

Developing Carbon Neutral Workforce Housing Using Mass Timber



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Cutler Development, LLC

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Course Description

This course examines how hybrid mass timber systems can support resilient multi-family affordable housing. Attendees will review design and construction approaches used to meet high-performance building goals, including Zero Carbon Certification (by Living Future) and Passive House certification strategies, hybrid structural systems, panel optimization, acoustic assemblies, and coordination with local trades and project teams. The course will also examine how mass timber contributes to durability, biophilic design, healthy indoor environments, and reduced embodied carbon in residential construction. Through real-world project examples, participants will gain practical insight into applying mass timber systems to improve building performance and address the growing demand for sustainable workforce housing.

Learning Objectives

1. Examine how hybrid mass timber and conventional wood framing systems can be integrated to support structural performance, durability, fire protection, and occupant well-being in multi-family housing projects.
2. Discuss the sustainability benefits of mass timber, including embodied carbon reduction and life cycle impacts, and why it matters.
3. Evaluate how design approaches such as panel optimization, acoustic assemblies, and coordinated trade integration contribute to constructability, building performance, and occupant comfort.
4. Apply lessons from real-world workforce housing developments to support resilient, code-compliant, and sustainable multi-family building design.

Cutler Development

www.cutlerdevelopment.com



We develop projects that better neighborhoods, society, and the environment.

Our Evolution With Mass Timber...



Junction Lofts: 2022

- 11 units: 30-80% AMI & 6500 SF retail
- Hybrid mass timber design



Star Lofts: 2024

- 20 units: 30%-80% AMI & 7000 SF retail
- Hybrid mass timber design
- Zero Carbon Certification (by ILFI)



Goldfinch Lofts: 2026 (projected)

- 30 units: 30%-80% AMI & 8000 SF retail
- Hybrid mass timber design
- Zero Carbon Certification (by ILFI)
- Passive House Certification (by Phius)

Junction Lofts

First mass timber apartments in Iowa

- 11 units: 30-80% AMI & 6500 SF retail
- Hybrid mass timber design



Star Lofts

First Zero Carbon certified apartments

- 20 units: 30-80% AMI & 7000 SF retail
- Hybrid mass timber design
- Zero Carbon Certification (by Living Future)



Goldfinch Lofts

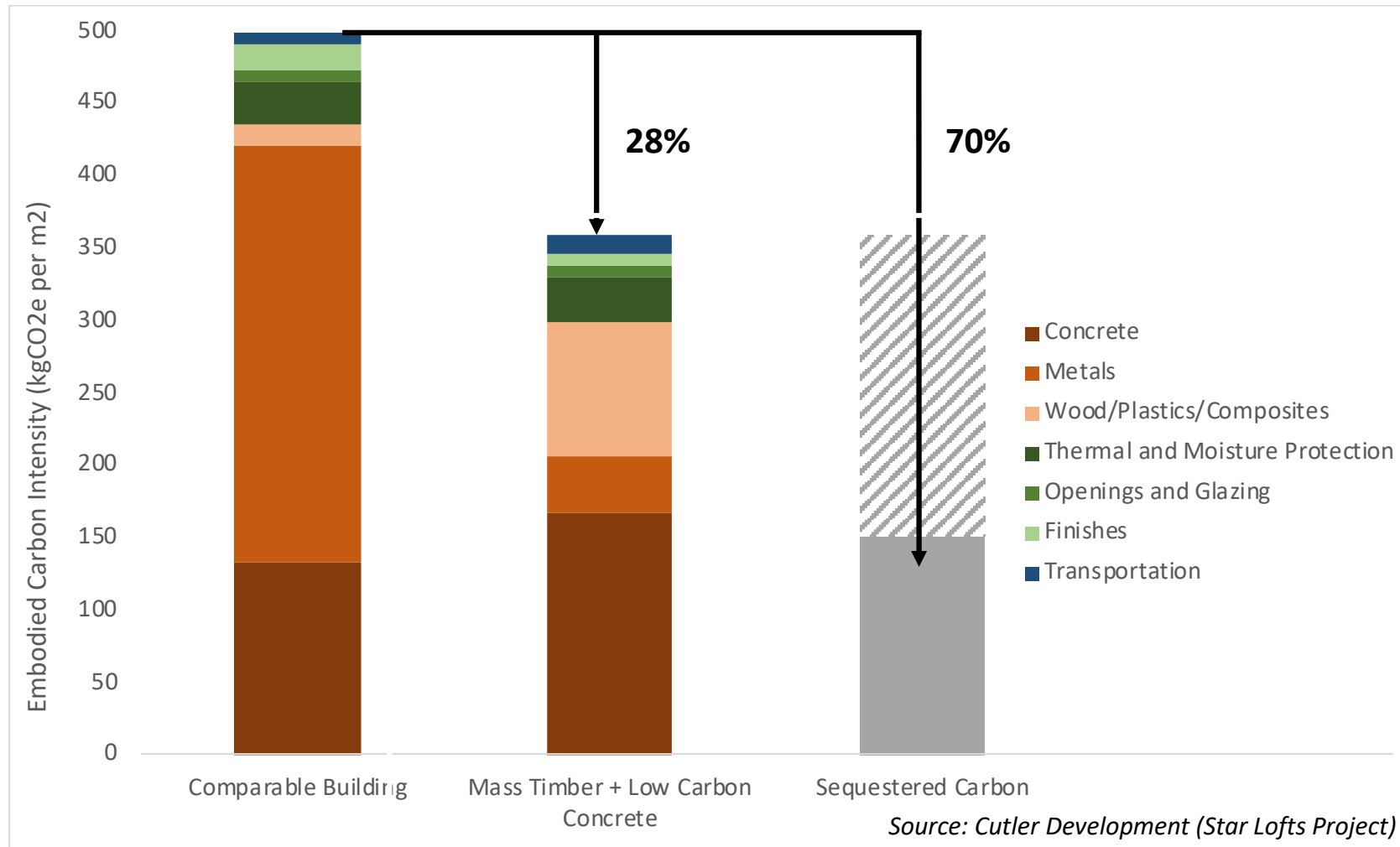
First Zero Carbon certified LIHTC Funded apartments
First Passive House certified apartments in Iowa

