Setting the Record Straight on Tall Timber

There is a great deal of misrepresentation on the web about the environmental and climate-related benefits of mass timber use for high-rise buildings. This brief Backgrounder will help to set the record straight.

Several articles have been published of late on the growing number of high-rise buildings constructed mainly from wood. Quite often these articles fail to address serious risk factors associated with such structures or misrepresent their true impacts on the environment.

Such articles often extoll the supposed virtues of tall timber buildings noting that structures built using cross-laminated timber are an "environmentally sustainable alternative to concrete and steel, which generate large quantities of greenhouse gases in their production."

It is often asserted that construction of cross-laminated timber high-rises emits roughly 25% less carbon dioxide than concrete, and such buildings store atmospheric carbon locked in the trees used to build them, which over time will be replaced by new trees that will absorb carbon dioxide.

For those unfamiliar with the term, cross-laminated timber is a form of engineered wood where pieces of wood are glued together to create a panel that is stronger than an ordinary wooden beam. This is a relatively new building product, but it is gaining popularity in North America in large part due to intense lobbying efforts by proponents in the architectural community and in the wood products sector.

The use of mass timber for tall buildings is touted for its power to mitigate climate change because they remove carbon from the atmosphere, an assertion that is fundamentally false.

Let's be clear, living trees sequester carbon from the atmosphere! Harvested and manufactured timber retains only a small fraction of the carbon originally stored in a tree. Most of the tree's carbon remains behind in the forest soil or is lost in the leaves and bark usually left to rot on the ground or is burned as biofuel. Far less than half the carbon of a living tree ends up as a long-lasting building product. The rest is emitted back into the atmosphere. The atmosphere really does not differentiate whether the emission is from "green carbon" or black carbon. Carbon is carbon!

It also is argued that carbon lost from harvesting sustainably managed forests is balanced by the absorption of carbon from new forest growth. Indeed, this is the basis of the carbon neutrality rule in international carbon accounting metrics that says carbon losses from harvesting trees are not counted in emissions statistics because somehow, they will be offset by new forest growth elsewhere.

The problem is that not all forests are sustainably managed, and even then, research indicates it can take over a hundred years before new forest growth will replace even half of the original carbon lost. The key point is that wood buildings do not absorb carbon from the atmosphere so it is false to say that building more wood buildings will reverse climate change. Cutting down more trees – the only effective natural means for absorbing atmospheric carbon – to make more mass timber structures is not a sound adaptive strategy for dealing with climate change.

A recent paper by the Sierra Club (*Forests, Wood, Climate*) notes that without great advances in forest protection and stewardship, increased wood use that leads to significant increases in deforestation and forest degradation would only deepen our climate problems.

Interestingly, there is a growing body of research that indicates exposed concrete reabsorbs CO2 from the atmosphere and "permanently" sequesters it through a process called carbonation. Certainly, more research on this phenomenon is required to determine the true value of CO2 emissions from concrete. Obversely, the carbon once sequestered in the wood from living trees will ultimately be remitted back into the atmosphere during end of life disposal. There is much evidence that under anaerobic conditions, such as those present in landfills, biological materials such as wood, decompose and carbon stored within them breaks down into approximately equal parts of Carbon Dioxide and Methane (CH4), which has a much greater global warming potential than CO2.

There are many other advantages touted in the popular press in favor of mass timber use for high rise structures including it is less expensive than concrete or steel, easier to assemble, more resistant to seismic disturbances, and more fire-resistant. More serious peer-reviewed studies have challenged most of these claims. In most cases, definitive answers are yet to be proven.

For example, one study suggests that the production cost for a panel of cross laminated timber is greater than the cost for a comparable slab or pre-cast concrete. So too, while building with wood may be faster than using ready mixed concrete on site, there are so many other variables such as location, design, size and adjacent environment, etc., that make categorical statements largely speculative. Clearly, more definitive and comparable studies are needed. We cannot and must not base investment decisions on speculative assertions.

What never seems to be discussed in these articles is the vulnerability of wood-based buildings to moisture damage, mold, and risks from termites. These are important risk factors that new home buyers are often not aware of until it is too late.

One risk factor that is bothersome pertains to the claim of improved resistance to fire. The implication, however subtle, that mass timber buildings offer greater fire protection than a comparable building made of concrete or steel quite simply is wrong. No one is safe in a burning building and to suggest otherwise is dangerous and should be censored accordingly.

This was certainly apparent to the National Association Of State Fire Marshals in its official position statement at the recent ICC hearings for the advancement of Cross-Laminated Timber for the Construction of Tall Wood Buildings. There simply is not enough test data to support such claims of fire resistance.

There are many other points that can be made, both for and against the use of mass timber. Clearly, wood use in low and mid-rise buildings is on the upswing across North America, fueled in part by rising demands for affordable housing, increased urban densification, and changing building codes largely due to intensive lobbying efforts on legislators. It is also worth noting, that concrete still plays an important role in such structures and adds elements of resiliency that wooden structures alone cannot provide.

Further Information

- For more information, check out this article: ***What's Up with Mass Timber?***
- Check out the Building Resilience Coalition ***website*** for up to date information on Building Better Buildings.

About the Building resilience Coalition

The Pacific Northwest Building Resilience Coalition is a gathering of organizations, primarily in the cement, concrete and masonry industries, committed to furthering the planning, development, and construction of buildings and associated infrastructure better able to recover from and to adapt to the growing impacts of an ever-changing urban and physical environment.

Our members include:

Northwest Cement Council

Washington Aggregates and Concrete Association

Concrete Reinforcing Steel Institute

The Portland Cement Association

Oregon Concrete & Aggregate Producers Association

Northwest Concrete Masonry Association

Masonry Institute of Washington

Masonry and Ceramic Tile Institute of Oregon

Concrete BC

Concrete Alberta

Insulating Concrete Forms Manufacturers Association

If you would like to contact us, please email us at
info@buildingresiliencecoalition.org