Case Study: A Low-Carbon, Mass-Timber Arena

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Idaho Central Credit Union Arena

University of Idaho

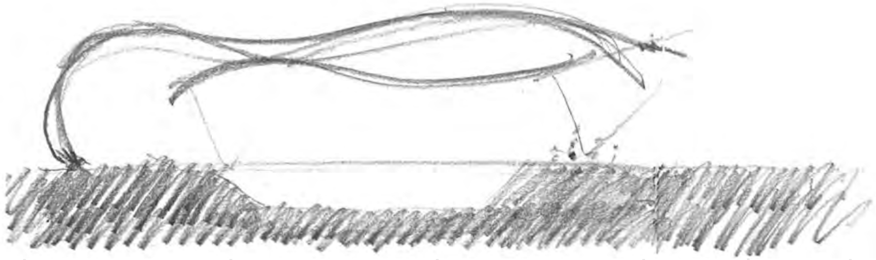
Size: 66,186 SF
Location: Moscow, Idaho, USA
Stat: 4,000 seats for basketball and
4,700 seats for concerts

Architect: Opsis Architects
Sports Architect: Hastings & Chivetta Architects
General Contractor: Hoffman Construction
Base Building Engineer: KPFF
Roof Engineer- Build: StructureCraft

Image credits: Opsis Architects
Cover image credits: StructureCraft

Forms of Palouse Form of the Arena

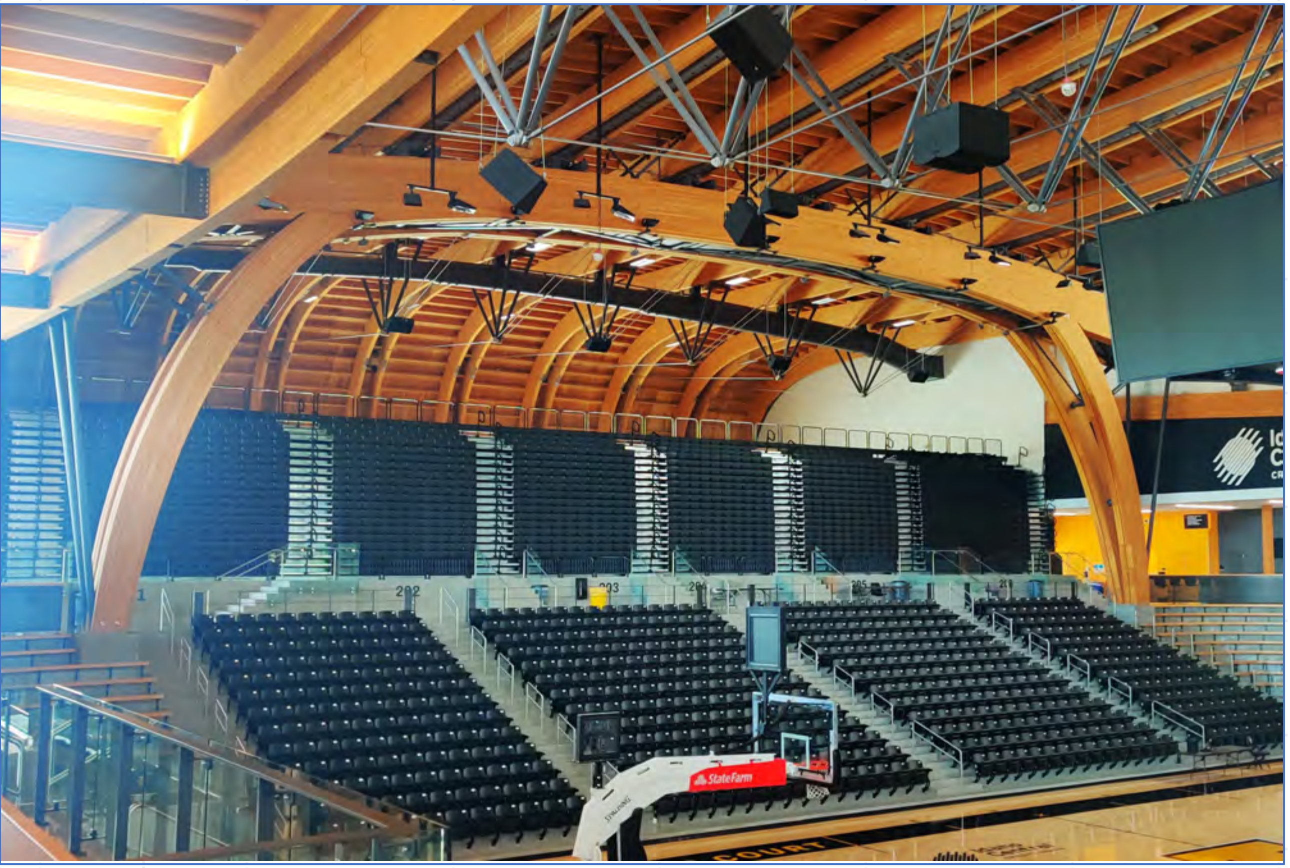
"The undulating roof forms recall the surrounding Palouse landscape" *Opsis Architects.*