- 30 units: 30-80% AMI & 9500 SF retail
- Hybrid mass timber design
- Zero Carbon Certification (by Living Future)
- Passive House Certification (by PHIUS)





Why Mass Timber? Our Top 5 Reasons



Why Mass Timber #1: Carbon Sequestration



Why Mass Timber #2: Healthy Forests



Why Mass Timber #3: Increased Durability



Why Mass Timber #4: Biophilic Design



Why Mass Timber #5: Increased Lease Rates



Net Zero: Our Strategy

Net Zero: Certification



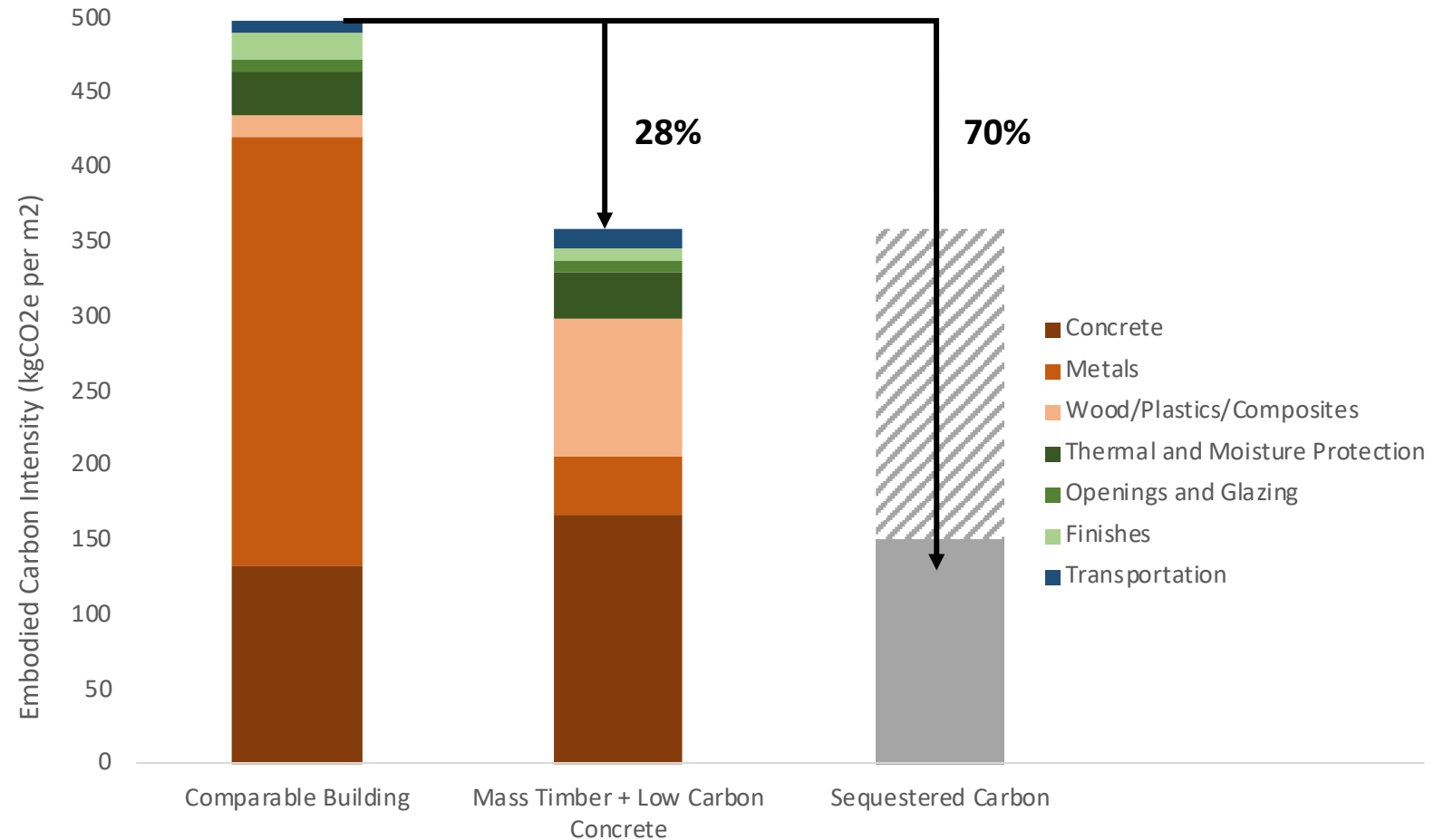
- 10% reduction in embodied carbon (vs. concrete building in Des Moines)
- 25% reduction in operational carbon (vs. building at current Iowa energy code)
- 100% renewable offset of remaining embodied and operation carbon (15 years)

Net Zero: Embodied Carbon Results

Embodied Carbon Reduction

Largest Contributors:

- Mass Timber Structure
- Low-Carbon Concrete
- Exposed concrete and mass timber



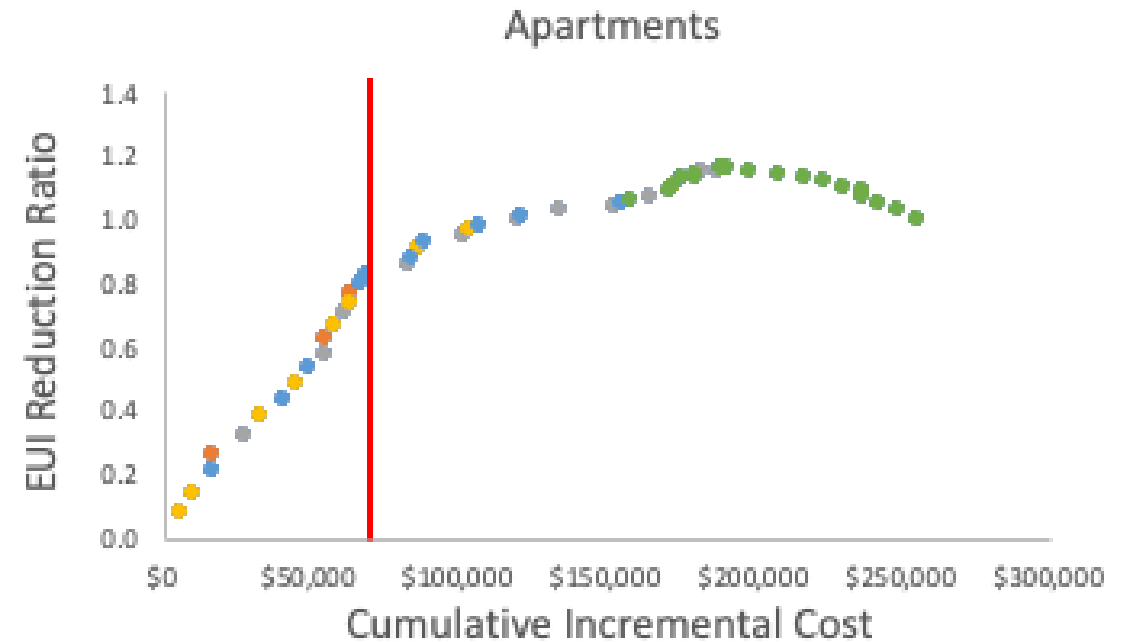
Source: Cutler Development (Star Lofts Project)

Net Zero: Operational Carbon Process

Operational Energy Reduction

Data-Driven Process:

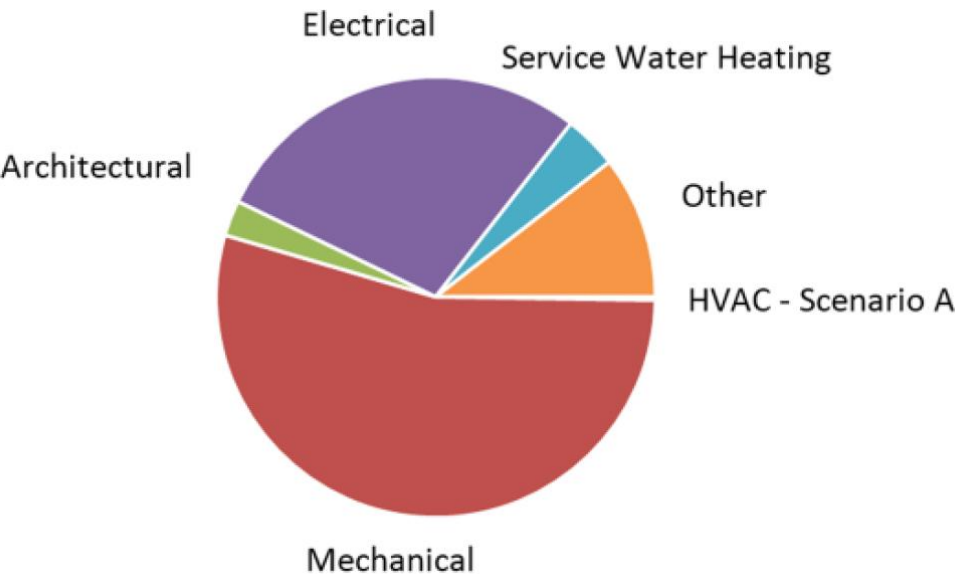
- 200+ strategies evaluated; 65 chosen
- ↑ curve = ↑ energy reduction/dollar spent
- Off-site solar to offset remainder



Source: Cutler Development (Star Lofts Project)

Net Zero: Operational Carbon Results

Relative Savings Distribution by Strategy



Annual Electric Consumption (kWh)

598,205

430,642

Annual Electric Consumption Savings

167,563

% Annual Electric Consumption Savings

28%



EUI (kBtu/sf/yr)

91.7

66.0

EUI Savings

25.7

% EUI Savings

28%

Source: MidAmerican CNC Willdan Star Lofts Report

Net Zero: Offsets



Star Lofts

- V** **Volume of wood products used:**
20,650 cubic feet
- U.S. & Canadian forests grow this much wood in:**
2 minutes
- C** **Carbon stored in the wood:**
505 metric tons of CO₂
- CO₂** **Avoided greenhouse gas emissions:**
513 metric tons of CO₂
- ✓** **TOTAL POTENTIAL CARBON BENEFIT:**
1,018 metric tons of CO₂

EQUIVALENT TO:

- Car** **215 cars off the road for a year**
- House** **Energy to operate 108 homes for a year**

Source: US EPA

Estimated by the Wood Carbon Calculator for Buildings, based on research by Sarthre, R. and J. O'Connor, 2010, A Synthesis of Research on Wood Products and Greenhouse Gas Impacts, FPIInnovations.
Note: CO₂ on this chart refers to CO₂ equivalent.

