

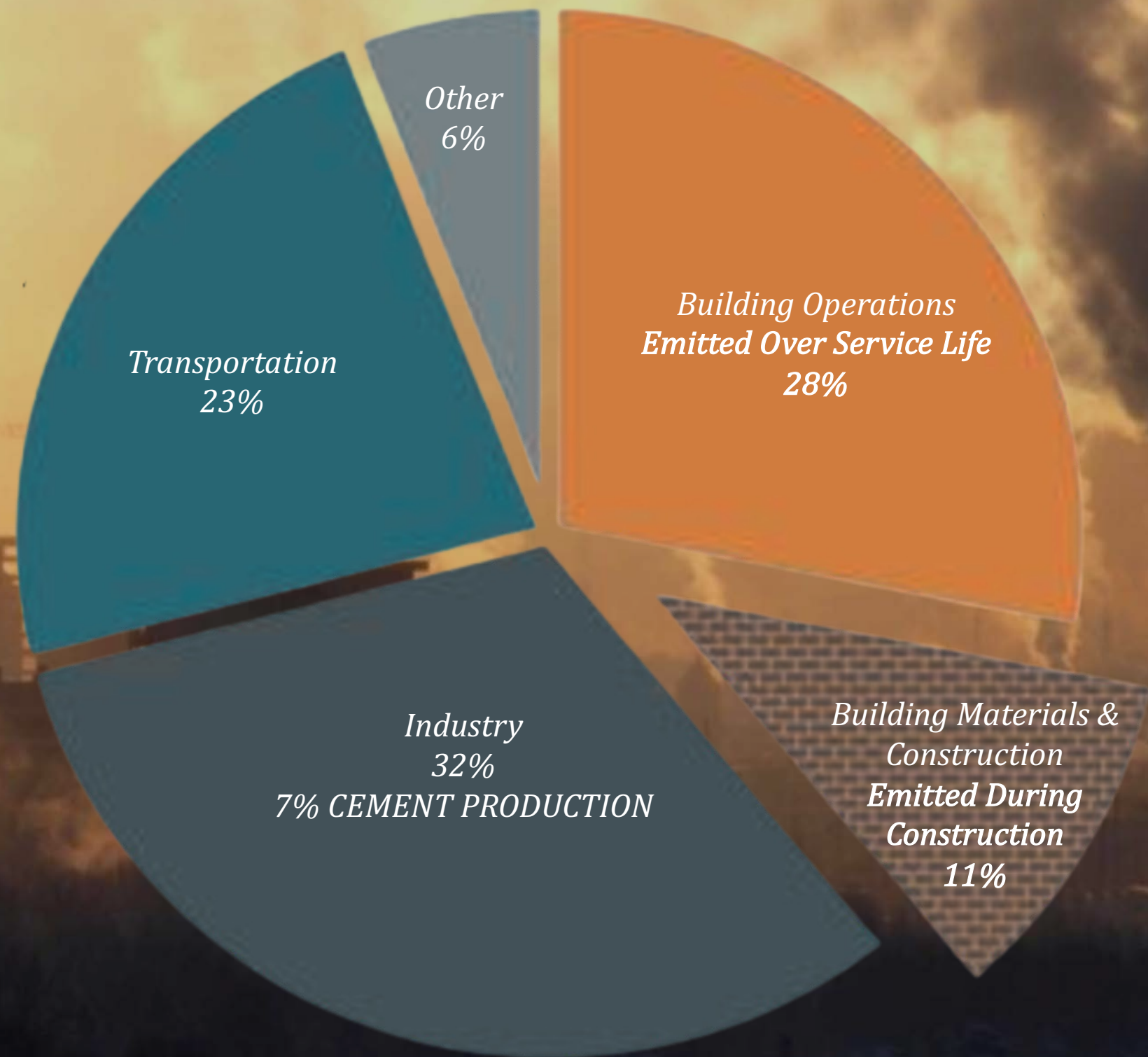
BamCore

*REDEFINING STRUCTURAL FRAMING WITH
ENGINEERED BAMBOO & EUCALYPTUS*



BAMCORE®

Global CO₂ Emissions By Sector



*Source: Global Alliance for Buildings and Construction
2018 Global Status Report*

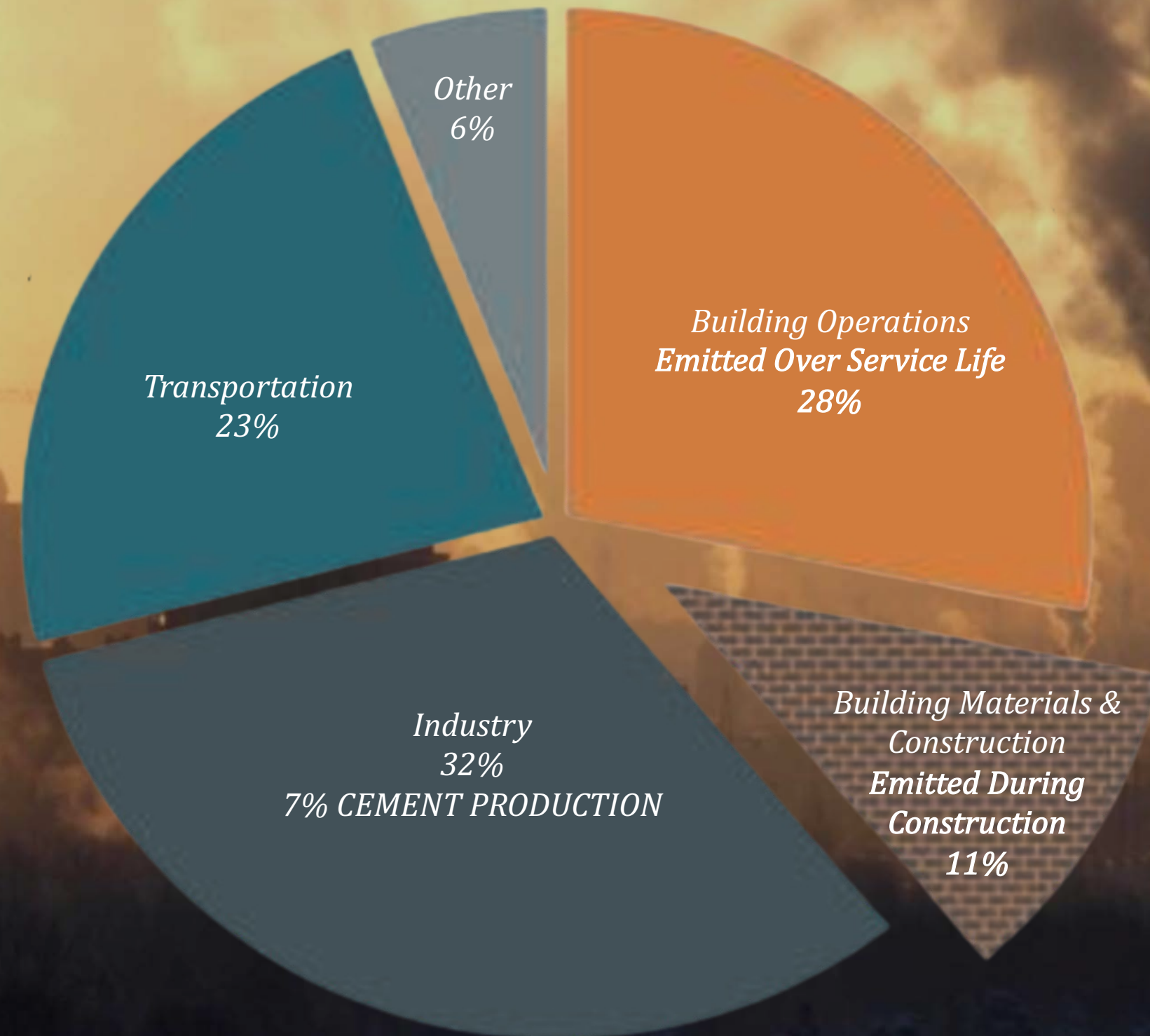
Buildings are the Problem

*Embodied Carbon is the
Hard Problem*

...and it is all upfront

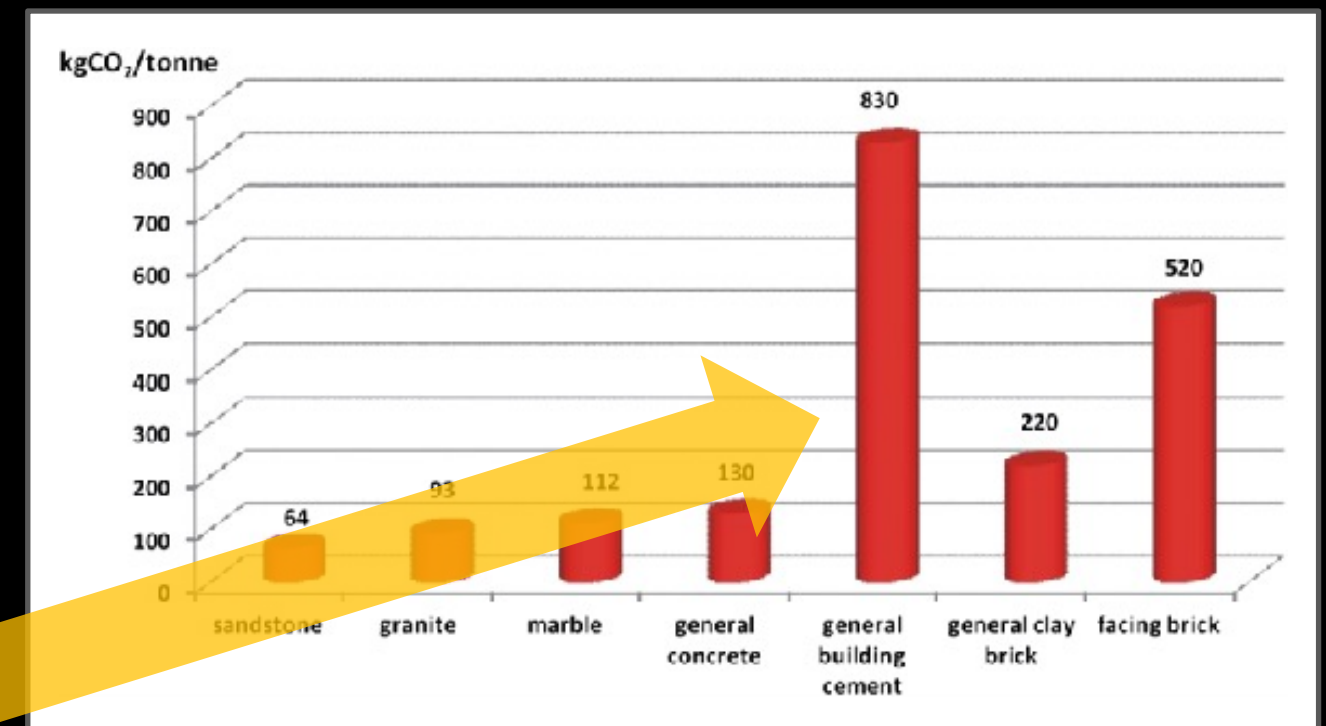


Global Co₂ Emissions By Sector



Source: Global Alliance for Buildings and Construction
2018 Global Status Report

Where does Embodied Carbon come from?

