



Fact Sheet

Building Sustainably: Mass Timber (September 2023)

WHAT IS MASS TIMBER?

Mass timber is an umbrella term for a class of engineered wood building materials, including those created by layering and bonding wood. The best-known example of mass timber is [cross-laminated timber](#), which can be made from small-diameter or diseased trees to create a strong, lightweight building material.¹ Other types of mass timber include nail-laminated timber, glue-laminated timber, laminated strand lumber, and laminated veneer lumber.

Unlike lumber, which is typically used in traditional stick-frame construction of houses and low-rise buildings, mass timber is strong enough to construct much larger structures. The world's tallest mass timber structure is a 25-story apartment building that [opened](#) in Milwaukee, Wisconsin, in 2022.²

Although mass timber is relatively new in the United States, it has been used in Europe for decades. The [number](#) of U.S. mass timber construction projects is rapidly increasing, with 1,860 completed or planned as of June 2023.³

MULTIPLE BENEFITS OF MASS TIMBER

Builders are turning to mass timber because of its benefits. In addition to having a lower carbon footprint than traditional steel and concrete, it is often cost-competitive with them.⁴

Carbon Storage. Trees sequester and store carbon from the atmosphere as they grow. When these trees are used to make mass timber products, some of that carbon continues to be stored and not released into the atmosphere.

Emissions Displacement. The cement and steel industries are [notoriously](#) greenhouse gas emissions-intensive and difficult to decarbonize.⁵ Building with mass timber instead of concrete and steel could [reduce](#) the emissions associated with building materials by 13% to [26.5%](#).^{6,7}

Forest Management. Mass timber can promote healthy forest management by incentivizing the removal of small-diameter trees that present a [wildfire hazard](#).⁸

Improved Construction. Mass timber building construction can be [faster](#), [quieter](#), and less temperature-sensitive than other builds.^{4,9} Mass timber also can be more [fire-resistant](#) than traditional wood construction, [cheaper](#) than concrete and steel, and better at handling [earthquakes](#) than other high-rise construction.^{10,11,4}

Workforce Growth. The global cross-laminated timber industry is expected to have a [market size](#) of \$3.56 billion by 2030, which could create jobs across the United States.¹² In Oregon, for example, if mass timber design grew to 5% of the state's construction market share, 2,048 direct manufacturing jobs would be [created](#).^{13,12}

Waste Management. [Lower-grade](#) mass timber panels, such as those from diseased or insect-infested trees, are used in non-structural applications like temporary roads and construction platforms, which prevents otherwise undesirable wood from being wasted.¹⁴



Benefits of Mass Timber



COMMONLY ASKED MASS TIMBER QUESTIONS

Is mass timber fire safe? Mass timber can provide better [fire resistance](#) than traditional light-frame wood construction, but architects must still carefully [consider](#) the fire hazards of individual projects.^{15,16} Fire testing has been [conducted](#) on cross-laminated timber buildings by the International Code Council (ICC), the Fire Protection Research Foundation, and the U.S. Forest Service, which also conducted successful [blast testing](#).^{17,18} [Features](#) like early warning systems, redundant sprinkler systems, and gypsum wallboard can help mitigate fire risk.¹⁹

How does mass timber affect U.S. forest management? While deforestation is a pressing global concern, the U.S. forest land base has been [stable](#) for the last 100 years, and sourcing timber domestically can allow for better sustainability transparency.²⁰ Sustainable mass timber is transparently sourced from [responsibly-managed forests](#) that preserve biodiversity, water quality, and ancient old-growth trees.²¹ Mass timber can be made from smaller diameter and less commercially-desirable trees. Regularly “thinning” such trees, which already [occurs](#) as a fire mitigation measure, can [sustainably supply fiber](#) for mass timber production when done [responsibly](#).^{22,23,24}

How can we be sure that carbon storage of mass timber is long-lasting? [Deconstructing](#) mass timber buildings at the end of their lives and reusing materials for similar purposes is one way to ensure that carbon remains stored and not emitted.²⁵ Mass timber products can be [upcycled](#) as load-bearing columns, beams, and panels, repurposed as furniture, or downcycled into [particle board or wood chips](#).^{26,27} Building projects with a “[design for destruction](#)” approach helps architects and designers plan exactly how materials can be recovered, reused, and recycled.²⁸

Are there any downsides to mass timber as a building material? Many common types of mass timber tend to [dry](#) out more slowly than conventional lumber, which can increase potential for fungi, insects, and mold.²⁹ Proper [moisture-excluding techniques](#), like the use of naturally-durable wood species and preservative-treated wood, fungicidal and insecticidal shallow barrier treatments, and [processes](#) that alter moisture behavior on the wood, can help mitigate moisture problems.³⁰

FEDERAL SUPPORT FOR MASS TIMBER

The U.S. Forest Service’s 2022 report, [Research Needs Assessment for the Mass Timber Industry](#), emphasized the importance of “comprehensive, significant, and strategic investments” in mass timber research and development to help support the growing industry and the sustainability and performance of its construction.³¹