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Ever.green Brings REI Co-op and Cutler Development Together to Support a New Solar Project in Marion County, South Carolina



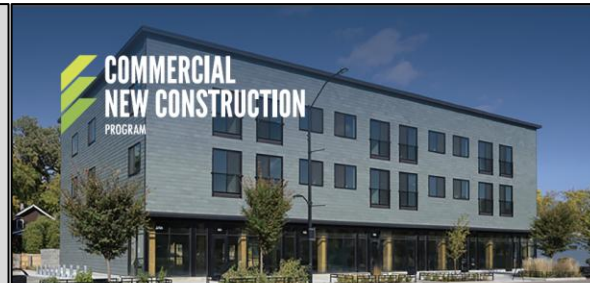
Ever.green brought REI Co-op and Cutler Development together to support a new solar project in Marion County, South Carolina.

Net Zero: Further Reading

CASE STUDY Star Lofts



Mass timber/light-frame hybrid optimizes affordable housing design



PROJECT OVERVIEW

At the forefront of sustainability, affordability, and community engagement is Star Lofts, a new mixed-use building in the heart of Des Moines, Iowa. Headed by local developers Molly and Scott Cutler of Cutler Development, Star Lofts aims to tackle climate change and the lack of affordable housing through its design. With support from the Commercial New Construction (CNC) program by MidAmerican Energy, implemented by Willdan, Star Lofts received guidance on maximizing energy efficiency through advanced energy modeling software.

ENERGY EFFICIENCY STRATEGIES

The project employed several energy efficiency strategies to meet this standard, including:

- **High efficiency air source heat pumps** with energy saving controls
- **Efficient appliances and lighting**, ENERGY STAR appliances and smart thermostats in each apartment unit, and all LED lighting
- **Improved building envelope** with improved insulation and reduced air infiltration

CNC PROGRAM SUPPORT

To help Star Lofts meet the International Living Future Institute (ILFI) requirements and ensure affordable tenant utilities, Cutler Development engaged with the CNC program to implement energy efficiency strategies. The CNC program provided a customized energy model outlining tailored pathways for energy savings, cost savings, upfront costs, energy use intensity, and available incentives. Star Lofts also received an additional 50% low-income incentive bonus per unit through the program.

The energy model guided Cutler Development's decision-making, with Molly calling it "illuminating." Initially considering electric resistance heating and cooling, the team switched to heat pumps after comparing the energy and cost savings of the two systems. The CNC program kept them on track with efficient strategies for their budget, enabling design choices that maximized energy savings at the lowest cost while remaining flexible to their zero-carbon goals. For Willdan energy consultant Robert Renken, the key to energy modeling and consulting for this project was to "balance real design with the goals of uniqueness and sustainability." Scott explained they had a great experience with Willdan and the CNC program on a previous project, so it was "an easy choice to team up with this group again" for Star Lofts and its ambitious goals. "You are paired with a team of highly qualified energy professionals who will model several MEP system design scenarios to provide you with options to decrease the building's energy consumption," he added.



CASE STUDY

STAR LOFTS

ESTIMATED ENERGY SAVINGS

- **24%** annual utility cost savings compared to baseline
- **68,248 kWh** in electric savings – equivalent to:
 - Avoiding the CO₂ emissions from 3,438 gallons of gas consumed
 - Carbon sequestered from 505 tree seedlings grown over 10 years

PROJECT TEAM

- **Developer:** Cutler Development
- **Architect:** ID8
- **Mechanical and Electrical Engineers:** Currie Engineering Associates, LPC
- **General Contractor:** Capital Homes

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AFFORDABLE HOUSING CASE STUDY

Star Lofts

On the site of the former Star Gas Station in Des Moines, Iowa, Star Lofts transforms an underutilized brownfield into vibrant urban infill housing. The three-story, 20-unit building contains 7,400 square feet of ground floor commercial space and provides housing for residents earning 30–80% of the area median income, including four units reserved for individuals experiencing homelessness. Created by Cutler Development in partnership with Anawim Housing—one of Iowa's largest permanent supportive housing providers—Star Lofts is on track to become the first **Zero Carbon** certified affordable housing project in the world.

Cutler Development's mission is to "develop projects that better neighborhoods, society, and the environment." With affordability at its core, this vision is realized through mixed-use, mixed-income projects located in areas with naturally occurring density and strong access to public transit. As a small developer, owners Molly and Scott Cutler see each project as a means to advance both housing access and climate action: developing a Zero Carbon affordable housing project offered an excellent opportunity to capture the essence of their mission while generating lessons that can be shared and scaled to larger projects.

LOCATION
Des Moines, IA
DEVELOPER
Cutler Development +
Anawim Housing
PROJECT SIZE
22,770 SF
TOTAL UNITS
20
CONSTRUCTION COMPLETION DATE
November 2024
CERTIFICATION PATH
Zero Carbon