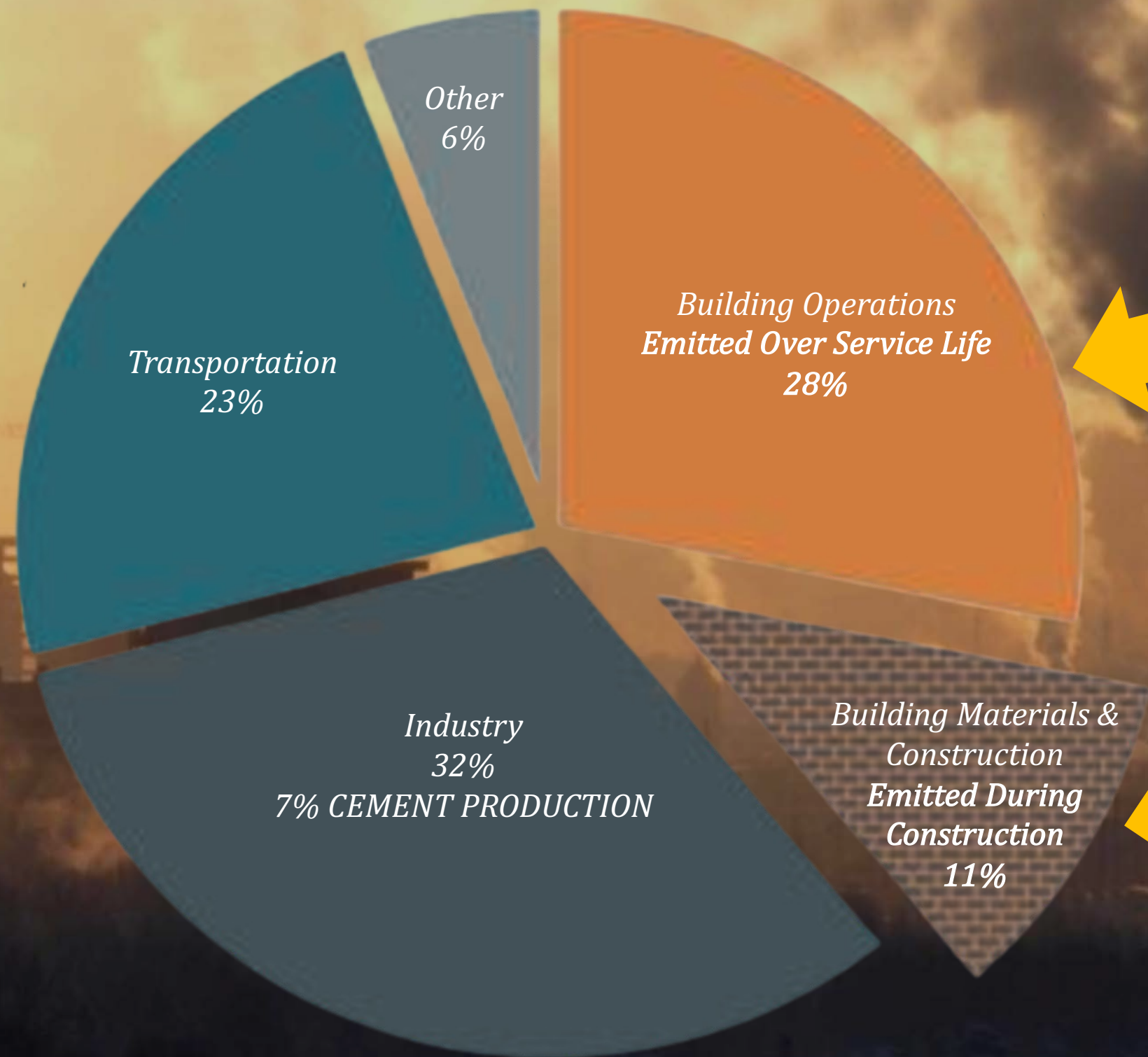


Embodied carbon associated with stone, cement, concrete and brick (data from Hammond & Jones 2008b; Crishna et al. 2011).



BAMCORE®

Global CO₂ Emissions By Sector



Source: Global Alliance for Buildings and Construction
2018 Global Status Report

CO₂ Solutions by BamCore

BamCore's Prime Wall™ is the **most thermally efficient** envelope available without synthetic plastics

BamCore's Prime Wall™ and Mass Timber Bamboo capture and store nature's fastest growing fibers **turning buildings into carbon stores**

Our mission is to decarbonize the built environment by harnessing the best of nature and technology

Change the Material:

Timber Bamboo

Eucalyptus

Change the Method:

Generative Design

Industrialized Construction

Change the Materials



Timber bamboo sequesters more CO₂

5x to 10x more than wood

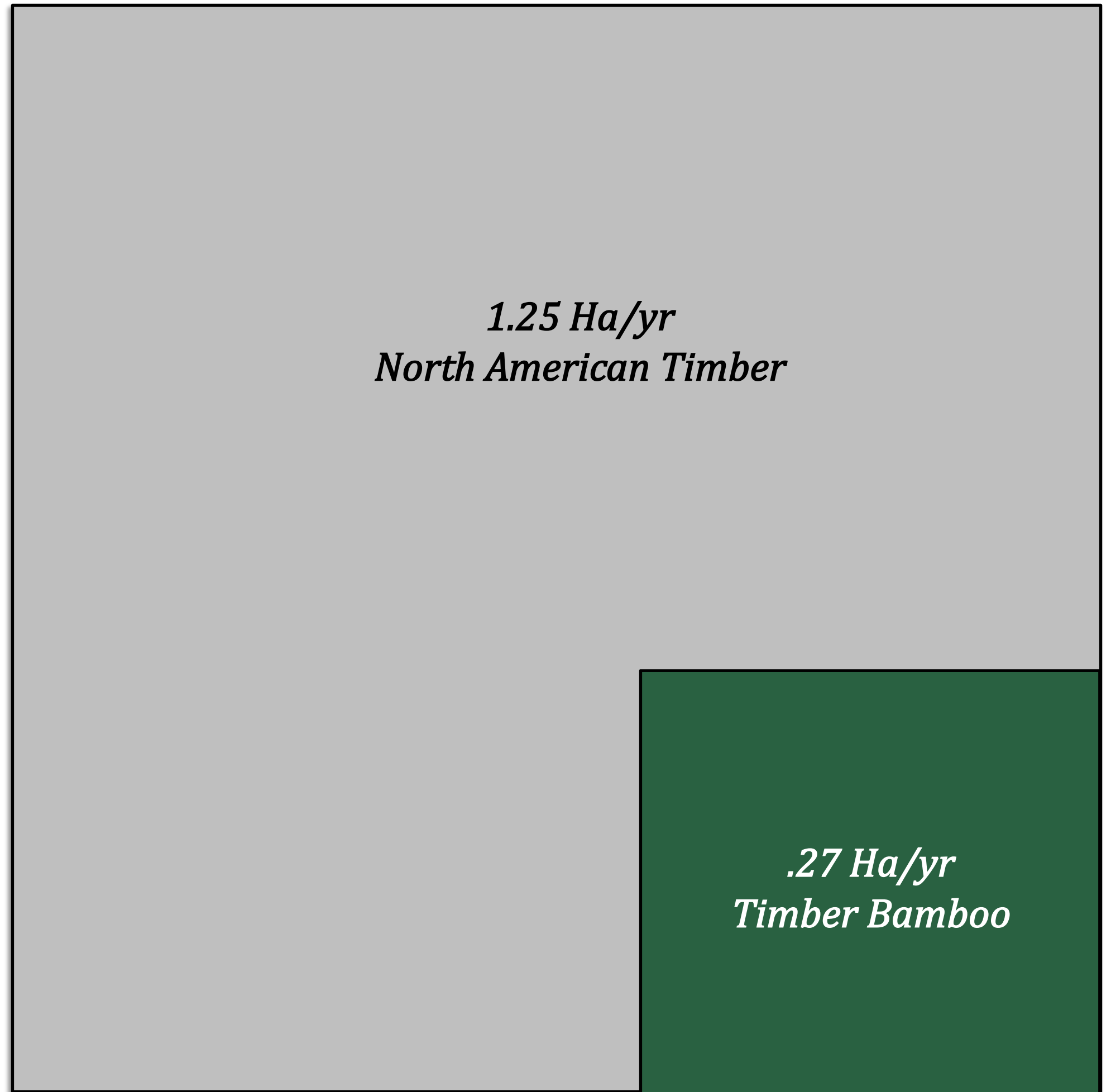
*because 20% of each stand can be
harvested every year
compared to woods' 25yr+ rotation
cycles*



Timber bamboo grows faster than wood

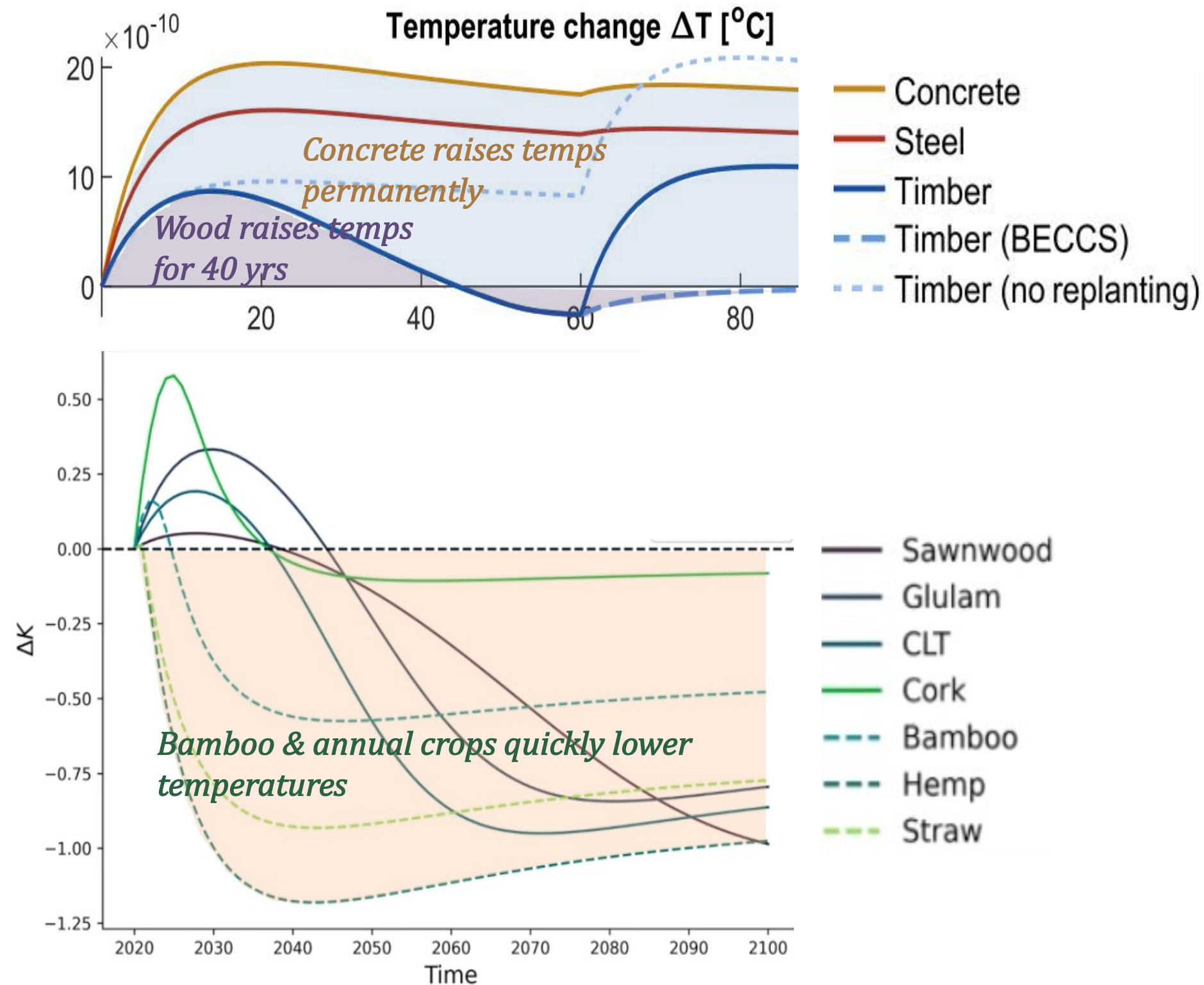
Timber bamboo only needs a
1/5 of the land to grow the same
amount of fiber

Diagram shows planted area for 1
house per year



Temperature change from construction materials

Extracted vs. Biobased



Top Graph Borrowed From Hawkins's, "Embodied carbon assessment using a dynamic climate model: Case-study comparison of a concrete, steel and timber building structure" 2020

Bottom Graph Borrowed From Jay H. Arehart CLF Rocky Mountain Meeting 28 April 2022



BAMCORE®

OPPORTUNITY

*Bamboo and Eucalyptus are
the most overlooked
structural materials in
construction*

.....
*STRONGER THAN
WOOD, GREENER
THAN STEEL &
CONCRETE*
.....