The U.S. Department of Agriculture’s [Wood Innovations Program](#) creates and expands markets for wood products.³² Wood Innovations Grants worth more than \$14 million have supported at least [60 projects that studied or supported](#) mass timber cost-effectiveness, seismic resilience, fire performance, mold and decay resistance, and more.³³ One grant [helped](#) the American Wood Council perform fire safety tests on taller mass timber buildings, leading ICC to allow expanded use of [exposed timber ceilings](#) in buildings as high as 12 stories.^{34,35}

The Farm Bill provides further opportunities for mass timber development. Provisions of the [Timber Innovation Act of 2017 \(S.538/H.R.1380\)](#) were [included](#) in the 2018 Farm Bill, setting the stage for increased investment in domestic facilities to manufacture mass timber, as well as providing research and technical support to code officials and designers and incentivizing new wood construction buildings.^{36,37,38}

Authors: Molly Brind’Amour, Savannah Bertrand

Editors: Daniel Bresette, Anna McGinn, Amaury Laporte

This fact sheet is available electronically (with hyperlinks and endnotes) at www.eesi.org/papers.

The Environmental and Energy Study Institute (EESI) is an independent nonprofit advancing science-based solutions for climate change, energy, and environmental challenges. Founded on a bipartisan basis by members of Congress, EESI has been informing policymakers and the American public about the benefits of energy efficiency, renewable energy, and environmental protection since 1984. In 1988, EESI declared that all energy policy must be examined through a climate lens, which has since guided us toward our vision: a sustainable, resilient, and equitable world.

-
- ¹ EESI, “Wood: The Building Material of the Future?,” Environmental and Energy Study Institute, October 23, 2018, www.eesi.org/briefings/view/102318timber.
- ² “World’s Tallest Timber Building Opens,” US Forest Service, July 29, 2022, www.fs.usda.gov/inside-fs/delivering-mission/apply/worlds-tallest-timber-building-opens.
- ³ “Mapping Mass Timber,” WoodWorks | Wood Products Council, accessed September 25, 2023, www.woodworks.org/resources/mapping-mass-timber/.
- ⁴ “Fact Sheet: Mass Timber,” American University, June 24, 2020, www.american.edu/sis/centers/carbon-removal/fact-sheet-mass-timber.cfm.
- ⁵ Samantha Gross, “The Challenge of Decarbonizing Heavy Industry,” Brookings, accessed July 20, 2023, www.brookings.edu/articles/the-challenge-of-decarbonizing-heavy-industry/.
- ⁶ Rachel Pasternack et al., “What Is the Impact of Mass Timber Utilization on Climate and Forests?,” *Sustainability Journal* 14, no. 2 (2022): 1, <https://doi.org/10.3390/su14020758>.
- ⁷ Francesca Pierobon et al., “Environmental Benefits of Using Hybrid CLT Structure in Midrise Non-Residential Construction: An LCA Based Comparative Case Study in the U.S. Pacific Northwest,” *Journal of Building Engineering* 26 (November 1, 2019): 100862, <https://doi.org/10.1016/j.jobe.2019.100862>.
- ⁸ “Living with Climate Change: Wildfires | Briefing | EESI,” Environmental and Energy Study Institute, June 13, 2022, www.eesi.org/briefings/view/061322climatechange.
- ⁹ Steve Marshall, “Mass Timber Benefits for Communities: A Citizen’s Guide,” Mass Timber Strategy, October 12, 2021, www.masstimmerstrategy.com/post/community-benefits.
- ¹⁰ TJ McCann, “What You Should Know about Mass Timber,” Coffman Engineers, August 16, 2022, www.coffman.com/news/what-to-know-about-mass-timber.
- ¹¹ Think Wood, “How Mass Timber Can Cut Your Construction Costs,” Think Wood, September 30, 2019, www.thinkwood.com/blog/how-mass-timber-can-cut-construction-costs.
- ¹² “Cross Laminated Timber Market Worth \$3.56 Billion By 2030,” Grand View Research, April 2023, www.grandviewresearch.com/press-release/global-cross-laminated-timber-market.
- ¹³ “Regional and Net Economic Impacts of High-Rise Mass Timber Construction in Oregon,” *Sustainable Cities and Society* 61 (October 1, 2020), <https://doi.org/10.1016/j.scs.2020.102154>.
- ¹⁴ “Growing Green Industry and Innovation: Mass Timber | Briefing | EESI,” Environmental and Energy Study Institute, September 23, 2020, www.eesi.org/briefings/view/092320workforce.
- ¹⁵ Adarsh Krishna and JJ Sneed, “Mass Timber 101: Efficient and Sustainable Construction,” Kimley-Horn, June 27, 2023, www.kimley-horn.com/mass-timber-101-efficient-sustainable-construction-part-1/.
- ¹⁶ Nat Barker, “Are Mass-Timber Buildings a Fire Safety Risk?,” Dezeen, March 22, 2023, www.dezeen.com/2023/03/22/mass-timber-fire-safety-timber-revolution/.
- ¹⁷ David Roberts, “The Hottest New Thing in Sustainable Building Is, Uh, Wood,” Vox, January 15, 2020, www.vox.com/energy-and-environment/2020/1/15/21058051/climate-change-building-materials-mass-timber-cross-laminated-clt.
- ¹⁸ Rebecca Wallace, “Blast Testing Shows CLT Can Take the Heat,” U.S. Department of Agriculture, March 30, 2018, www.usda.gov/media/blog/2018/03/30/blast-testing-shows-clt-can-take-heat.
- ¹⁹ Hallie Busta, “Mass Timber 101: Understanding the Emerging Building Type,” Construction Dive, May 24, 2017, www.constructiondive.com/news/mass-timber-101-understanding-the-emerging-building-type/443476/.
- ²⁰ “Forest Sector Investment” (United States Department of Agriculture), accessed May 31, 2023, www.fia.fs.usda.gov/library/bus-org-documents/docs/strategic-plan-docs/FIA%20Brochure%20Investment-%208p%20JUL14%20v4d.pdf.