PHOTOS COURTESY OF CUTLER DEVELOPMENT

Net Zero: Next Iteration

Project Details

Low Income Housing Tax Credit Project

Living Future Zero Carbon Certification

PHIUS ZERO Certification

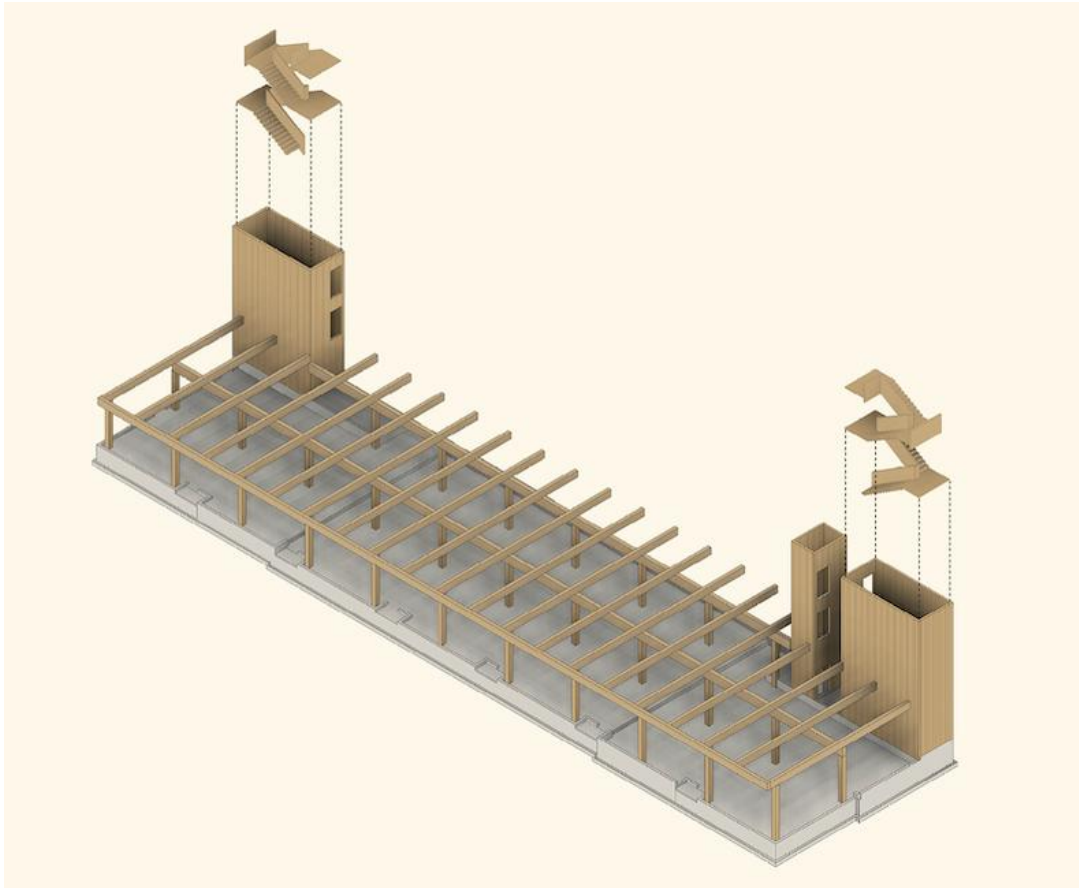