.....
*FASTEST GROWING
STRUCTURAL FIBERS*
.....

.....
*CAPTURES 5-10X
MORE CO2 THAN
WOOD TIMBER*
.....

PRODUCT

Prime Wall™

- *World's most thermally efficient scalable bio-based building system*
- *World's lowest embodied carbon scalable framing system*
- *Code compliant to five stories*
- *Custom pre-fab system for low labor & fast installation without cranes*
- *Reduces 90% of studs, headers, plates, OSB, drywall & foam insulation*
- *Acoustically superior to wood frame*
- *Saves money and reduces waste*



BAMCORE HAS A UNIQUE AND POWERFUL SOLUTION

bio-based building systems that lower carbon, cost, time & labor

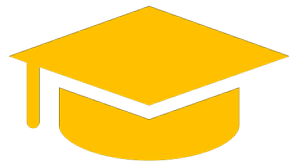


Reduces thermal mass and thermal bridges



Prime Wall™

extreme energy efficiency



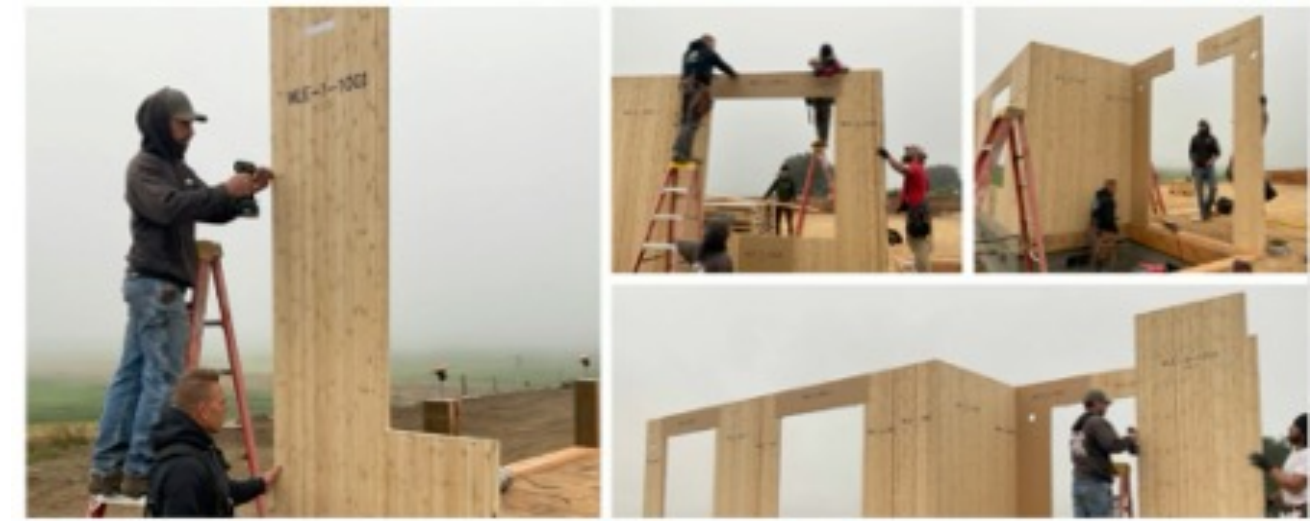
Four LCAs & Biogenic Analyses



*Operating emissions **saved 223Mt CO₂ per house equivalent** (Quantis LCA 2020) = the emissions of driving 500,000 miles*

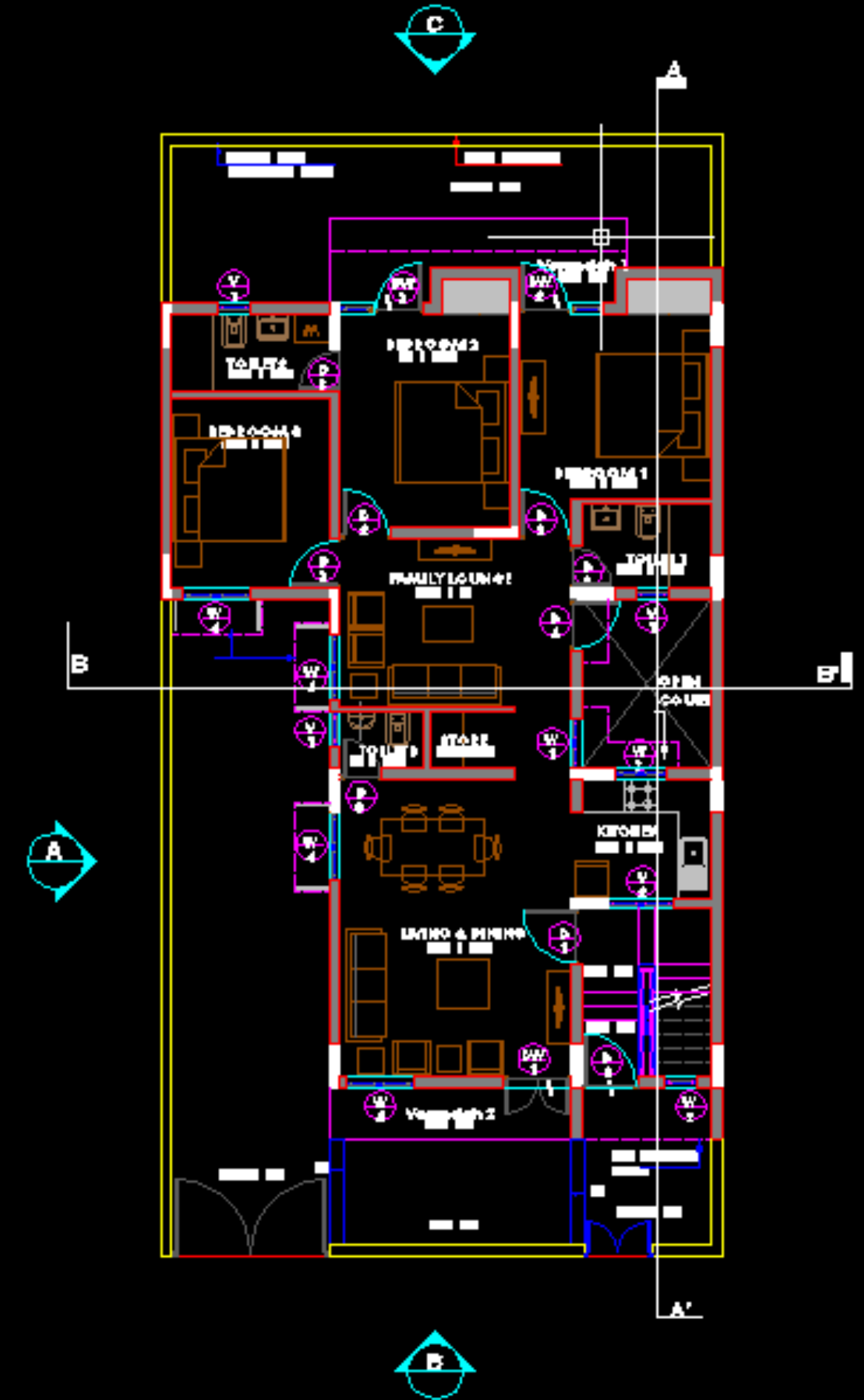
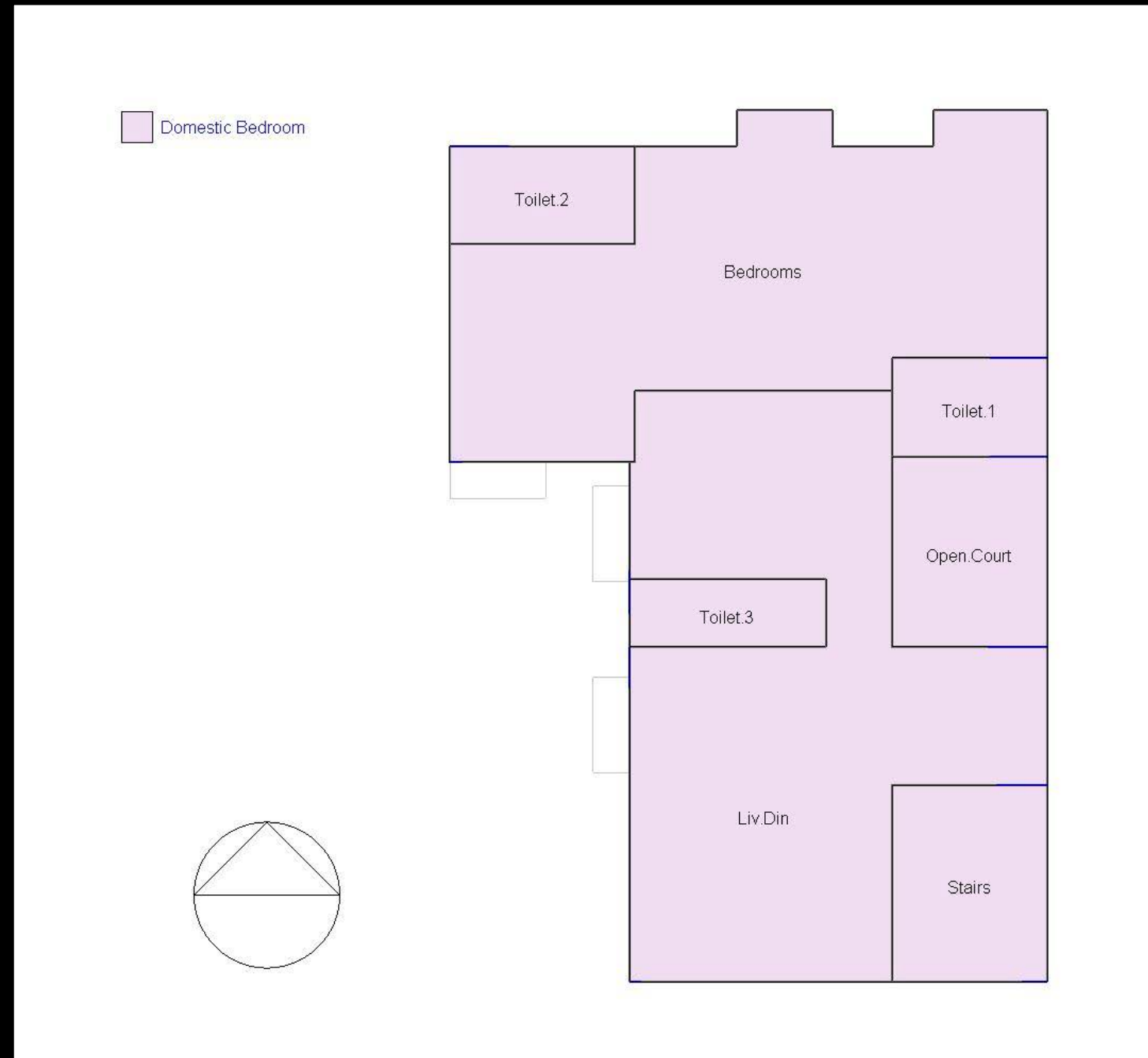


