Basics of Wood's Carbon Footprint

How lower embodied carbon + stored carbon support net-zero carbon buildings

Emission reduction strategies must include both operational and embodied carbon.

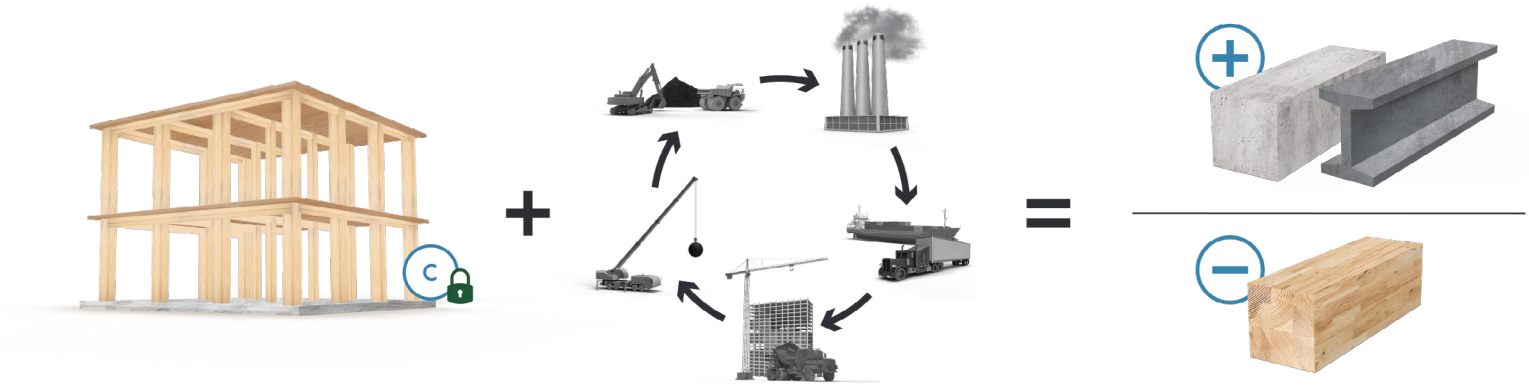
Around ⅔ of GHG emissions in the built environment are due to building operations, referred to as operational carbon. That can be addressed through more energy efficient design and use of renewable energy. About a third of those emissions are from the manufacturing, transportation, and installation of construction materials, or upfront embodied carbon.

Wood's embodied carbon is low.

Manufacturing lumber is the least energy intensive, followed by 100% recycled steel, concrete, and virgin steel. This accounts for wood's low embodied carbon.[1]

Wood stores carbon.

Wood products are **approximately 50% carbon by dry weight.** When sequestered carbon is considered along with embodied carbon, **many wood products have a negative CO_2eq value** when sourced from forests with stable or increasing carbon stocks.[2]



Stored Carbon | Embodied Carbon | CO_2eq Value

1. Jim Bower, Portland Cement as a Construction Material: How Does It Compare to Wood, Steel?, Dovetail, Inc., page 4.
2. FPInnovations & Think Wood: The Impact of Wood Use on North American Forests, page 6; North American Softwood Lumber Environmental Product Declaration.

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Building with wood can transform the built environment from a carbon source to a carbon sink.

Cities built from bio-based materials such as timber can serve as constructed carbon sinks. According to a study published in Nature Sustainability, they could increase the existing carbon pool of urban areas by 25% to 170%.[3]

Wood's carbon storage offsets some temporarily reduced forest carbon.