Architect's initial sketch

Image credits: Opsis Architects

Glu-lam Beams



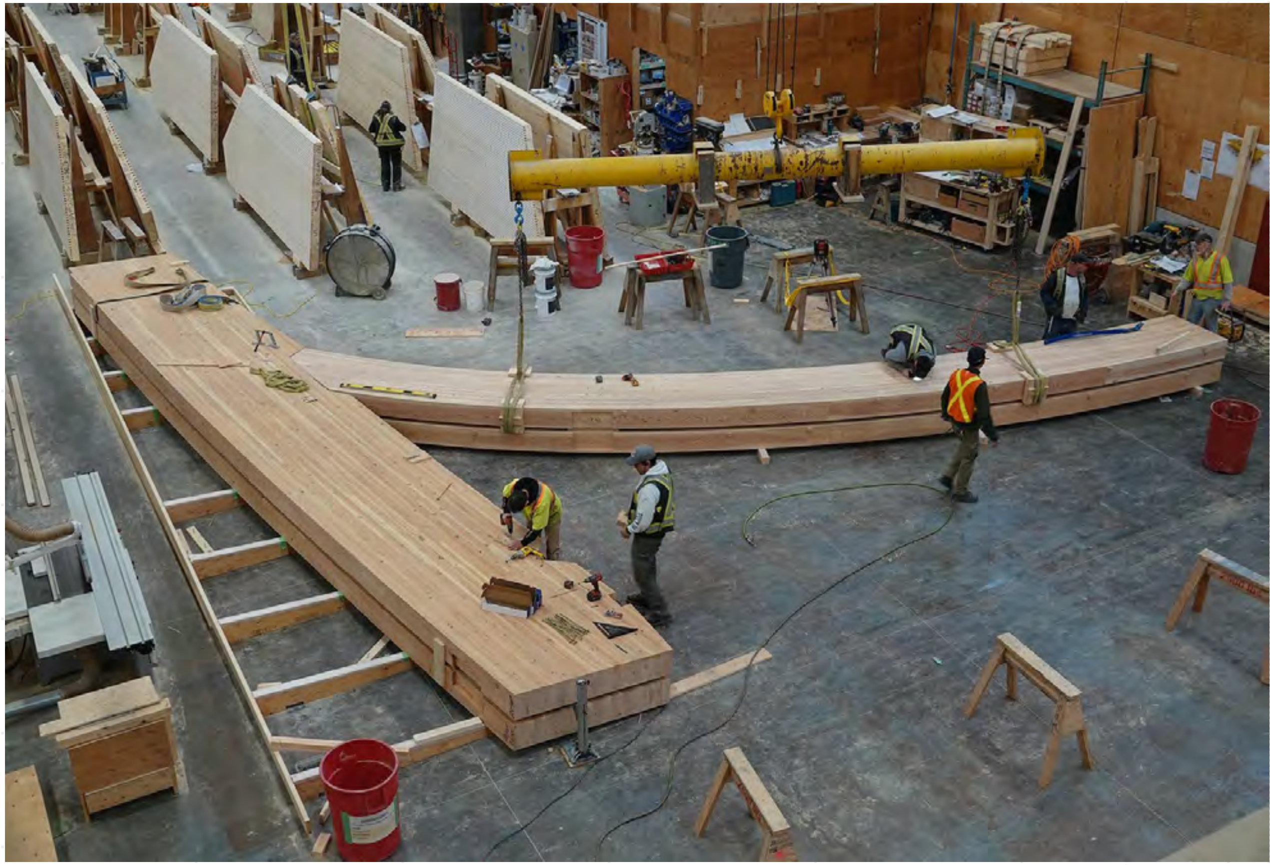
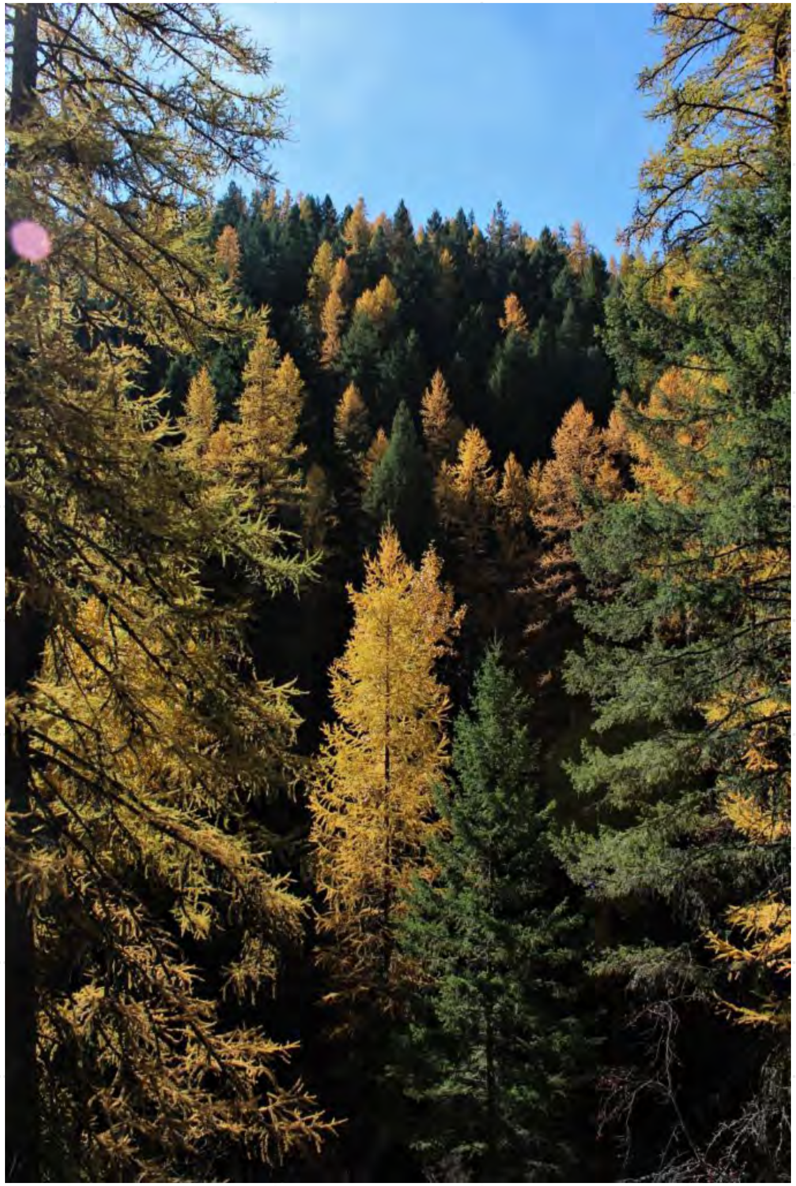