***Global savings 9.6 Gt CO₂** (2020 CEA Emissions Reduction Potential Report. Includes US and European markets penetration until 2050.)*



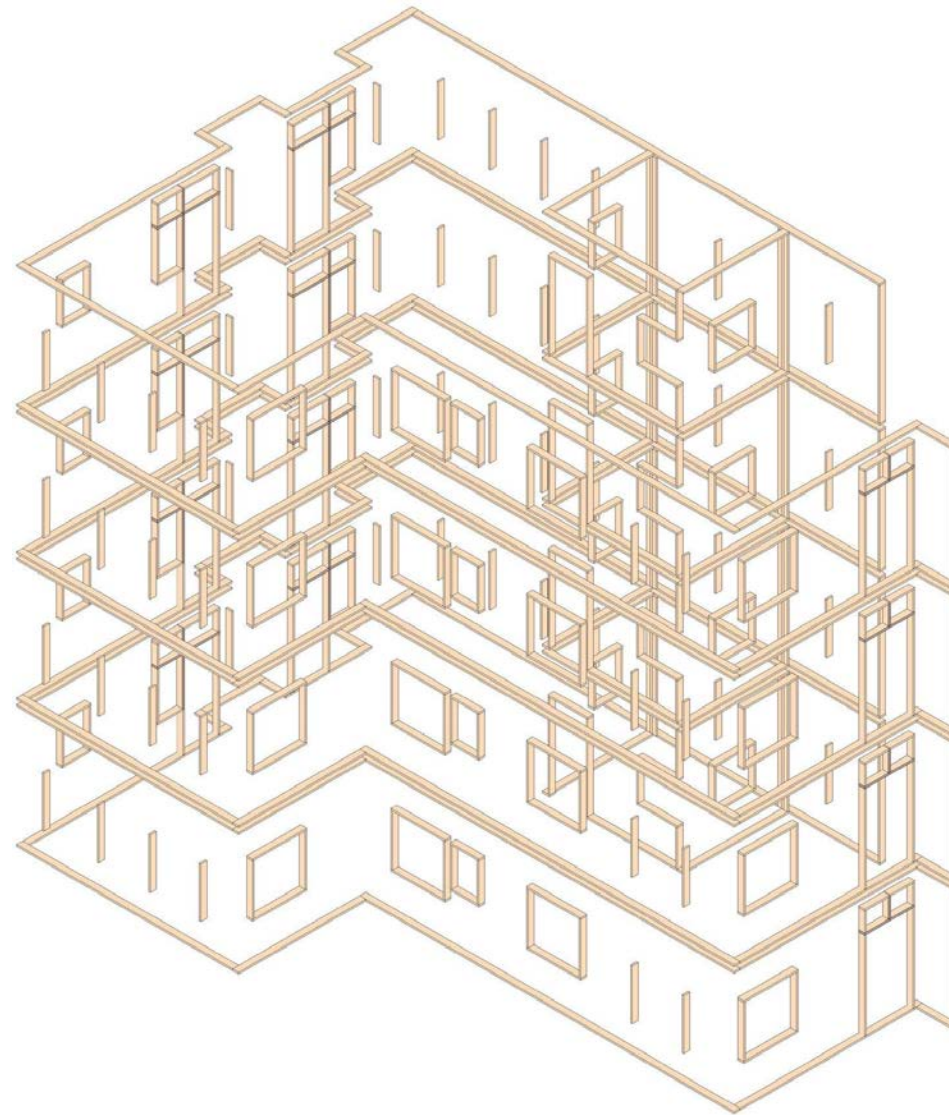
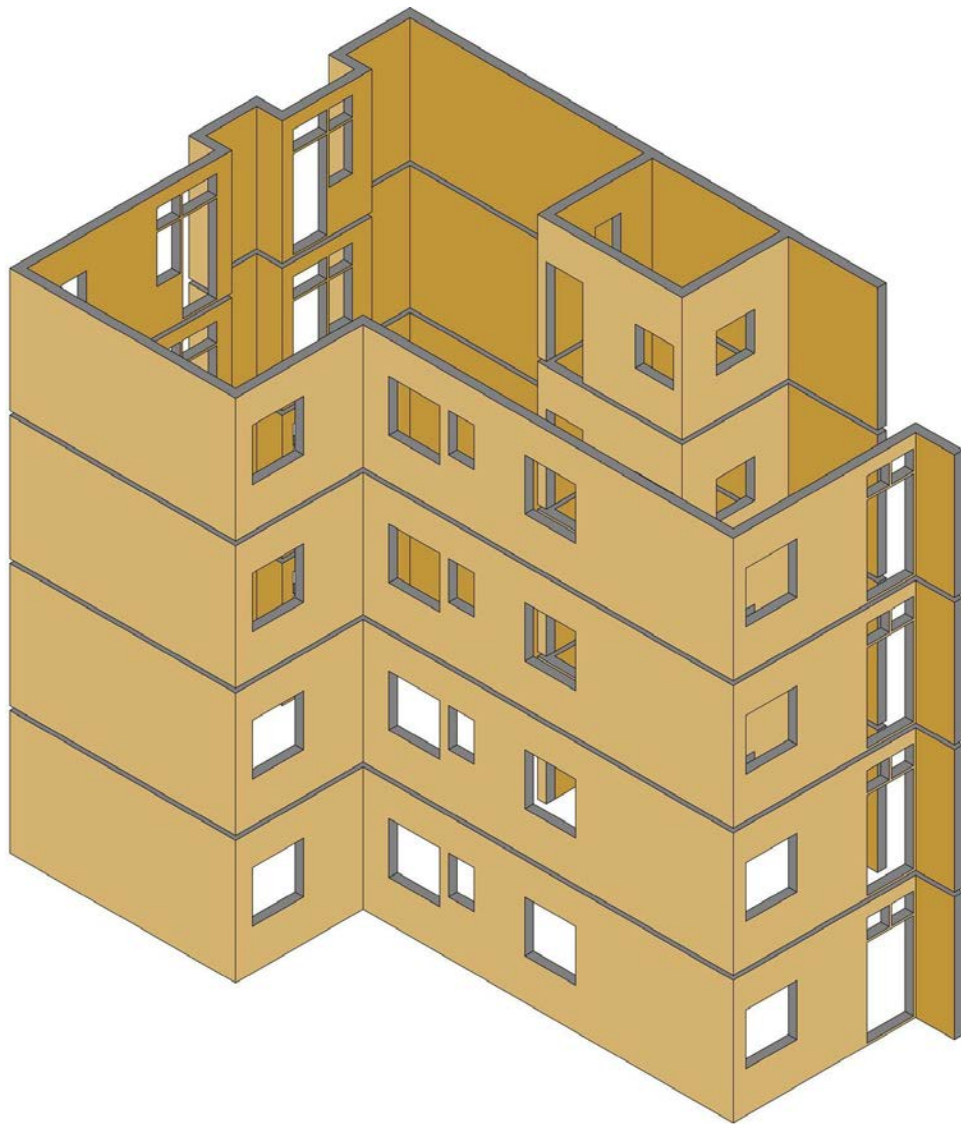
Case Study Parameters

Simplified Zoning



A:B Comparison of Structural Frames

BamCore Biobased / 100 RCC / RCC W/Brick In-fill



Wall Takeoff

8' Panels: 0

10' Panels: 378

Area Feedstock: 15,120

Lumber Takeoff (linear feet)

2x6" Plate: 1,832 ft 2x6"

Stud: 1,115 ft

**BamCore does not provide lumber, these numbers are for reference only*

Square Footage

4312 sq ft

Wall Height

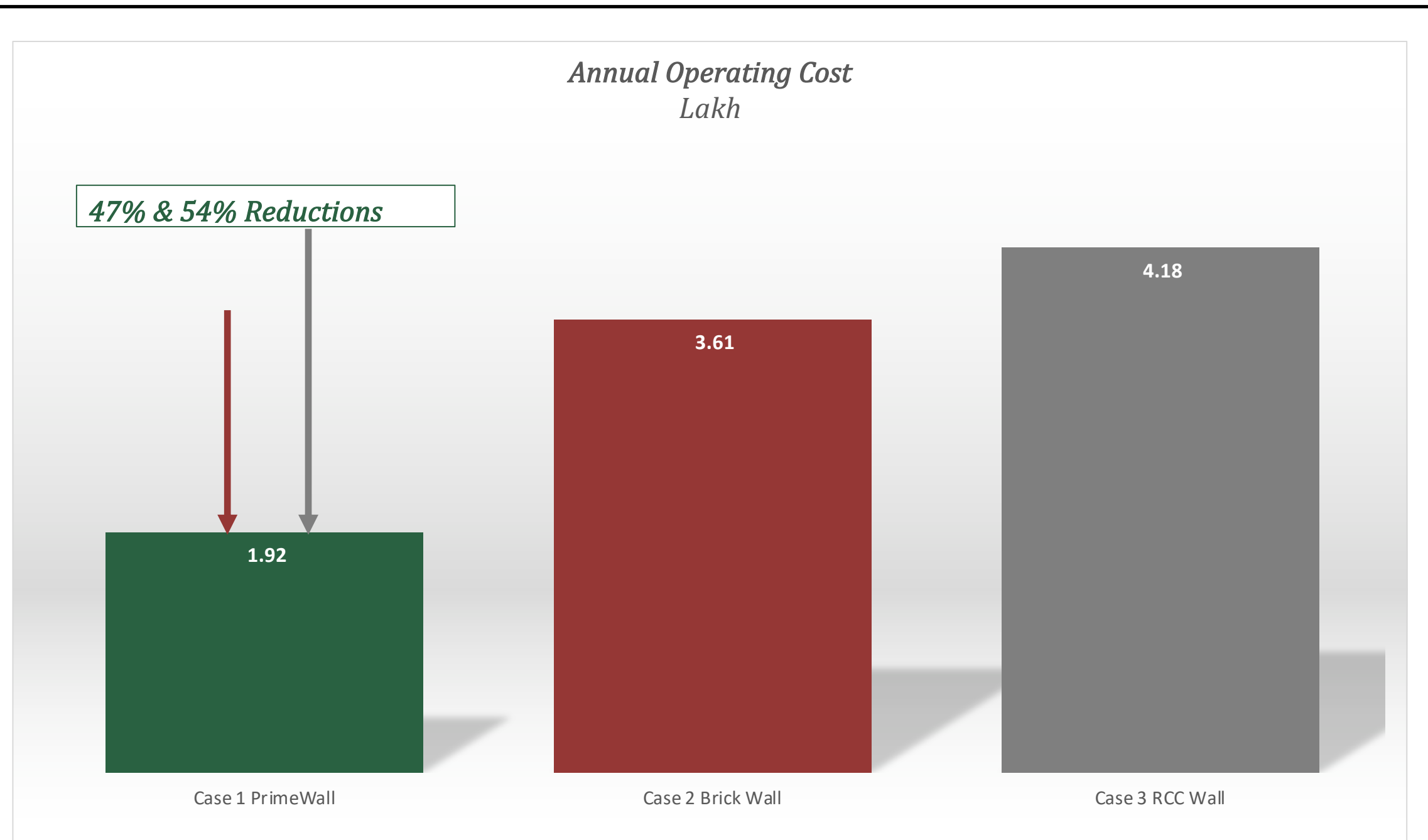
9' 6 3/16"