-
- ²¹ “Forest Stewardship Council Certification,” Sierra Club, accessed July 14, 2023, www.sierraclub.org/forests/forest-stewardship-council-certification.
- ²² Robert Hudson Westover, “Thinning the Forest for the Trees,” US Forest Service, August 19, 2021, www.fs.usda.gov/features/thinning-forest-trees.
- ²³ Lydia Lee, “How Mass Timber Could Help Reduce Wildfire Risk,” *Metropolis* (blog), December 9, 2020, <https://metropolismag.com/viewpoints/mass-timber-wildfire/>.
- ²⁴ Rodd Kelsey, “Wildfires and Forest Resilience: The Case for Ecological Forestry in the Sierra Nevada” (Sacramento, California: The Nature Conservancy, March 2019), www.scienceforconservation.org/assets/downloads/EcologicalForestry_2019rev.pdf.
- ²⁵ “Building Materials: From Production to Reuse,” Environmental and Energy Study Institute, December 8, 2021, www.eesi.org/briefings/view/120821waste.
- ²⁶ Amanda Stanton, “End-of-Life and Reusing Mass Timber,” *Timber Tectonics in the Digital Age* (blog), December 13, 2021, <https://timbertectonics.com/2021/12/14/end-of-life-and-reusing-mass-timber/>.
- ²⁷ “Full Circle: Designing and Specifying for End-of-Life,” Think Wood, September 23, 2021, www.thinkwood.com/blog/coming-full-circle-designing-for-end-of-life.
- ²⁸ Eduardo Souza, “There Is Life After Demolition: Mass Timber, Circularity and Designing for Deconstruction,” ArchDaily, July 27, 2021, www.archdaily.com/963070/we-must-think-about-the-future-of-buildings-after-demolition-mass-timber-circularity-and-designing-for-deconstruction.
- ²⁹ J.Y. Wang et al., “Durability of Mass Timber Structures: A Review of the Biological Risks,” *Wood and Fiber Science* 50, no. Special (August 13, 2018), <https://doi.org/10.22382/wfs-2018-045>.
- ³⁰ Jed Cappellazzi et al., “Potential for Decay in Mass Timber Elements: A Review of the Risks and Identifying Possible Solutions,” *Wood Material Science & Engineering* 15 (February 1, 2020), <https://doi.org/10.1080/17480272.2020.1720804>.
- ³¹ Marco T. Lo Ricco et al., “Research Needs Assessment for the Mass Timber Industry: Proceedings of the 3rd North American Mass Timber Research Needs Workshop” (Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory, March 23, 2023), <https://doi.org/10.2737/FPL-GTR-297>.
- ³² “Wood Innovations,” US Forest Service, February 1, 2016, www.fs.usda.gov/science-technology/energy-forest-products/wood-innovation.
- ³³ “Wood Innovations Data,” US Forest Service, January 8, 2021, www.fs.usda.gov/science-technology/energy-forest-products/wood-innovations-data.
- ³⁴ “Forest Service Announces 2019 Wood Innovation Grant Awards,” US Forest Service, May 7, 2019, www.fs.usda.gov/news/releases/forest-service-announces-2019-wood-innovation-grant-awards-reducing-wildfire-risk-and.
- ³⁵ Ricky McLain, “Tall Wood Corner: Exposure Allowances in the 2024 IBC,” Wood Products Council WoodWorks, October 26, 2022, www.woodworks.org/tall-wood-corner-exposure-allowances-in-the-2024-ibc/.
- ³⁶ “S.538 - 115th Congress (2017-2018): Timber Innovation Act of 2017,” legislation, congress.gov, March 7, 2017, 03/07/2017, www.congress.gov/bill/115th-congress/senate-bill/538.
- ³⁷ “H.R.1380 - 115th Congress (2017-2018): Timber Innovation Act of 2017,” legislation, congress.gov, April 25, 2017, 2017-03-07, www.congress.gov/bill/115th-congress/house-bill/1380.
- ³⁸ “Forest Owners Applaud Bipartisan Farm Bill’s Support for Working Forests,” National Alliance of Forest Owners, December 11, 2018, <https://nafoalliance.org/forest-owners-applaud-bipartisan-farm-bills-support-for-working-forests/>.