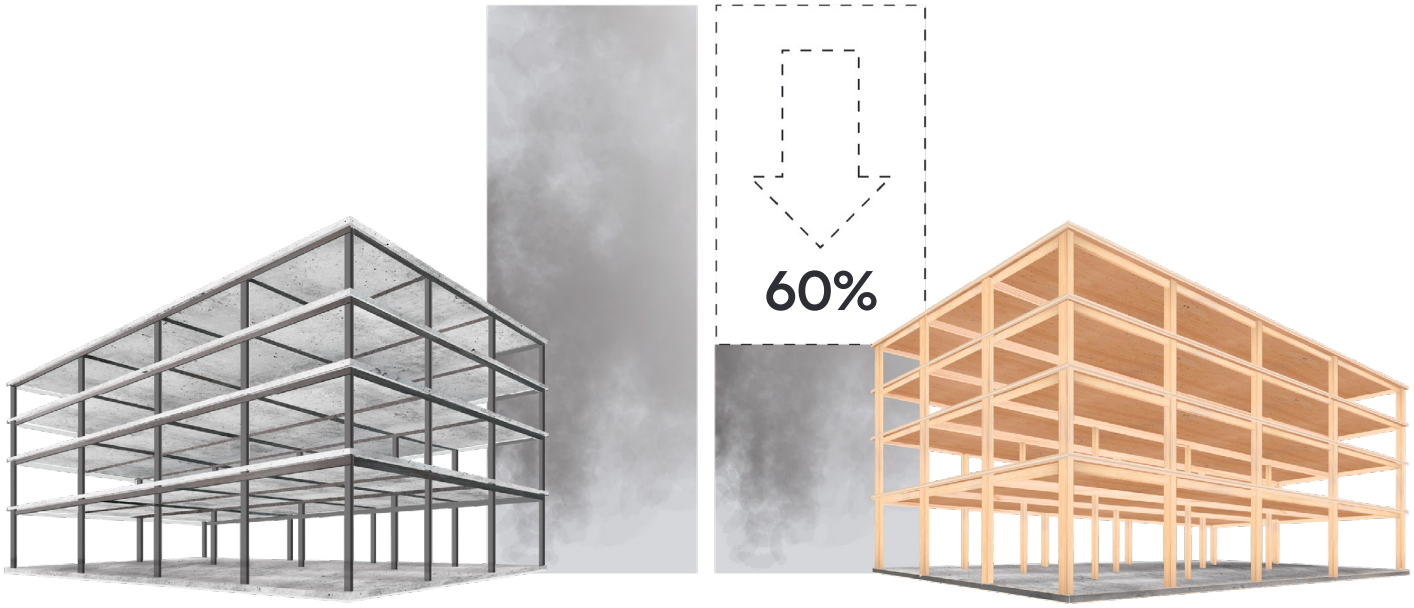
The carbon storage of mass timber buildings will offset some of the temporary reductions of carbon stock in forests, which will re-grow and continue to absorb carbon from the atmosphere.[6] Because the rate of carbon sequestration is greater during the years of young, vigorous tree growth,[7] a cycle of harvesting and replanting maintains the forest's ability to serve as a carbon sink.

Building with wood can cut carbon emissions.

Using life cycle analysis, researchers found that **substituting wood for concrete and steel in commercial buildings cut GHG emissions by an average of 60%.**[4] Increasing wood use to the maximum extent feasible in multifamily, commercial construction, and remodeling could result in a carbon benefit equal to about 21 million metric tons of CO_2 annually–that would be equivalent to taking 4.4 million cars off the road indefinitely.[5]

Wood manufacturing emits less carbon, creates less pollution, and produces less waste than concrete and steel.

Wood requires less energy from harvest to transport, manufacturing, installation, maintenance, and disposal or recycling.[8] **Because the industry uses every piece of each log it harvests–for mulch, compost, pulp and paper, and fuel pellets–it also produces very little waste.**[9]



Concrete + Steel

Wood

3. Churkina, Buildings as a global carbon sink, Nature Sustainability, January 2020, page 4.
4. Use of structural wood in commercial buildings reduces greenhouse gas emissions, Oregon State University, 2017.
5. Building With Wood = Proactive Climate Protection,Dovetail Partners, 2015, p. 9
6. Churkina, Buildings as a global carbon sink, Nature Sustainability, January 2020, page 4.
7. How Forests Store Carbon, Penn State, 2020
8. A Synthesis of Research on Wood Products & Greenhouse Gas Impacts, FPInnovations, 2nd Edition, Sathre, R., O'Connor, J., 2019, p. 3
9. Changes in the Residual Wood Fiber Market, 2004 to 2017, Forest2Market, Inc., 2018, p. 22

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