Completion (projected) November 2026



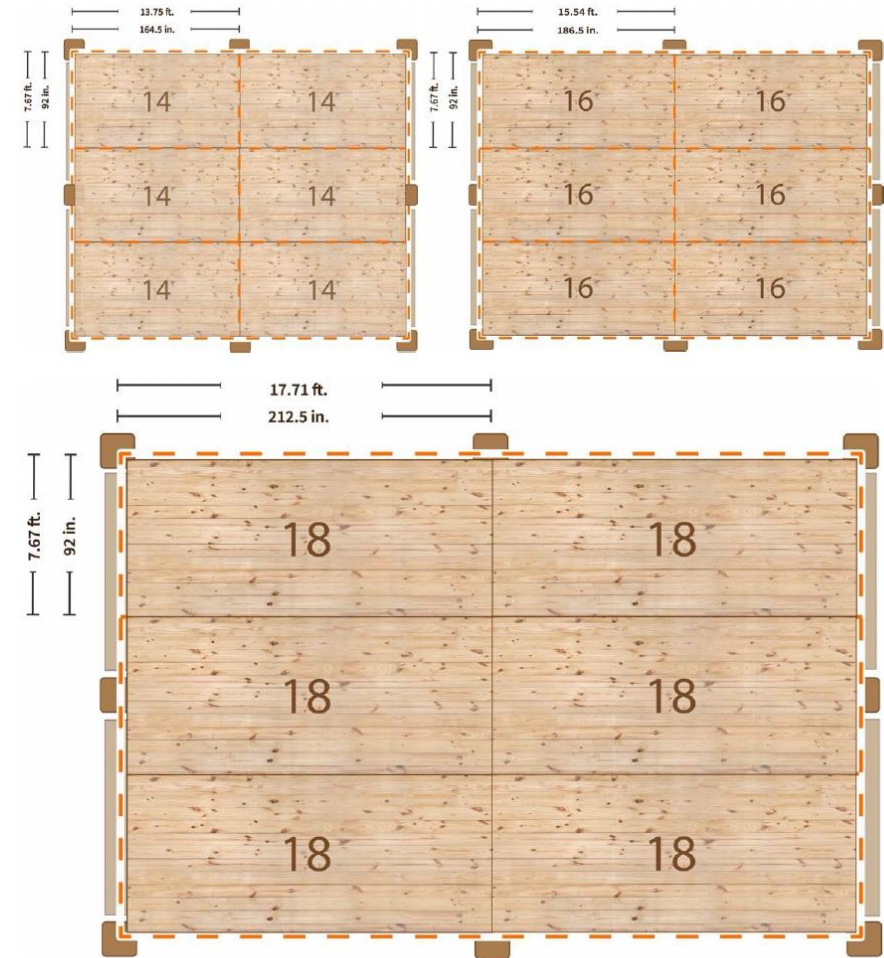
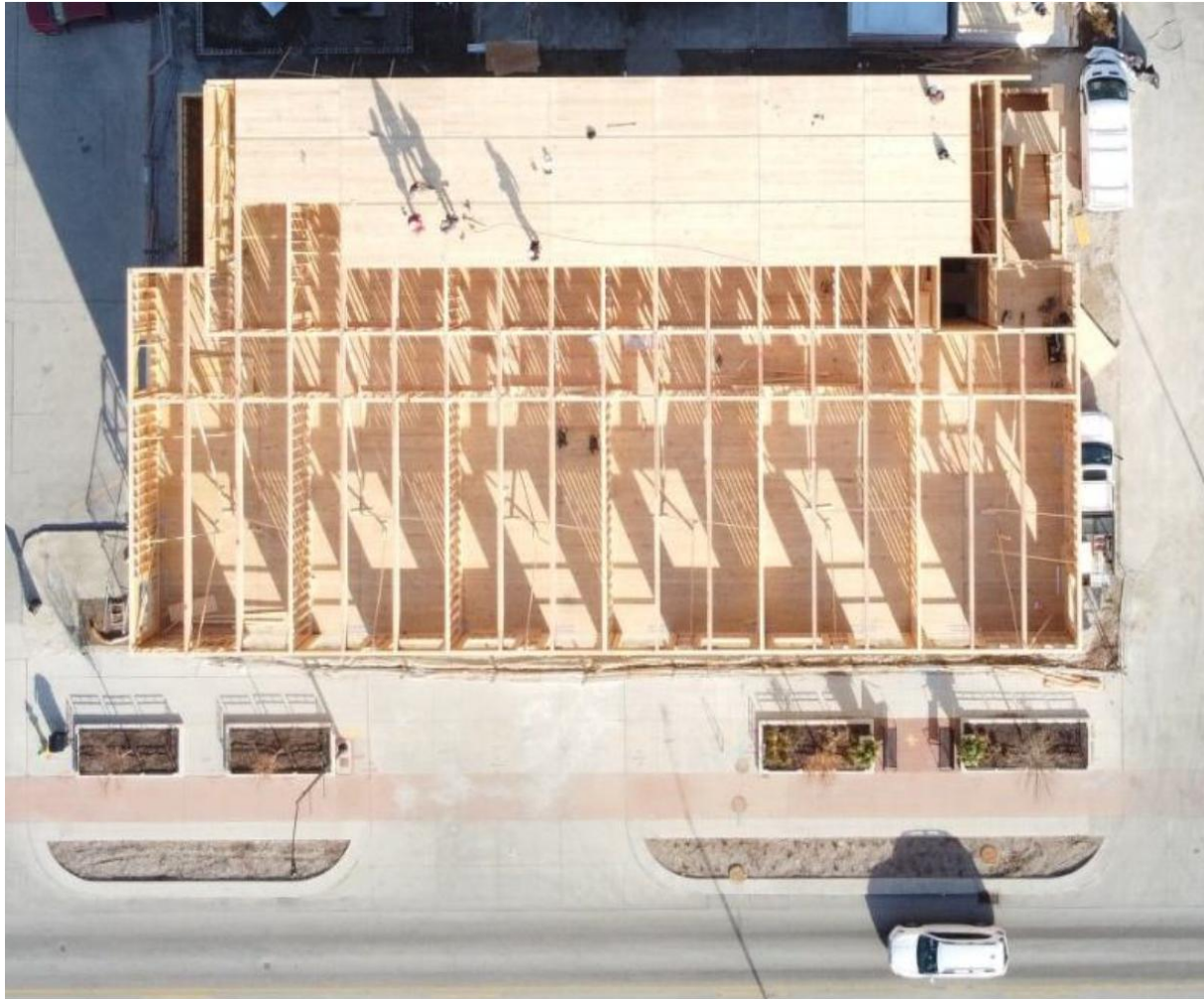
GOLDFINCH LOFTS
PHIUS PASSIVE HOUSE DESIGN CERTIFICATION



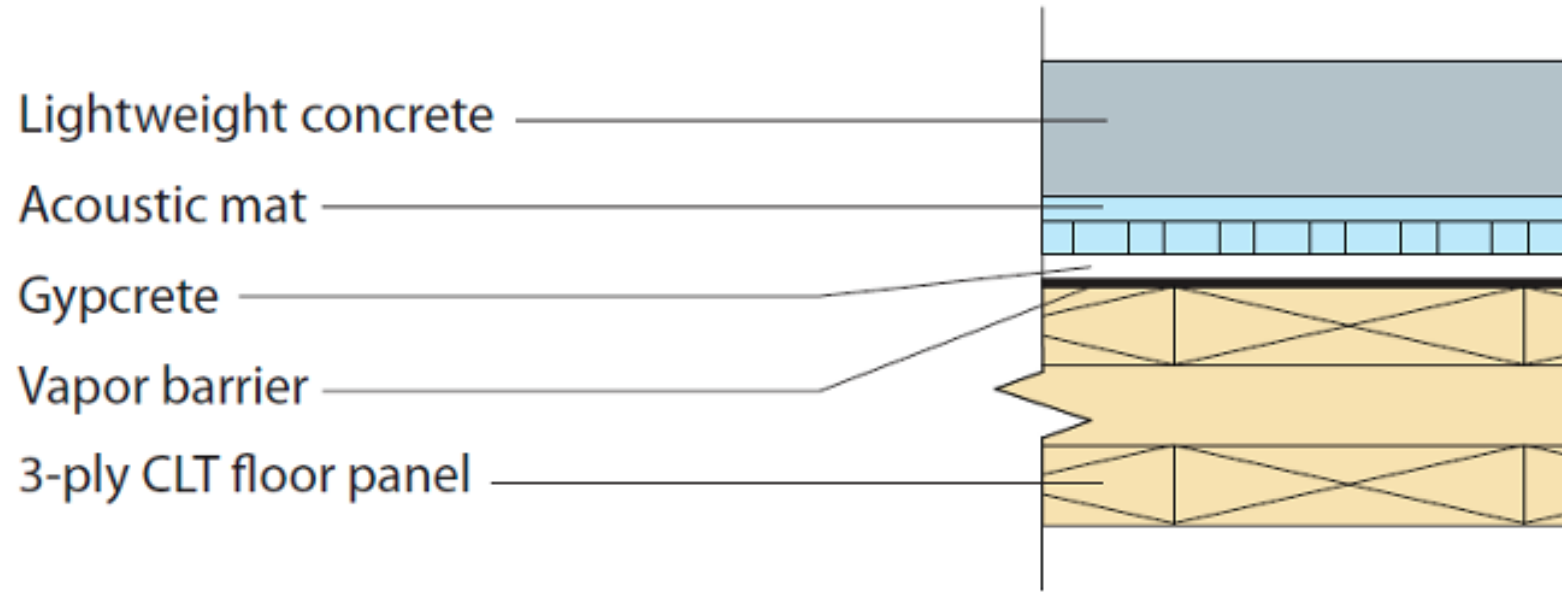
How to save on cost? Our top 5 strategies