Floor to Ceiling Height

9' 10 1/8"

Annual operating cost reductions:

47% Brick/RCC & 54% To RCC



Equipment Impact	KW HVAC Load	Tons of Cooling	Tons per floor
Case 1	36.9	10.49	2.62
Case 2	72.4	20.59	5.15
Case 3	85.8	24.40	6.10

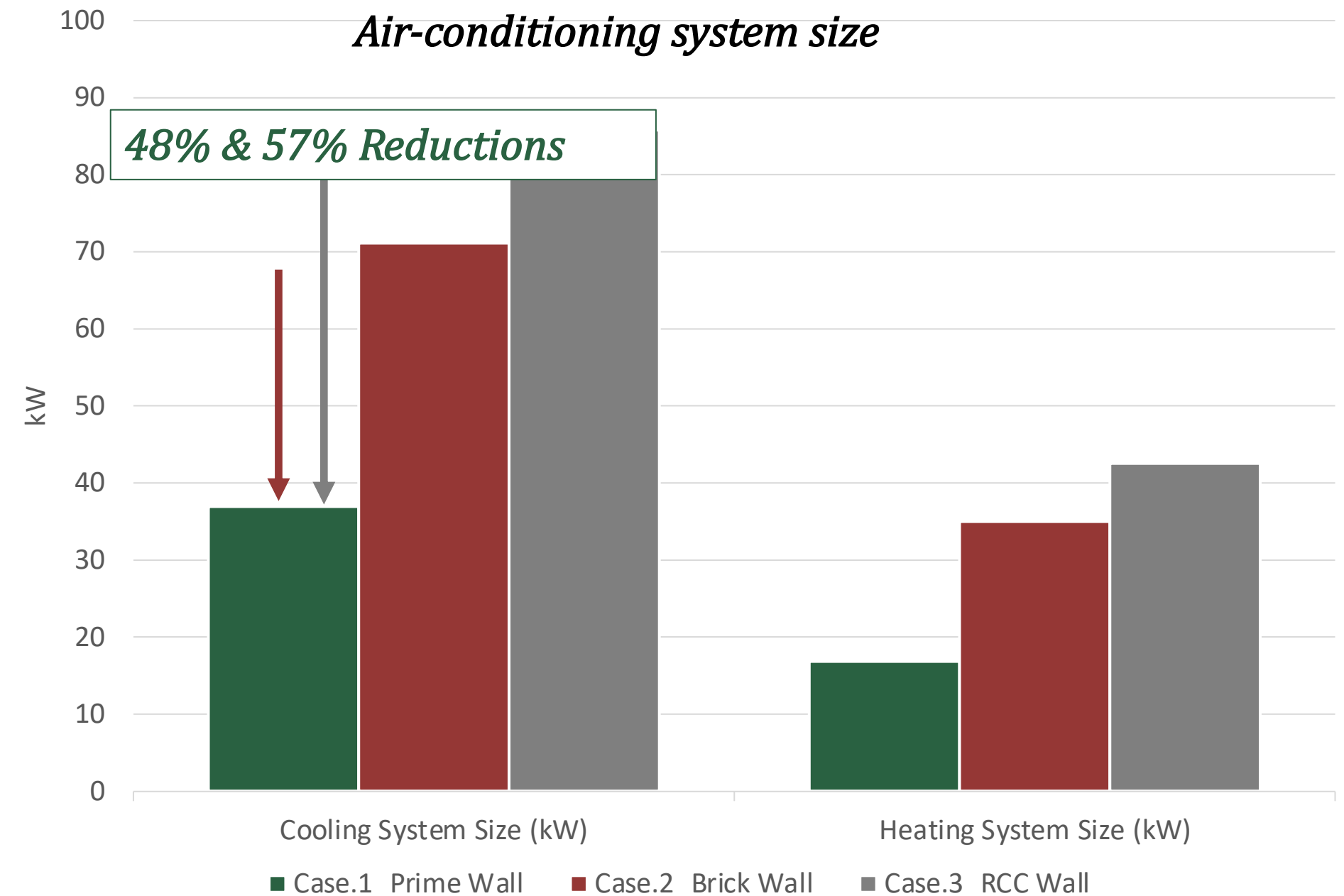
Bio-based reduces air-conditioning system size

Reduction In Cooling System Size:

From RC Wall to Prime Wall = **57.0%**

From Brick Wall to Prime Wall = **48.1%**

	Prime Wall	Brick Wall	RCC Wall
Cooling System Size (kW)	36.9	71.1	85.8
Heating System Size (kW)	16.8	35	42.5

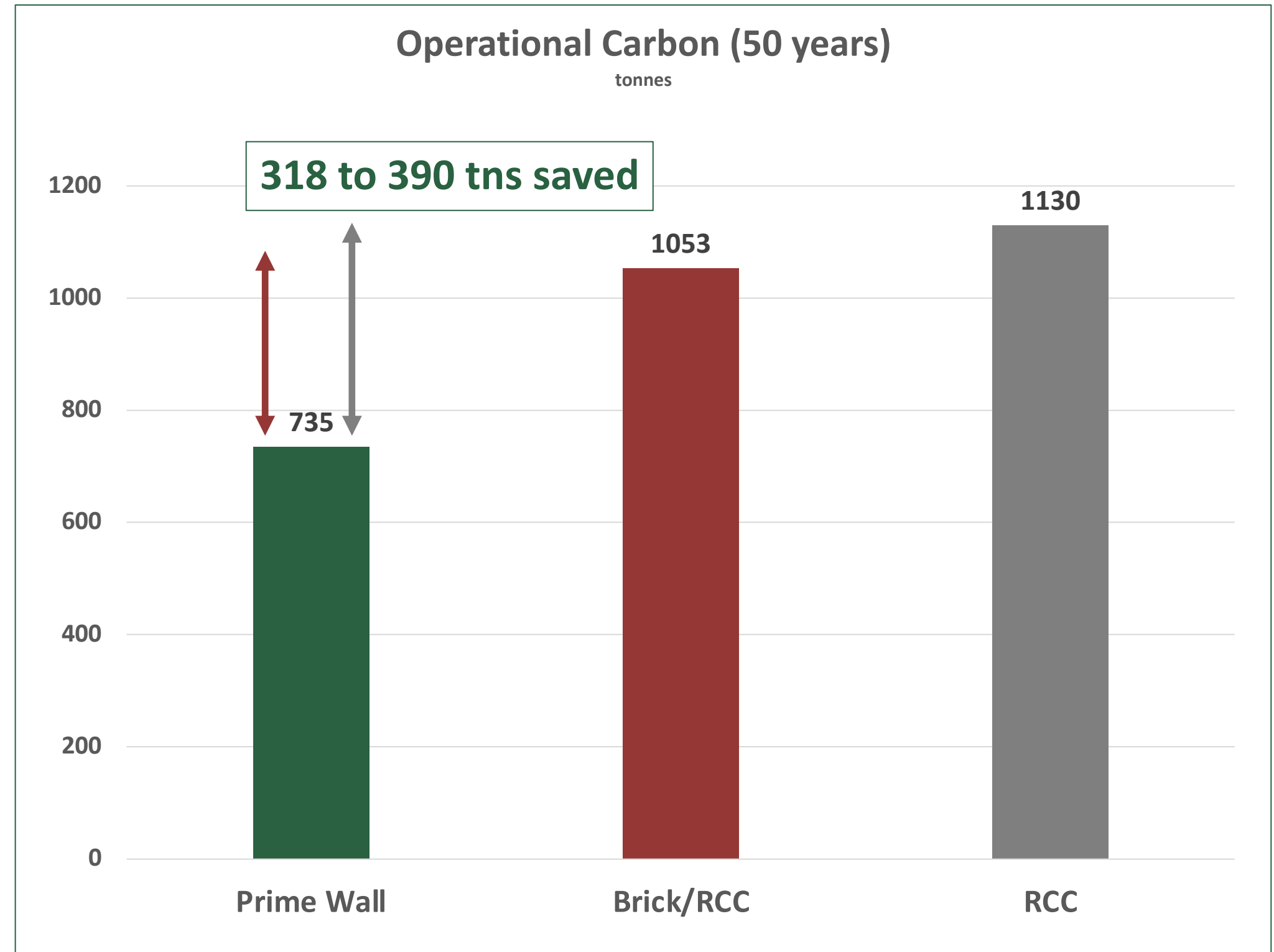


Operational Carbon from bio-based building

*318 to 390 Tns Not Emitted Over
50 Year Service Life*

saves

6.4 tonnes per year



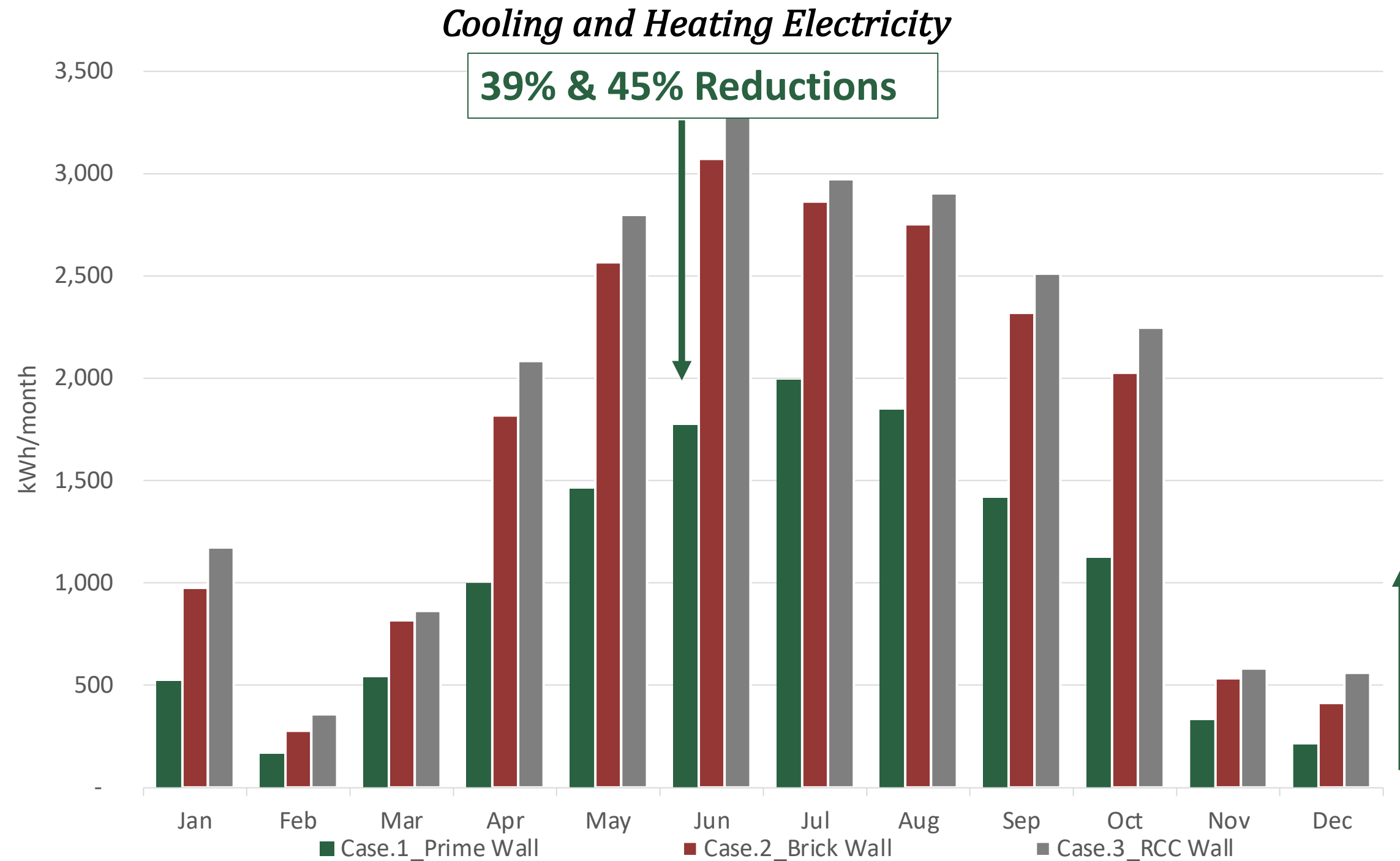
Peak load grid demand reductions:

Savings In Air-conditioning Electricity

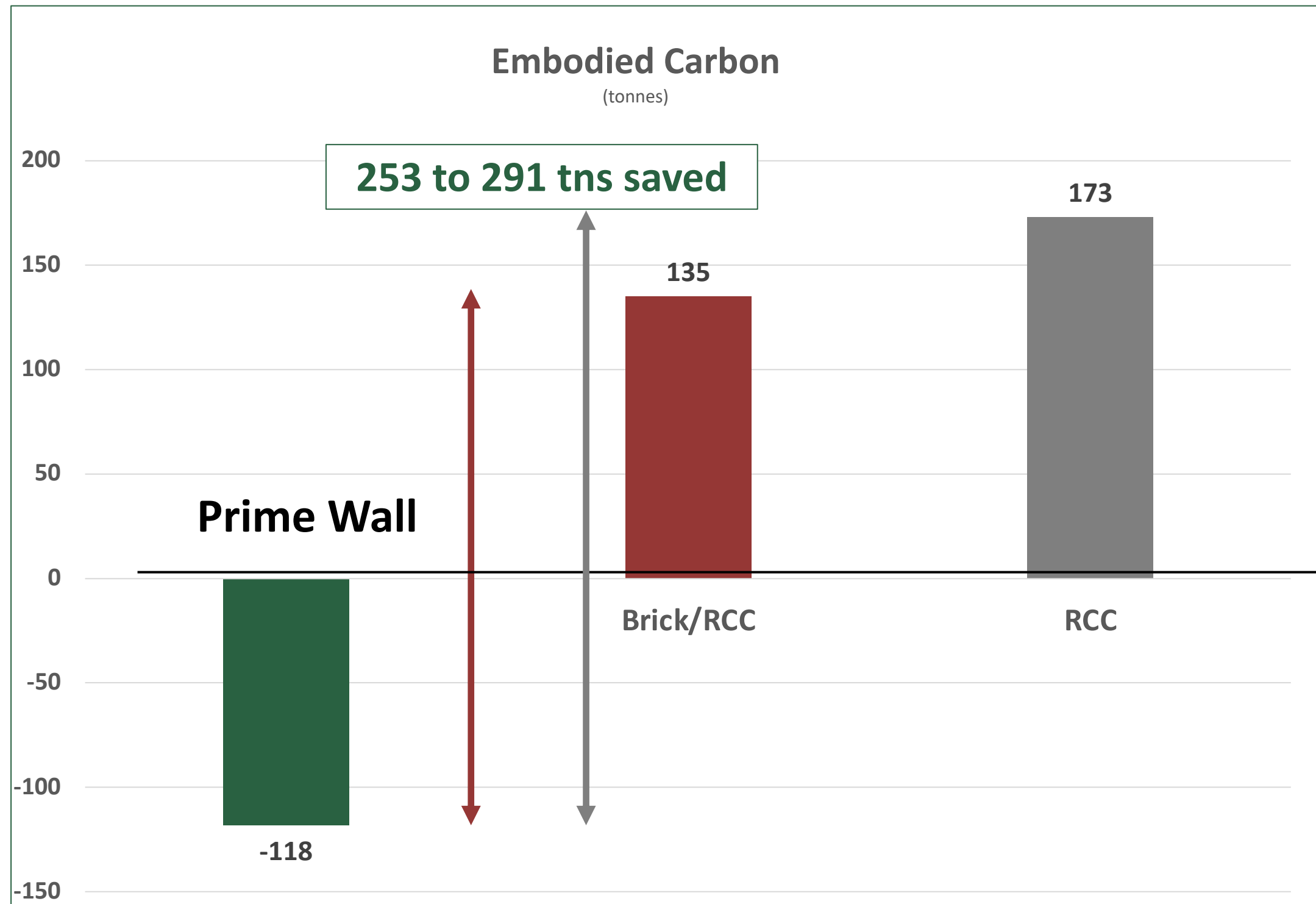
From RCC Wall To Prime Wall = **44.7%**

From Brick Wall To Prime Wall = **39.4%**

	Cooling+ Heating (kWh/y)
Prime Wall	12,383
Brick Wall	20,433
RCC Wall	22,382



Negative Embodied Carbon From Bio-based Building



- *136 tns NOT emitted + 141 tns negative emissions (biogenic storage)*

- *Brick/RCC building emits 135 tns, RCC 173 tns by completion date*

- *BamCore bio-based building stores 118 tonnes of biogenic (net)*

- *BamCore bio-based building saves 253 to 291 tons of atmospheric CO₂*

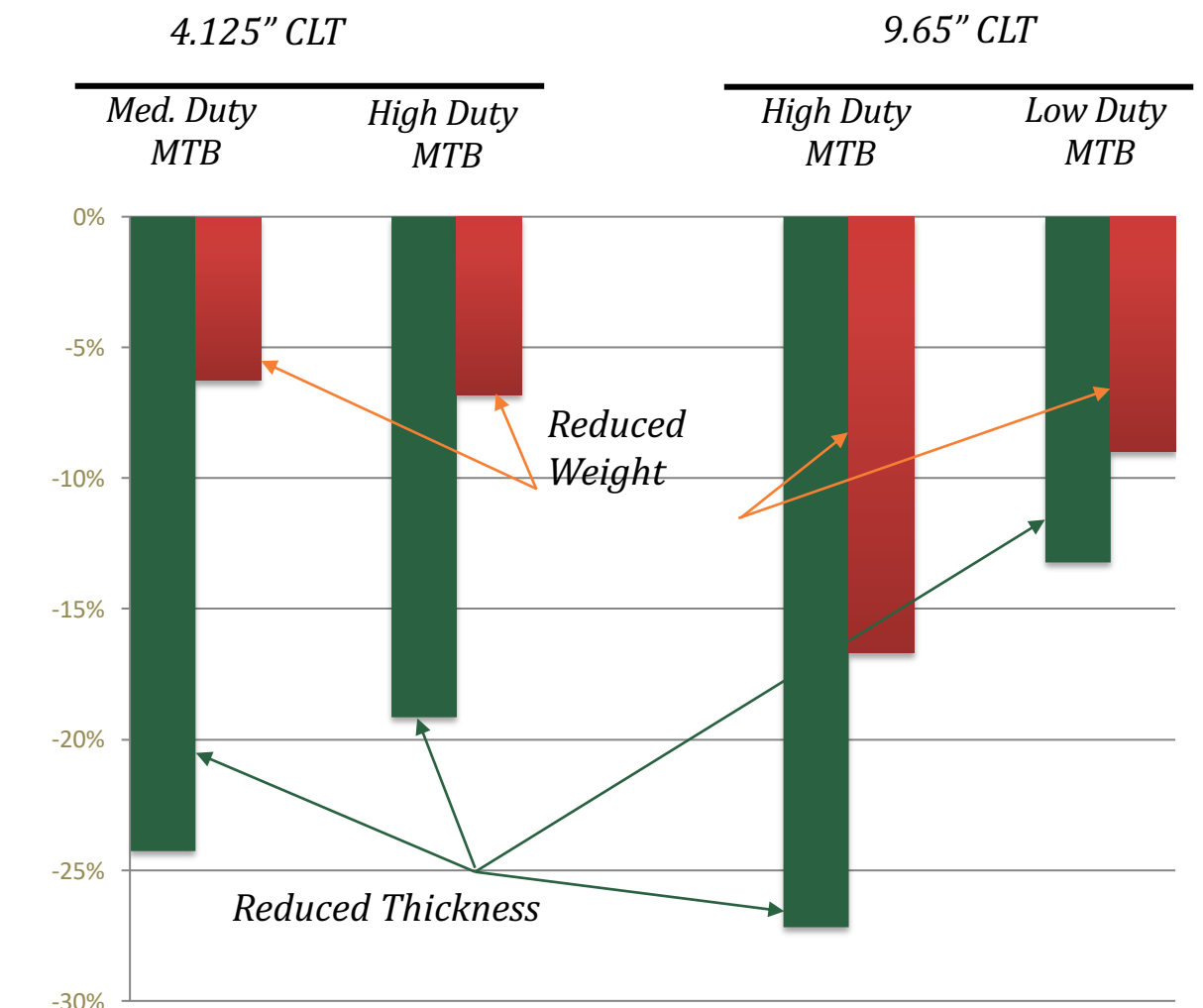
Mass Timber Wood Buildings Today 18 Stories

*Mass Timber Bamboo
Will Be Stronger, Lighter,
Greener*



Mass Timber Bamboo™ outperforms CLT

- Harnesses BamCore IP technology and global supply chain to advance the rapidly growing CLT (mass timber) markets
- Radically improves CLT performance:
 - Stiffer (up to 98%, same thickness)*
 - Thinner (up to 27%, same stiffness)*
 - Lighter (up to 17%, same stiffness)*
- Customizable mass timber performance over a wide range of needs
- **10-25% reduction in embodied CO2** vs legacy steel, concrete & Cross Laminated Timber (CLT)
- Increases usable square area