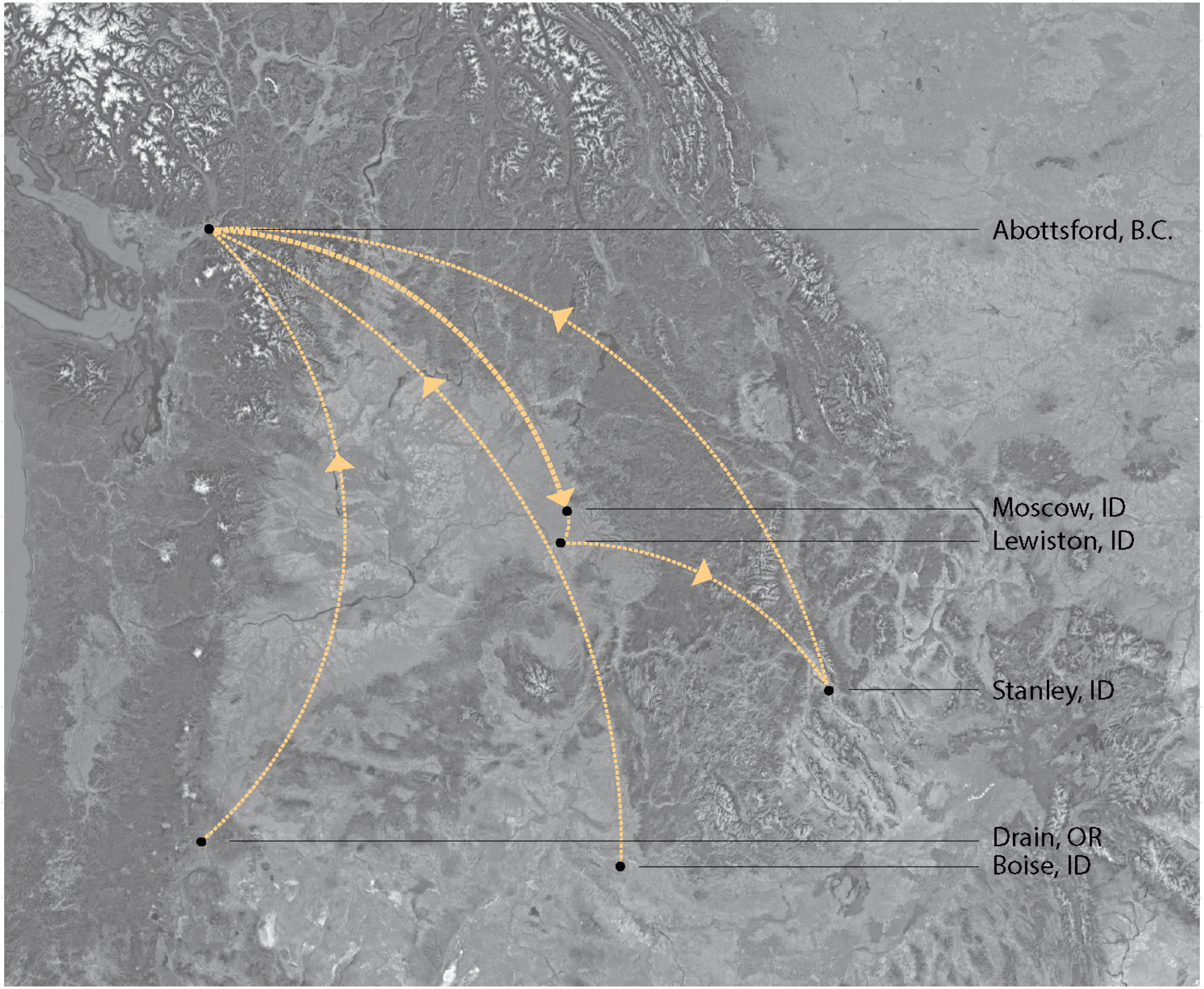
Image credits: Shristi Tamrakar, StructureCraft

