement would save this building 375000 kg CO2
- Equivalent to a car circling the earth 38 times!
- Equivalent to powering a mid-sized city of 100,000 people for 11 hours!

VIEW FROM CORNER OF MAIN ST. & WILLIAM ST.

Source: Mlive

Goals of the resolution

- Highlight the importance of embodied emissions
- Develop local expertise in low embodied carbon materials
- **Communicate methods to reduce embodied emissions**

Resource Guide

Provide methods to calculate embodied emissions

- EPD collection (EC3)
- EPD creation (ZGF, Athena, Climate Earth)

Outline available and developing technologies and reduction techniques

- Cement Production (e.g. carbon capture)
- Concrete Production (e.g. SCMs, carbon curing, well-graded aggregates)
- Concrete Procurement (e.g. climate impact weighting)

Highlight local projects / research / contacts

Other local policies