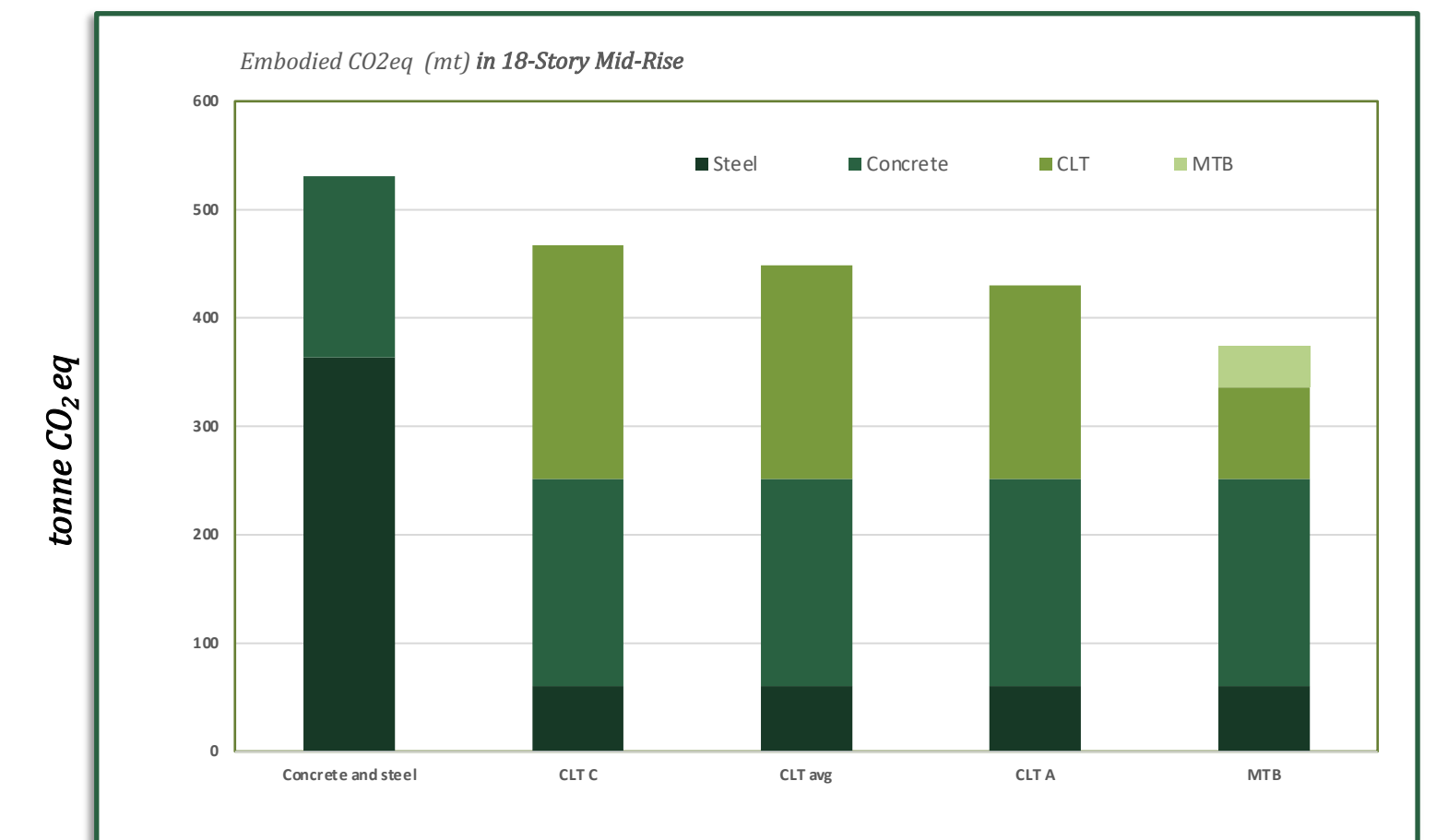
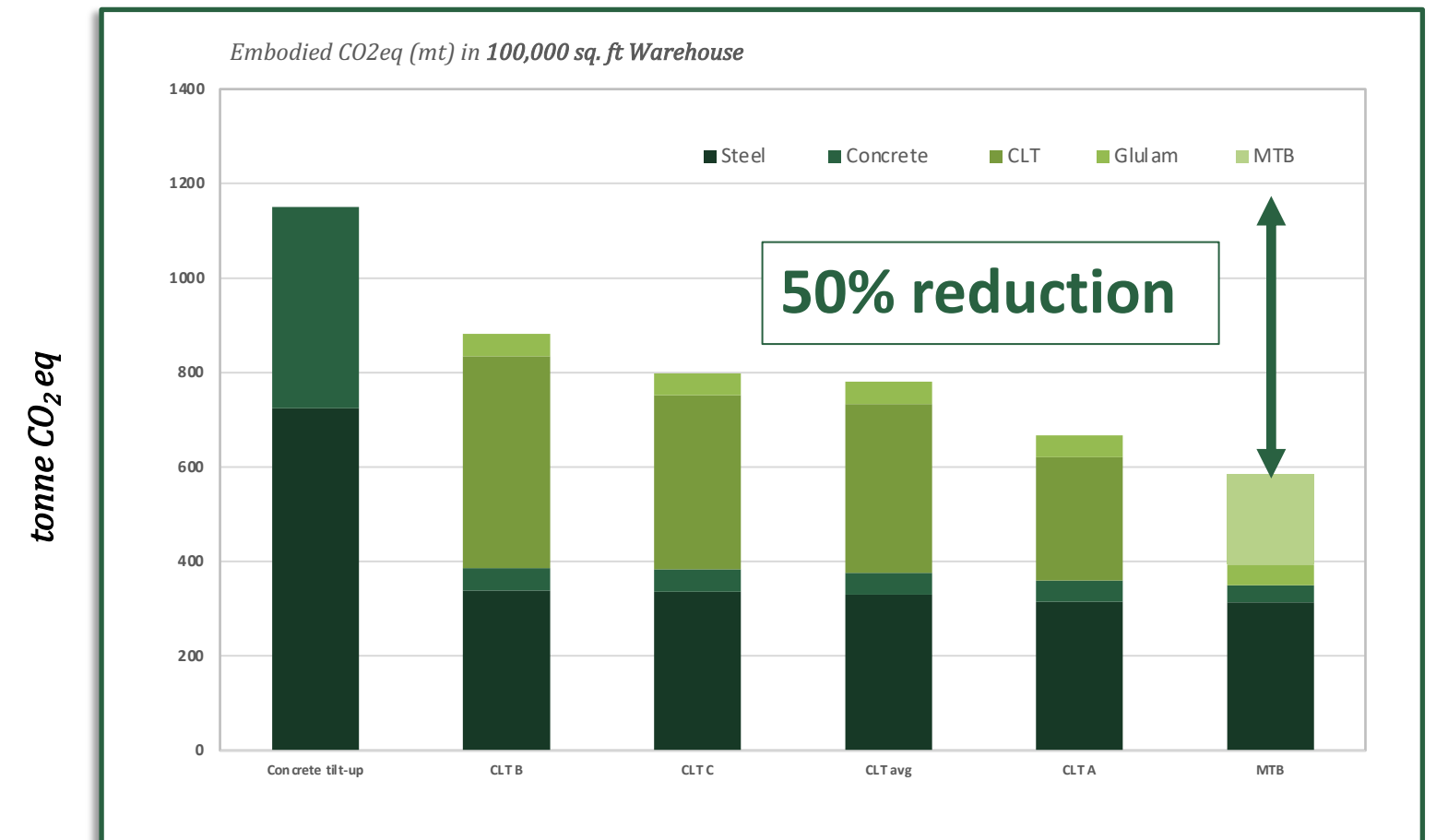
Mass Timber Bamboo™ lowers embodied carbon

50% compared to legacy steel & concrete in warehouses

At the whole building level, when compared to average CLT, the MTB can lower embodied carbon:

- up to 25% in warehouses
- up to 20% in Mid-Rise buildings

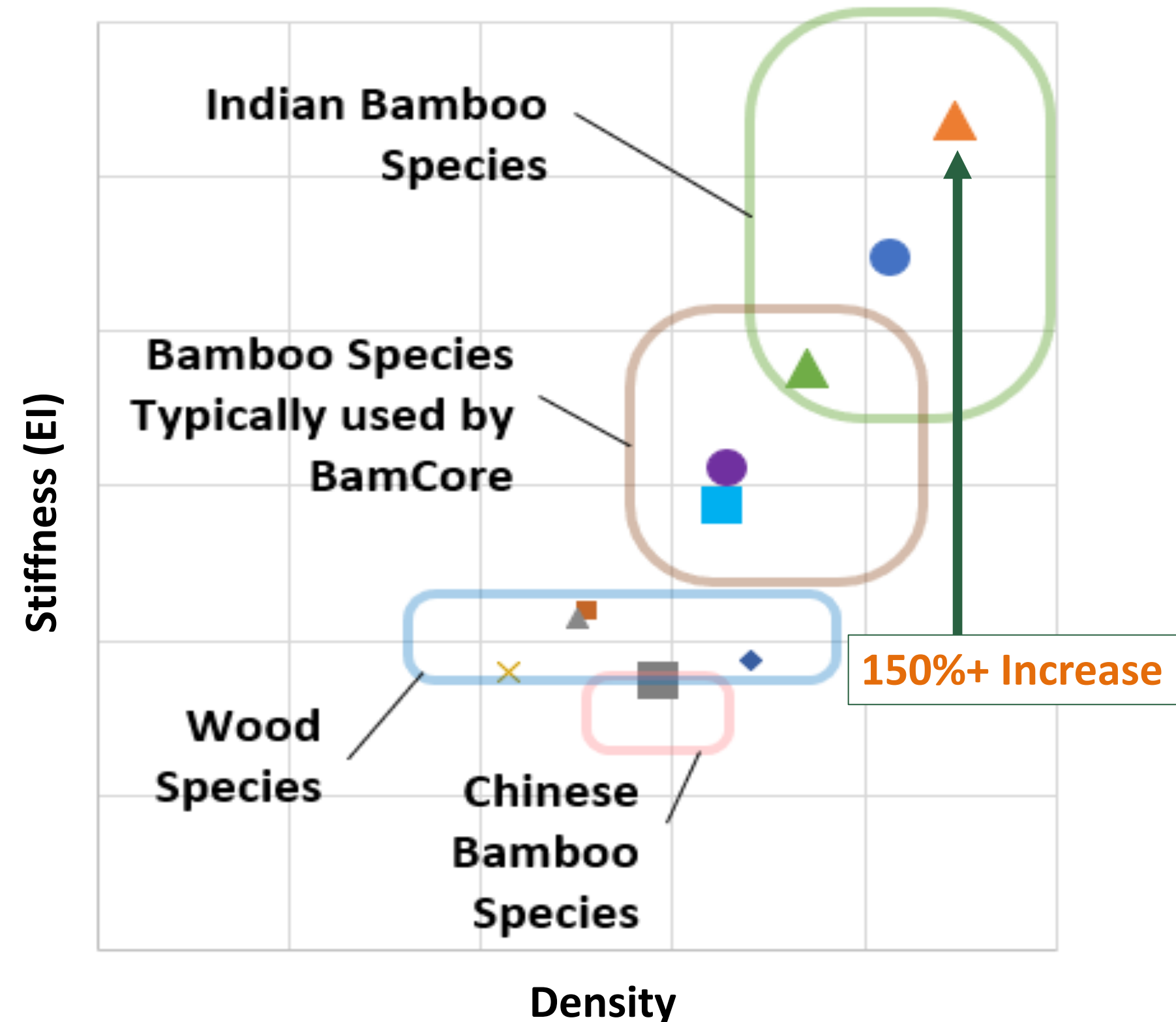
And, even more compared to legacy steel and concrete.



