WOOD IN THE BUILT ENVIRONMENT

The operation of buildings in the U.S. accounts for 40% of all U.S. GHG emissions. There is growing pressure from the wood products industry to build with wood as a means of reducing the carbon footprint of buildings.

Any approach to combating global climate change must include a robust and comprehensive plan for reducing the carbon footprint of the built environment.

Forests

Forests are the lungs of our planet. It is estimated that globally, forests and their soils absorb approximately **ONE-QUARTER** of all the CO_2-equivalent emissions from human activities each year.

Old-Growth, natural forests are the Sequestration Champions of North America. Acre per acre, the Old-Growth forests of the Pacific Northwest sequester more carbon than any other ecosystem on the planet.

The merchantable portion of trees accounts for only about 10% of the total ecosystem carbon. The largest carbon pool in the forest is actually below ground in the soils – making up nearly 50% of total ecosystem carbon.

Logging causes unreported emissions of CO_2 from the soil, and impairs long-term productivity. The effects of wood building products exist in this broader context.

Carbon Sequestration

Living Trees Sequester Carbon. Wood products are outputs of industrial processes that generate considerable Greenhouse Gas emissions.

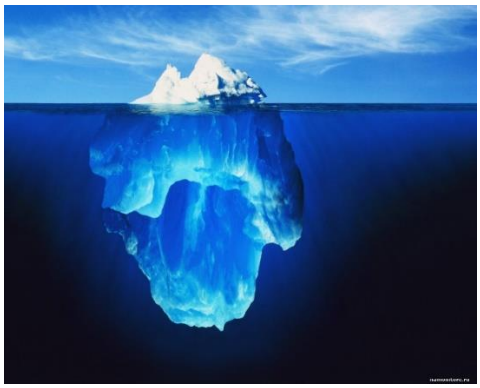
Timber harvesting and wood product manufacturing operations have high energy and carbon emission intensity footprints that are approximately equivalent to other building products and materials.

Wood products do not sequester carbon anew. Carbon sequestration in wood products is in fact a transfer of carbon from the forest to the wood products pool. On the journey from forest to wood product, 65-85% the carbon initially stored in the living tree is lost.

Tip of the Iceberg

Initial Embodied Energy is the cumulative energy and associated emissions arising from the sourcing and manufacture of all building materials. It also includes emissions from transportation to a construction site, and the construction of the building itself.

The Initial Embodied Energy of a building typically represents only 10% of its lifetime emissions.

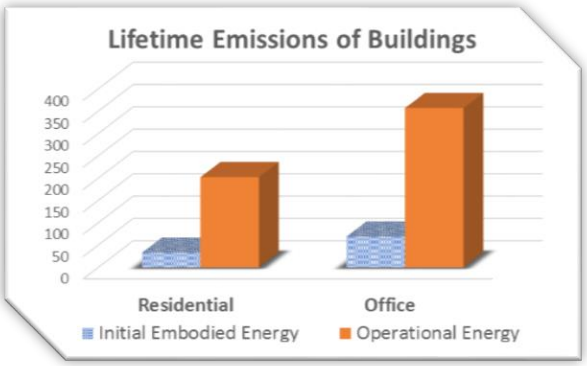


The use of wood building products as a means of "sequestering carbon" in buildings affects only the Initial Embodied Energy of the building. While this may reduce the initial carbon footprint, as a climate related strategy it addresses only the tip of the iceberg.

Lifetime Costs

The emissions profile of the built environment is dominated by Operating Energy – the energy and emissions required to heat, cool and supply electricity over the service life of the structure. Operating Energy typically accounts for about 90% of the lifetime emissions of a building.

A complex array of factors interacts to determine the lifetime carbon footprint of buildings, and building products. Over the lifetime of a building the most crucial factors include: Design, Location, Materials Selection, Construction Practices, Climate-Related Impacts, Electricity Source, Maintenance and Asset Management Decisions, and End-of-Life Disposal Practices.



Design is the Key

Reducing the carbon footprint of a building requires a more comprehensive design approach than materials substitution. Since the emissions associated with replacement and repair can equal or exceed the initial embodied energy of the materials, the longevity and durability of materials is a large part of the equation.

The design of a building, which can include both active and passive features to reduce operating energy, is the crucial factor.

There is much more opportunity to make an impact on the carbon footprint of the built environment through innovations in construction and design, than by swapping one material for another on the tip of the iceberg.

Wood Products Performance

Criteria	Performance		
	High	Med	Low
Durability		✓	
Thermal Mass	✓		
Cost		✓	
Embodied Carbon			✓
Moisture Resistance			✓
Accoustics	✓		
Fire Performance			✓
Adaptability		✓	
Maintenance	✓		

Building for Resilience

Over the coming decades, climate change will continue to bring greater fluctuations and weather-related extremes, from rainfall patterns, to floods, fires and freezing. These conditions will challenge the construction and resiliency of our structures. Buildings and Community Infrastructure must be made more resistant to climate-related damage, and be able to quickly recover.

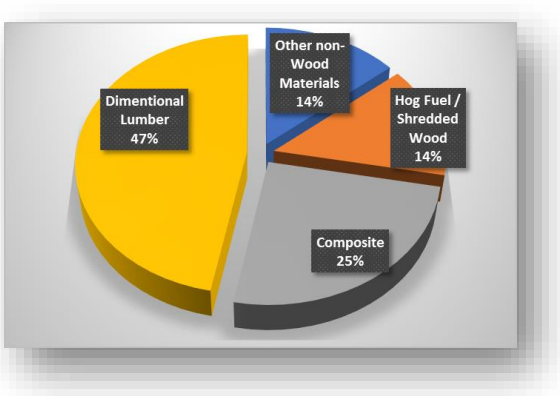
Durability and Longevity are essential design considerations. Highly efficient, and low-cost buildings will still incur severe environmental and GHG emissions if they need to be rebuilt every 25 years.

Waste Management

When wood products reach the end of their service life, they are often disposed of in open dumps, or landfills.

Globally, landfills are responsible for as much as 20% of anthropogenic Methane emissions. Methane gas has a Global Warming Potential (GWP) 25 times that of CO_2.

Landfill Composition: Demolition, Land-Clearing & Construction Waste*



Wood products decompose in landfills to emit both CO_2 and Methane gases. The impact on climate of these emissions from decomposing wood products in landfills is multiplied massively by Methane's greater GWP.

The rate of decay and emissions from wood products in landfills is not yet well understood, and wood products sequestration research is often highly sensitive to assumptions regarding the disposal consequences of wood products.

*Source: 2015 Demolition, Land-clearing, and Construction Waste Composition Monitoring Program, Metro Vancouver.