UI's Experimental Forest

"The industry as a whole is proud of the project. It's such a large collaboration. You have this gorgeous architectural wonder whose materials are supplied from partners throughout the state of Idaho. When we look at it, we see the amazing creativity of how we can utilize mass timber." - *Jennifer Okerlund, executive director of the Idaho Forest Products Commission*

Image credits: University of Idaho website



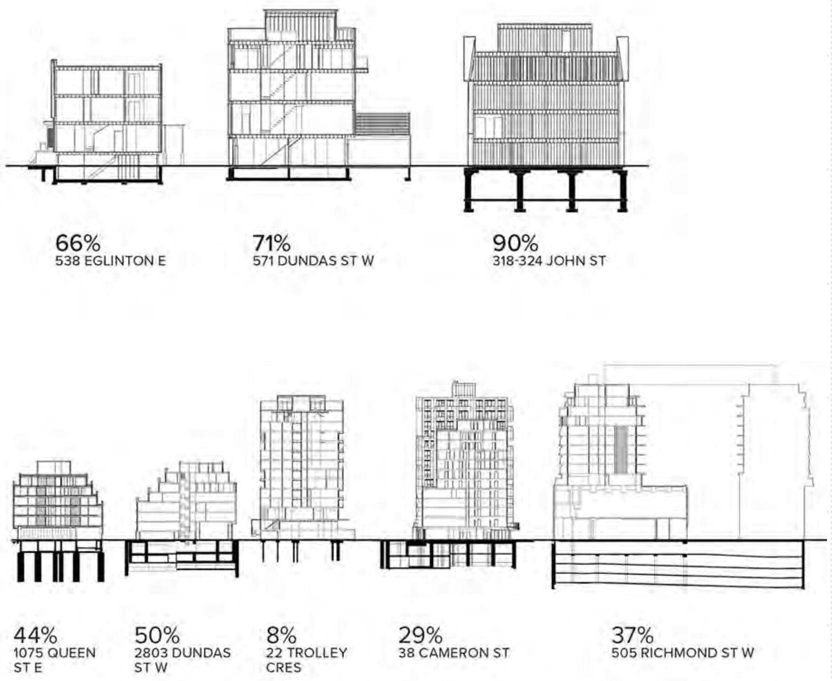


Timber in the PNW

Image credits: 1)Vaagen timber 2)UI

Is a net-zero-carbon arena possible?