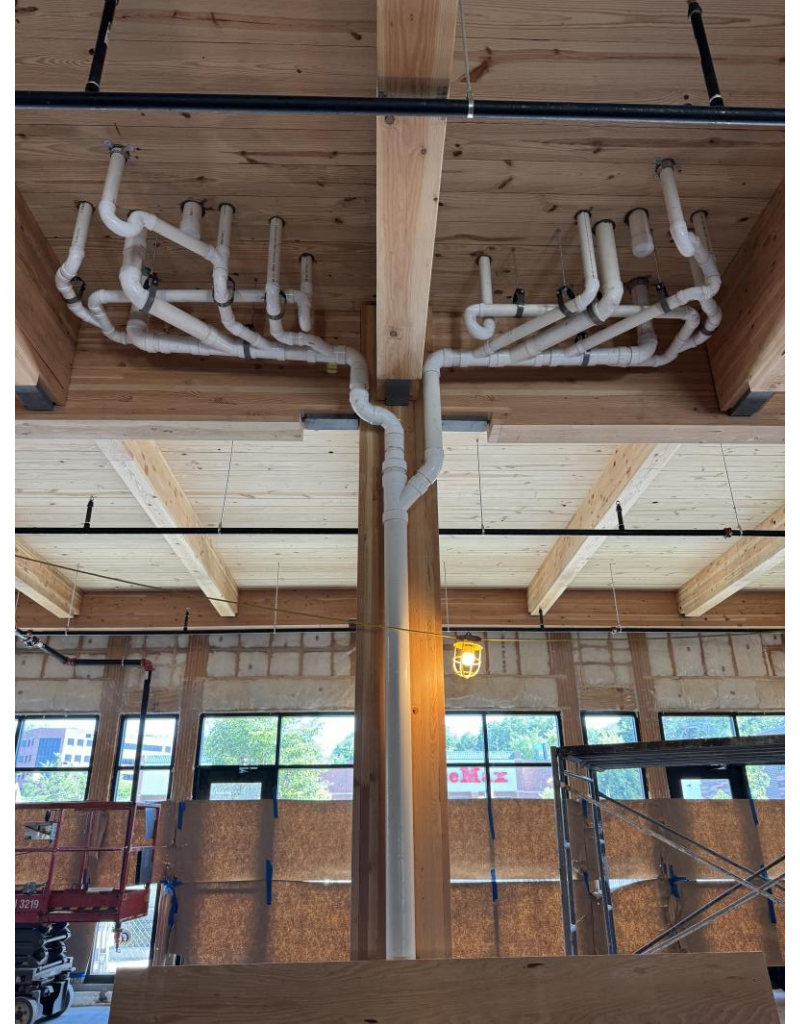
How to save on cost #1: Hybrid Design



How to save on cost #2: Panel Layout & Thickness



How to save on cost #3: Sound Assembly



How to save on cost #4: Local Trades



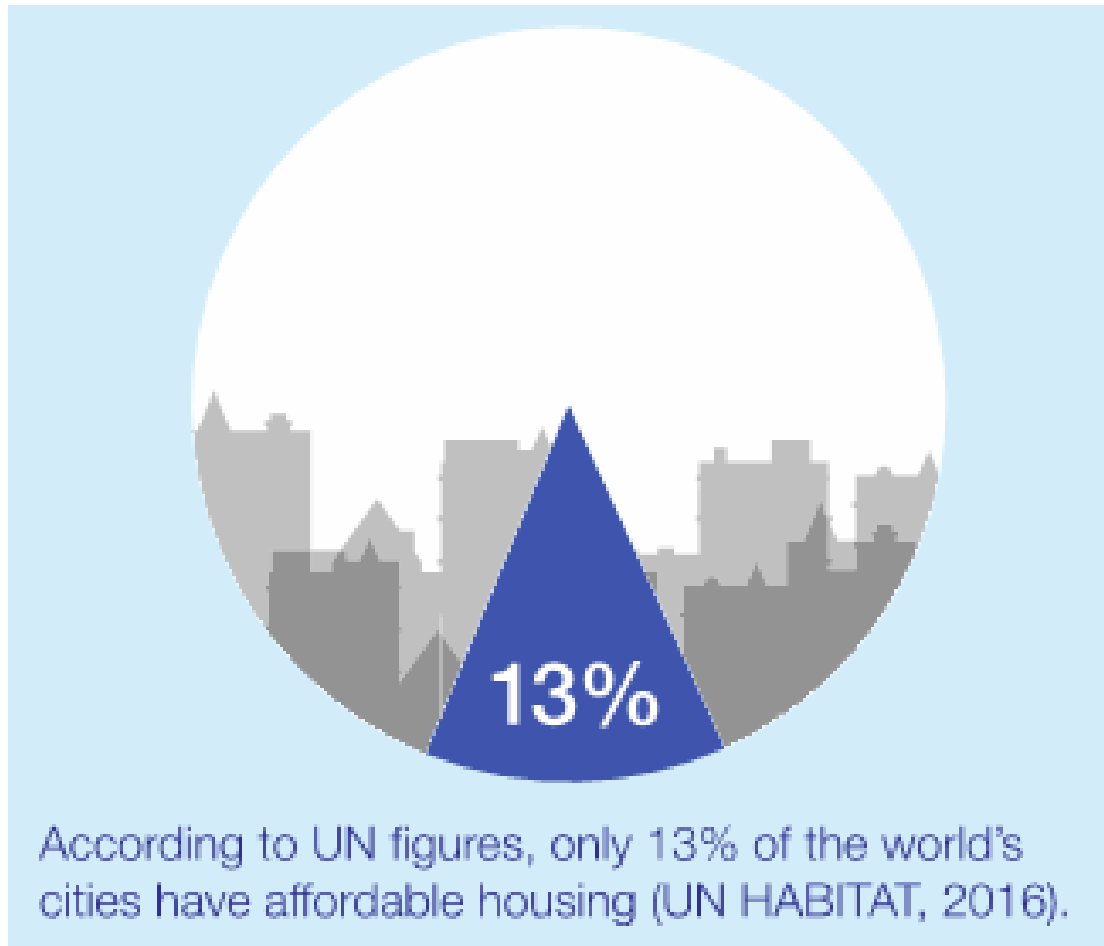
How to save on cost #5: Utilize Support



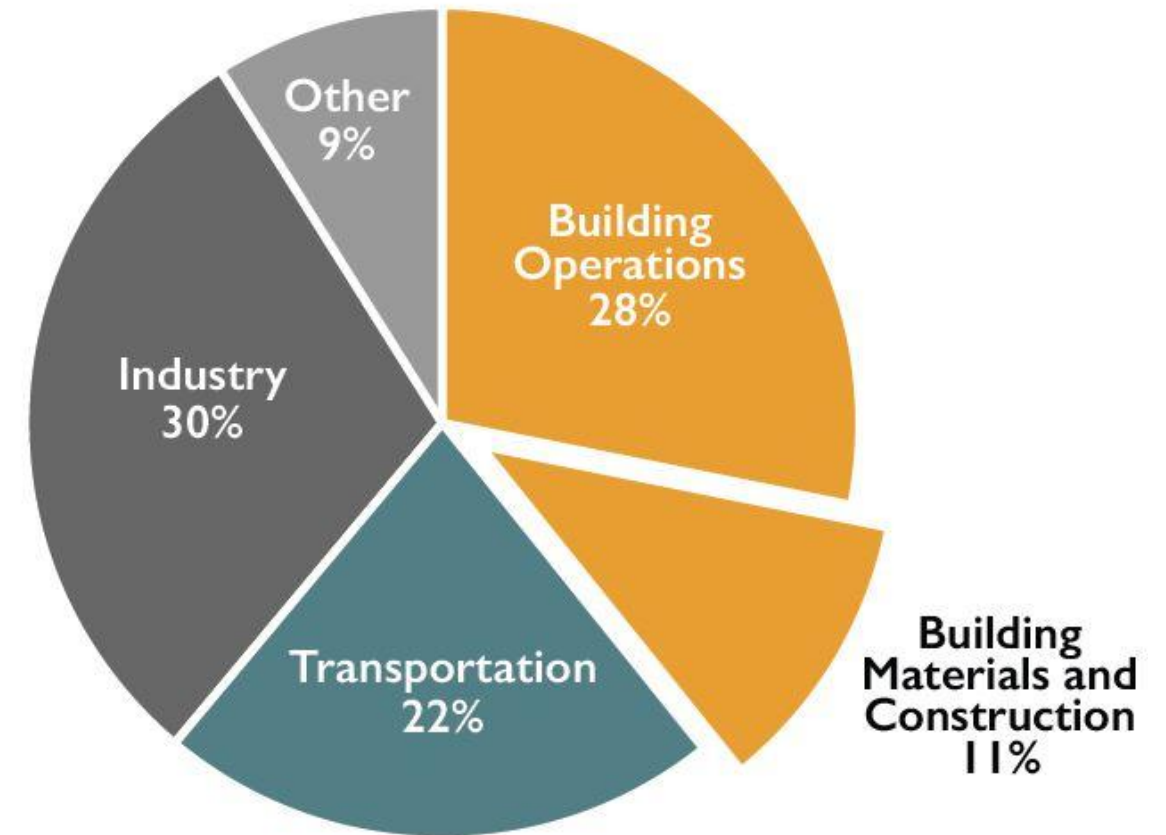
Mass Timber as a dual solution...

Affordable Housing & Climate Change

Global Affordable Housing Availability



Global CO₂ Emissions by Sector



Source: © 2018 2030, Inc. / Architecture 2030. All Rights Reserved. Data Sources:
UN Environment Global Status Report 2017; EIA International Energy Outlook 2017



Thank you!

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