CLT providers include DR Johnson, Freres, and Structurlam Analysis completed by Sustainable Minds

Optimizing Fiber Utilization Commercial & Mechanical Values Vary Widely

- BamCore has **6 years optimizing fiber strength** to commercial applications
- US DOE award allows BamCore to **maximize fiber yield recovery**
- Advanced building sciences and engineering will produce new **super strong yet carbon negative products**



Change the Method




Customized panels are easier and faster to install - saving time, money & labor

Proprietary 3D software designs prefab panels to spec,
reducing design conflicts & waste

Prime Wall system arrives as a kit of sequentially
numbered parts, enabling *50% faster install*

Eliminates guesswork by precutting each panel to
millimeter accuracy for every window, door, switch, outlet
and panel



*"Since utilizing BamCore
products, we have seen overall
costs decrease and the quality
of construction increase."*

- Kirk Philo, Multi-family Developer



BamCore's Product Workflow

Load-Optimized Biogenic Fibers in Industrialized Construction

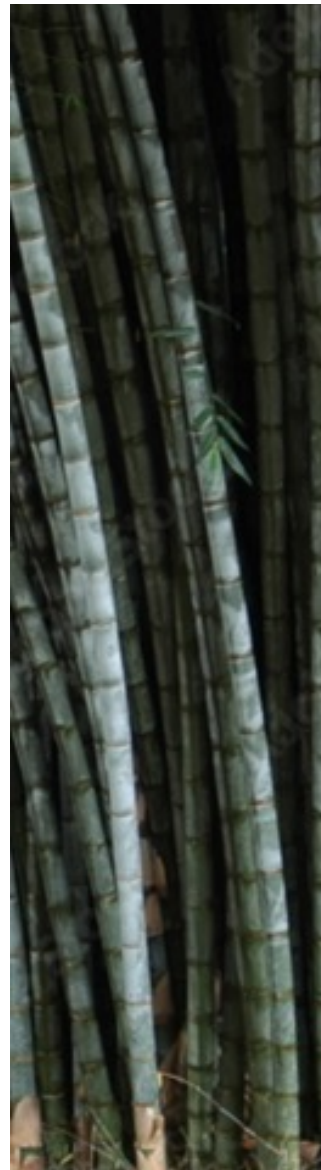
1. HARVEST FASTGROWING BIOGENIC FIBERS FOR STRUCTURAL LOAD



EUCALYPTUS



WOOD TIMBER



TIMBER BAMBOO

2. GREEN ENGINEER NEW MATERIALS INTO DURABLE SOLUTIONS



OPTIMIZED FIBER MATERIALS

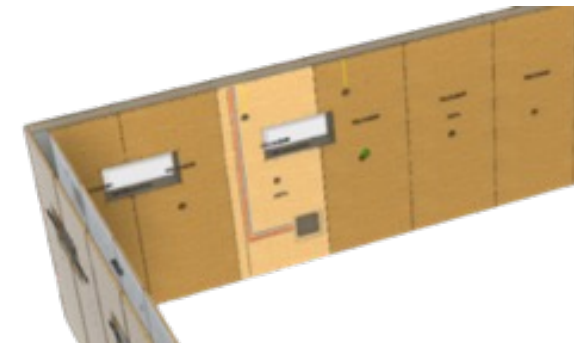


MANUFACTURE PANELS



CODE-COMPLIANT
OPTIMIZED PANELS

3. DRIVE INDUSTRIALIZED CONSTRUCTION WITH PROPRIETARY COLLABORATIVE SOFTWARE



TRADES DRAW MEP LOCATIONS



ENGINEERS APPROVE DETAILS



OWNERS APPROVE DESIGN

4. FAST INSTALL OF HIGH-PERFORMANCE CARBON NEGATIVE BUILDINGS



BUILD BY NUMBERS
EASY INSTALLATION

CAD-to-CAM workflow drives industrialized construction & mass customization

*With our proprietary inventor software
plug-ins, we:*

- *Optimize nesting routines*
- *Reduce factory waste*
- *Optimize revenue*



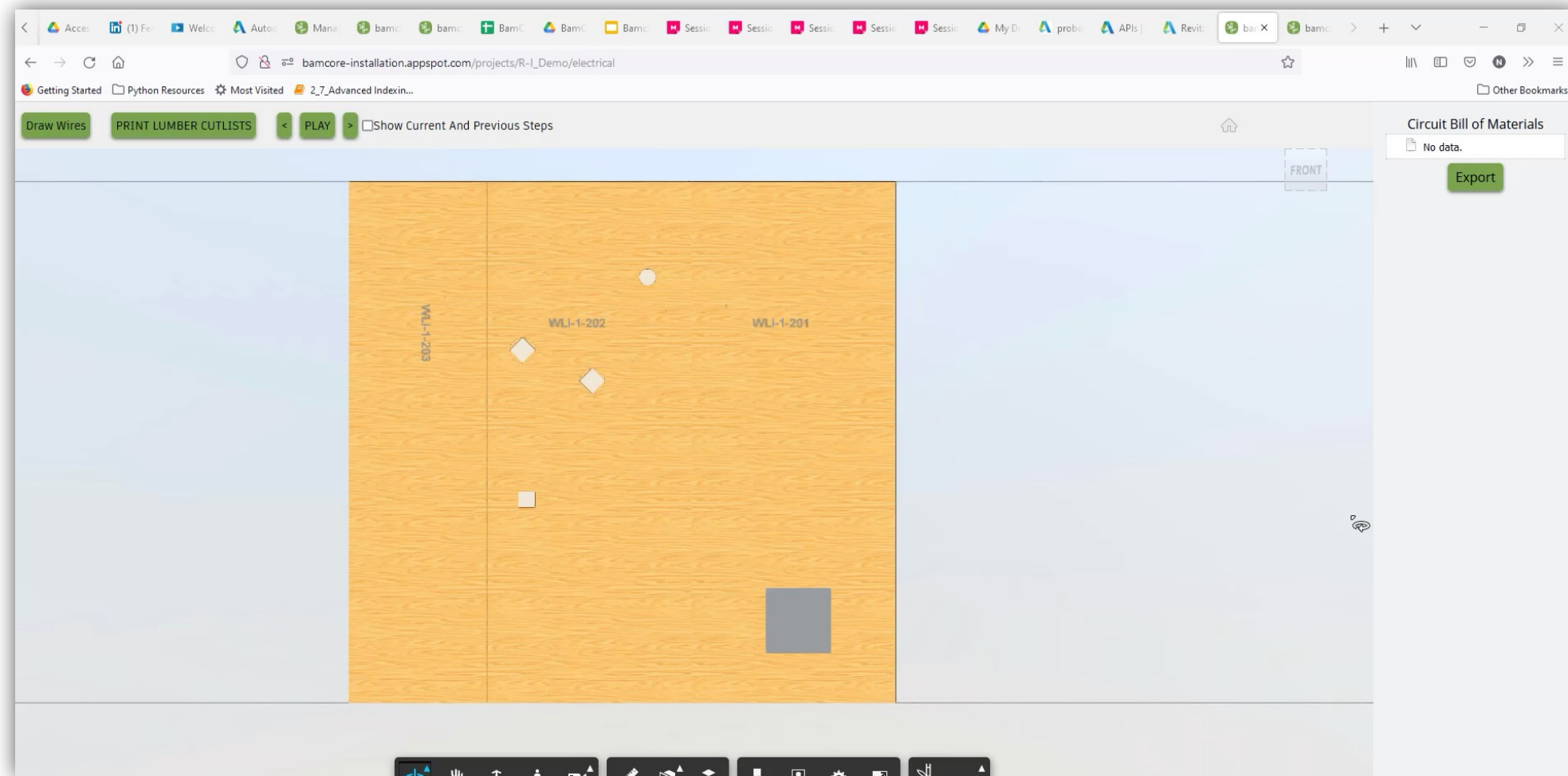
*CUSTOMIZED ON PANEL MARKING
Cimat machine instruction translates panel number, nail pattern and MEP
placement map to Onsrud for direct panel printing*



*FULL MILLIMETER PRECISION FABRICATION
Cimat machine instruction translates nesting optimization and precision panel
cutting to millimeter accuracy for every geometry*

Next Generation CAD to CAM Technology

drives collaborative design / bid / build



Cad-to-cam workflow for industrialized construction & mass customization



Customized on panel marking

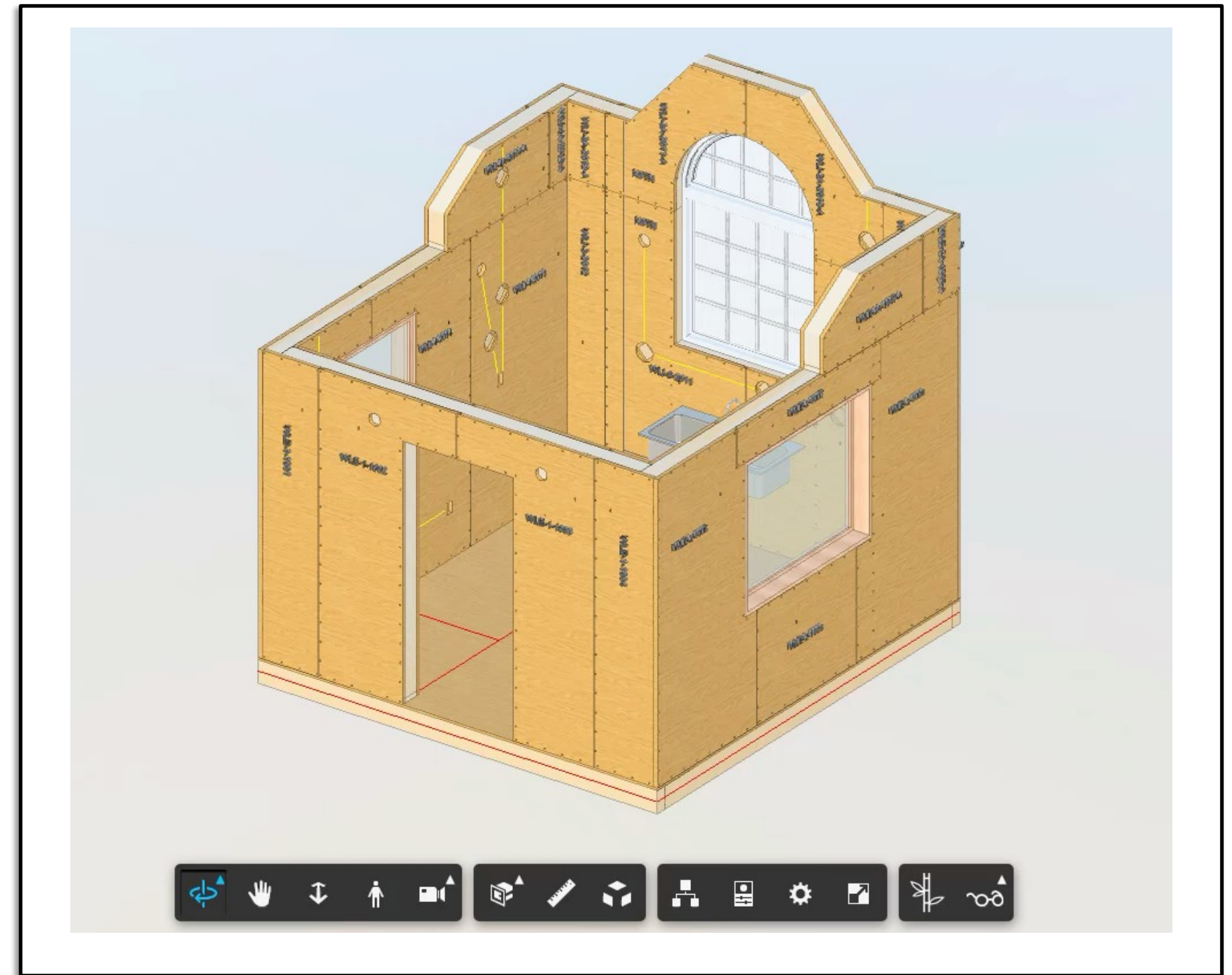


Full millimeter precision fabrication


Proprietary modeling & animations

Our next generation design / bid / build Platform:

- *Creates real time collaboration between:*
 - *Owners, Architects, Engineers & The Trades*
- *Enables phone/tablet job site access*
- *Saves construction time, reduce design conflicts and waste*
- *Provides job site application:*
 - *Lumber cut list*
 - *Panel location & pallet browser*
 - *Color-coded pallet placement plan*
 - *Simple installation with 3D job site animation*



brings speed, ease & savings to the build experience



Thank you !

Dhanyavaad !

Hal@BamCore.com