Image credits: University of Idaho website



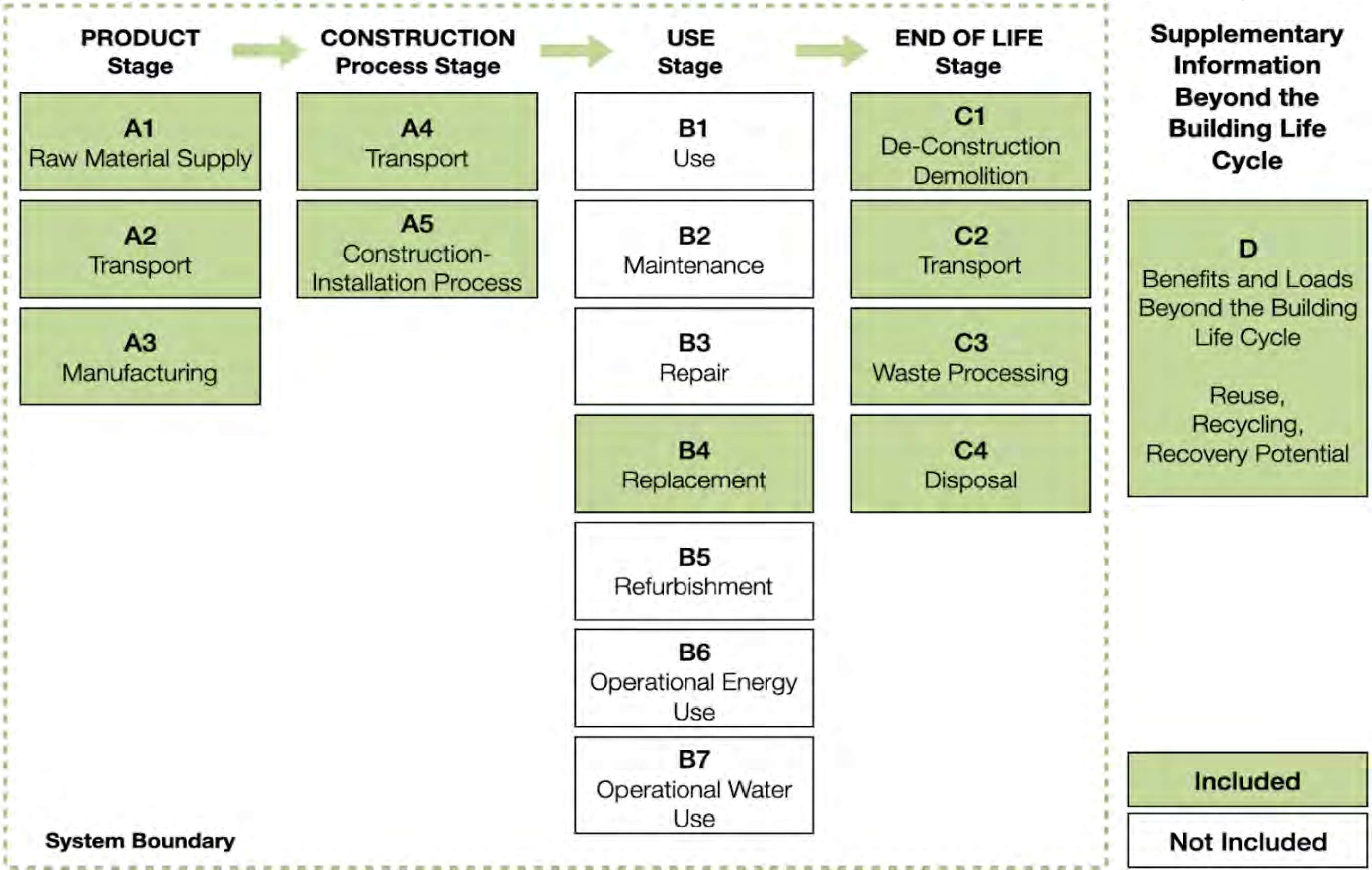
This January we learned that the embodied carbon didn't totally offset the carbon footprint.

Even though Athena cautioned about comparison, we wanted to contextualize the results with two case studies.

1. Concrete-clad Swiss Life Arena in Zurich.
2. Mid-rise buildings in Toronto analyzed by architecture students in Kelly Doran's Ha/f Studio

Image credits: 1)Wikipedia 2)Canadian Architect

Our LCA included only embodied carbon



The Results

Total (A-C)
1.31E+06
9.75E+03
1.58E+03
4.98E-02
1.97E+05
2.29E+07
2.03E+07
1.78E+07

Table 9 Summary LCA results (A-C), including biogenic carbon

Environmental Indicator	Unit	Total (A-C)	Per m²
Global Warming Potential	kg CO_2 eq.	1.31E+06	2.13E+02
Acidification Potential	kg SO_2 eq.	9.75E+03	1.59E+00
Eutrophication Potential	kg N eq.	1.58E+03	2.57E-01
Ozone Depletion Potential	kg CFC-11 eq.	4.98E-02	8.10E-06
Smog Formation Potential	kg O_3 eq.	1.97E+05	3.20E+01
Total Primary Energy	MJ	2.29E+07	3.72E+03
Non-renewable Energy	MJ	2.03E+07	3.30E+03
Fossil Fuel Consumption	MJ	1.78E+07	2.90E+03

Image credits: Arch Paper

Table 1. Carbon embodiment in different structures (Doran, 2021).

