Meeting Sustainability Objectives with Wood Buildings

Healthy Buildings, Carbon Impact, Resilience, Circularity

Mass timber structural systems help meet several development objectives that fall under the broad sustainability umbrella, including healthy buildings, reduced carbon impact, resilience, and circularity. Developers and owners can take advantage of wood's benefits to create buildings that contribute value by attracting tenants, align with evolving policy requirements, and appeal to investors who are increasingly seeking sustainable investments.

Carbon Benefits of Wood Buildings

Less Embodied Carbon + Stored Carbon = Lower Carbon Impact

Low embodied carbon: Wood products have low embodied carbon compared to steel and concrete.[1,2] Embodied carbon is a measure of the greenhouse gas (GHG) emissions associated with materials and construction processes throughout the lifetime of a structure. Embodied carbon, especially upfront emissions associated with producing materials and constructing a building, can be significant.[3]

Biogenic carbon: As trees grow, they absorb carbon dioxide (CO_2) from the atmosphere, release the oxygen (O_2), and store the carbon in their wood, leaves or needles, and roots. Wood elements used in a building continue to store this carbon for the building's lifetime—longer if the wood is reclaimed and reused or recycled.

Developer Crescent Real Estate chose mass timber for Platte Fifteen, a speculative office development in Denver, for aesthetic differentiation and alignment of sustainability goals. They found that the authentic aesthetic of timber appeals to both technology companies as well as more traditional tenants.[4]

> ***"Mass timber is great environmentally and creates warm, natural, biophilic spaces that enrich human experiences. It is a viable, sustainable structural option that drove leasing and the ultimate economic success of Platte Fifteen. The differentiated authentic timber interiors proved to be exceptionally attractive to quality, sustainability-minded tenants and investors. It is fundamentally what makes this building special."***
>
> – Conrad Suszynski, Co-CEO
> Crescent Real Estate

Photo JC Buck

Platte Fifteen – Denver, CO
Crescent Real Estate

Photo Nick Johnson, Tour D Space

INTRO Cleveland – Cleveland, OH
Harbor Bay Ventures

Sustainable and Resilient Forest Management

Sustainable forest management practices such as those used in North America are essential to the forest-carbon cycle. While wood buildings store carbon, the next generation of trees begins to grow and absorb CO_2. This helps to ensure that our forests remain a carbon sink while creating a sustainable supply of wood for new buildings.

Strong markets for wood products incentivize sustainable forest management by providing an economic reason to keep forested lands forested instead of converting them for other uses. They also encourage landowners to invest not only in forest regeneration, but thinning and other landscape restoration efforts that promote forest health and reduce the risk of wildfire. It's business 101; our forests are healthiest when there is demand for forest products.

Healthy Buildings and Biophilia

Harbor Bay Ventures, developer of INTRO Cleveland, chose mass timber for aesthetic differentiation and to appeal to the health and wellness desires of occupants.

As a natural material, wood has biophilic benefits when exposed on a building's interior. Emerging research shows that people in workplaces with a higher portion of visible wood report higher concentration, lower stress levels, and improved overall mood.[5] Owners and tenants are attracted to wood—a warm, beautiful and natural material. Many leasing brokers have witnessed prospective tenants touching wood surfaces and even taking selfies with wood columns.[6]

Affinius Capital, formerly USAA Real Estate, chose mass timber for its Dallas logistics warehouse to appeal to both institutional investors and workers in a market where attracting and retaining labor is a struggle. The cross-laminated timber (CLT) not only provides a warm biophilic interior, but also contributes to better thermal insulation for the wall system. This helps reduce heat gain on hot summer days, contributing to a healthy indoor environment for workers.

"Our underlying thesis for the Dallas warehouse was 'How do we effectively reduce our use of cement to lower the carbon impact of the development?' We wanted to have the greatest impact on embodied carbon for our investment and truly make a difference while not compromising our standard of developing Class A institutional buildings our tenants expect. Through the hybrid design of mass timber walls with conventional structural steel structure, we were able to achieve just that."

– Josh Hullum,
Executive Director
of Construction
Management
Affinius Capital

Photo Mark Humphries Photography

Southfield Park 35 Warehouse – Dallas, TX
Affinius Capital

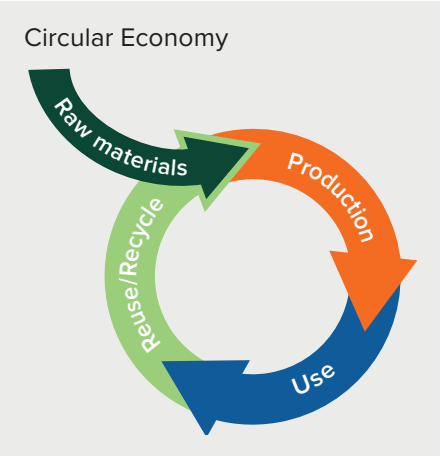
Energy Efficiency and Insulation

Wood has the advantages of low thermal conductivity and higher thermal insulation compared to steel and concrete.[7] When used in exterior walls, mass timber panels can help contribute to a higher thermal insulation for the overall wall system. In the case of logistics warehouses like the Dallas warehouse that may not have air conditioning systems, a higher-insulated exterior façade can help reduce the risk of heat exhaustion for laborers during extreme heat events, which are becoming increasingly frequent. It can also help reduce heat-related absenteeism.

For buildings with HVAC systems, wood can make a small contribution to lower operational energy. Wood in the exterior façade can help reduce heat loss through thermal bridging. Also, the precision of mass timber systems can provide for exceptional air tightness.

Circular Economy

Wood is a natural and renewable material sourced from trees harvested at the earth's surface, after which new trees are planted in their place. Sourcing of the other two common structural options, steel and concrete, require extraction of minerals from hundreds or thousands of feet below ground.[8] One of the goals of a circular economy is efficient input of raw materials into the loop, which wood provides. Wood is also the only major building material that's renewable.



There is also potential to reuse wood products, which further contributes to circularity. Large heavy timber beams and columns have been reused in many applications, and are valued for their beauty and performance. When designed to be disassembled at the end of a building's service life, mass timber panels also offer an exciting opportunity for reuse. Apex Plaza in Charlottesville, Virginia, is one example. All the panels in this 300,000 square-foot office building are designed to be disassembled and reused.

Photo Prakash Patel

Apex Plaza – Charlottesville, VA
Hourigan / William McDonough + Partners

[1] Think Wood. *Net Zero Carbon Buildings*.

[2] Think Wood. *How It's Made and the Environmental Impacts: A Comparison of Wood, Steel and Concrete*.

[3] World Green Building Council. (2019). *Bringing Embodied Carbon Upfront: Coordinated action for the building and construction sector to tackle embodied carbon*.

[4] WoodWorks. (2020). *Platte Fifteen – Denver's First CLT Commercial Office Building Puts Sustainability to Work.*

[5] Think Wood, WoodWorks. *Biophilic Design LookBook*.

[6] WoodWorks. *Mass Timber Business Case Studies*.

[7] American Wood Council. *What is the thermal conductivity of wood and how does it compare to other materials.*

[8] The Architectural League. *Alan Organschi: Building a Global Carbon Sink*.

Photo Travis Mark

Timber House – New York, NY
MESH Architectures

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