Mass timber construction is a carbon removal technique that involves using specialized wood products to construct buildings, including high-rise buildings. Manufacturers use products such as cross-laminated timber (CLT), laminated veneer lumber (LVL), and glue laminated timber (“glulam”) to produce wood panels and beams, which can replace concrete, steel, and masonry as building materials. Because it displaces emissions-intensive steel and concrete, mass timber can significantly reduce the “embodied carbon” in buildings. Because the wood stores carbon dioxide ($\text{CO}_2$) that was captured from the atmosphere via photosynthesis, mass timber construction can function as a form of carbon removal when combined with sustainable timber production and building demolition practices. Other approaches to building with wood may be able to sequester carbon, as well, including in low-rise buildings.

**CO-BENEFITS AND CONCERNS**

+ **Lower cost**: mass timber construction is more cost-effective than alternative forms of construction for mid- and high-rise buildings.
+ **Energy efficiency**: building with mass timber is less energy intensive than building with steel and concrete.
+ **Faster construction**: by using prefabricated wood panels, mass timber construction is often faster than building with steel and concrete.
+ **Displaces steel and concrete**: by reducing demand for steel and cement, mass timber construction reduces emissions from those hard-to-abate sectors.
+ **Disaster resistant**: engineered mass timber products are fire-resistant, and mass timber buildings can handle earthquakes better than traditional high-rise construction.

**POTENTIAL SCALE AND COSTS**

It is currently difficult to quantify the cost and carbon removal potential of mass timber construction. Mass timber construction appears to be slightly less expensive than traditional steel and concrete construction. While costs are difficult to compare between the two approaches, one analysis of eighteen case studies found an average cost savings of about 4 percent. With respect to carbon removal potential, Skullestad and colleagues estimate that high-rise buildings provide carbon removal benefits equivalent to roughly 150–250 kilograms of $\text{CO}_2$ per square meter of floor space. For context, that would mean that building a city with as much floor space as Manhattan would sequester something on the order of 25–40 million metric tons of $\text{CO}_2$. This is in addition to the mitigation benefit from displacing steel and cement production. Estimates of the global potential for carbon sequestration via mass timber construction are not available at this time.
MASS TIMBER CONSTRUCTION

TECHNOLOGICAL READINESS

Mass timber construction is already practiced at commercial scales, but it remains tiny compared to conventional steel and reinforced concrete construction. Further research and development is still needed to extend the possibilities for mass timber construction and identify circumstances in which it would prove environmentally beneficial. More widespread expertise in and acceptance of mass timber construction would accelerate its adoption.

GOVERNANCE CONSIDERATIONS

- **Sustainable Timber Production**: good governance is critical to ensuring that the trees used for mass timber construction are grown and harvested sustainably, which is essential for making mass timber construction carbon-negative and environmentally sustainable.
- **Life Cycle Analysis**: standardizing best practices for life cycle analyses of embodied carbon would help ensure that mass timber construction is genuinely carbon-negative.
- **Construction Regulations**: building codes and other regulations may need to be updated to promote appropriate forms of mass timber construction and appropriate handling of timber after demolition.
- **Incentivization**: incentives or regulations may be needed to accelerate adoption.
- For cross-cutting considerations, see the [What Is Carbon Removal? fact sheet](https://carbonremoval.info/factsheets) on our website.

FURTHER READING


For more fact sheets on carbon removal, visit [https://carbonremoval.info/factsheets](https://carbonremoval.info/factsheets).