PROJECT ADDRESS	FLOORS	STRUCTURAL SYSTEM	GFA OF STUDY	kgCO2e /m²
538 Eglinton Ave E	G+3	Wood Frame	203	283
571 Dundas St W	G+2	Wood Frame	136	243
318-324 John St	G+3	Wood Frame	342	227
GTHA LOW-RISE AVERAGE				**251**
1075 Queen St E	G+6	Hollowcore & Steel	859	395
2803 Dundas St W	G+7	Concrete	1,522	596
22 Trolley Cres	G+12	Concrete	2,289	366
38 Cameron St	G+13	Concrete	4,529	615
505 Richmond St W	G+14	Concrete	1,911	469
GTHA MID-RISE AVERAGE				**488**
481 University Ave	G+53	Concrete	20,618	494
11 Wellesley St W	G+60	Concrete	10,644	546
GTHA HIGH-RISE AVERAGE				**520**

ICCU @ 213 kgCO2eq/m2

Counter Balancing Carbon with Timber

87% of the total embodied energy is from concrete.
Athena

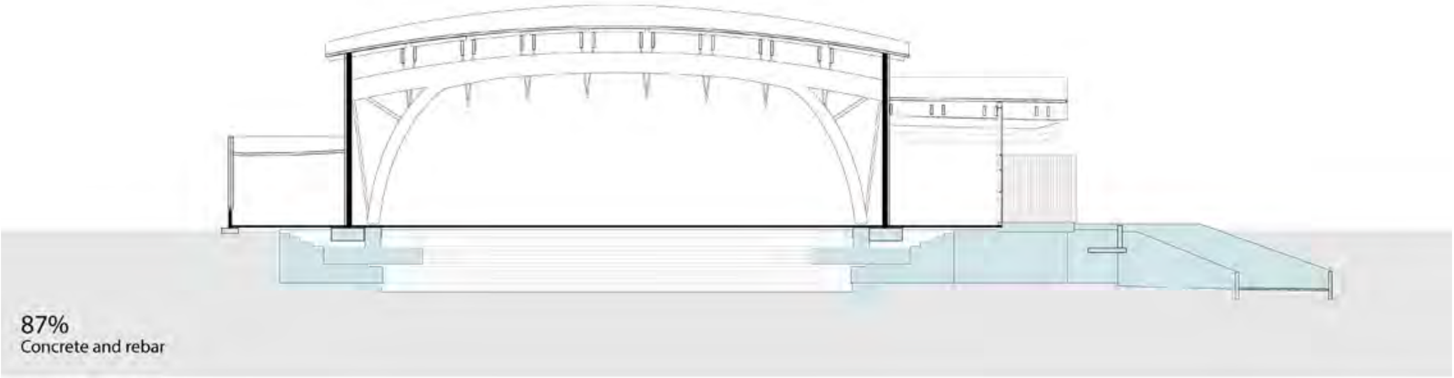


Image credits: Bruce Haglund

‘Over 90% of concrete used in construction could be replaced with timber’ Or with stone.

20 JULY 2023 • BY FRAN WILLIAMS

Waugh-Thistleton

Amin Taha, Groupwork

Conclusion:

Announcing a Breakthrough in Carbon-Negative Concrete

This Oregon winery may spark a revolution in sustainable concrete applications.

Brought to you by Build With Strength

Winemaker Remy Drabkin and her builder, John Mead

What about site concrete paving?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Questions?

POLITICS

'Stick to net zero strategy,' UN climate chief tells world leaders