

# Mass Timber 2.0

By **Andrew Macklin** October 2, 2019

The adoption of mass timber has been slow in Canada. There is a lack of knowledge of the material among project owners, zoning and building code regulations have not kept pace, and in some cases, the market isn't fully aware of the life-cycle and environmental benefits that mass timber construction can offer.

But the slow and steady growth is creating skylines where cross-laminated timber structures, and those built with other forms of mass timber products, are emerging from the masses of concrete and steel that have traditionally dominated the landscape. Projects already built, and currently under development, in British Columbia, Ontario, and Quebec are improving people's perception of a material once proclaimed to be too flammable to be sensible by its <sup>[1]</sup><sub>[SEP]</sub> stalwart opponents.

Like any other emerging trend, there are barriers to success. Being able to scale up production, making appropriate changes to current policy, and the need to train an industry on building with a new material are challenges that must be overcome if mass timber is going to become a part of the everyday conversation for building procurement across Canada.

In June, ReNew Canada convened an expert discussion with industry stakeholders from across the country in order to better appreciate the barriers to mass timber's growth in Canada, and how Canada can best position itself to capitalize on the global movement, pegged by U.S. researchers to be 150-230 per cent from 2017 to 2025.

## Moving the needle

Mass timber has already been demonstrated in Canada, although on a limited basis and at a limited scale.

British Columbia has been the standard bearer for adoption of mass timber construction, not surprising based on its vast supplies of wood products and commitment to carbon emission reductions. The province has recognized both the economic and environmental benefits of construction using cross-laminated timber (CLT) and glulam, and has already created such landmark projects as Brock Commons at the University of British Columbia and the Wood Design and Innovation Centre in Prince George. At the time it was completed, in 2017, Brock Commons represented the tallest timber structure in the world.

It was October of that year when the Ontario Ministry of Natural Resources and Forestry released its Tall Wood Building Reference for construction of six-storey mass timber structures. That document provided a technical roadmap for how to develop tall wood solutions under the provincial building code. Coupled with the opportunities for pilot and institutional projects, the

six-storey guidance has helped drive awareness and has led to a few more projects to emerge as pilot projects in the 7-12 storey range (George Brown College and the University of Toronto). But the adoption in Ontario has still been slow.



The University of Toronto's proposed 14-storey mass timber and concrete hybrid building.

The impending update to the National Building Code could change that. According to Michael de Lint, director of building regulatory reform and technical standards for the Residential Construction Council of Ontario (RESCON), those changes are expected to come into effect in the latter part of 2020, and would open the door for 12-storey mass timber construction.

### **Barriers beyond the code**

Even with provincial and national building codes opening the doors for the expansion of mass timber use in residential, commercial, and public sector construction, there are still hurdles to overcome that could stunt, or halt, the progress being made.

From a municipal standpoint, education and zoning stand out as the two primary areas of concern. And while it is important for all impacted municipal staff members to understand the values of building with wood, the drive to do so must be provided by the people in leadership positions.

“Unless you have that downward pressure from the government on the various departments, the change won't happen easily,” said David Moses, principal at Moses Structural Engineers.

Having champions at the highest levels of government, be they mayors, councillors, reeves, wardens, or perhaps influencers among provincial and federal government representatives, will take an uptick in education and lobbying. The Canada Wood Council was formed to educate the country on the overall benefits of wood, and along with the newly formed Mass Timber Institute, has taken the lead in providing on the benefits of tall wood construction.

If municipal staff need verification of the viability of the products involved in mass timber construction, there are buildings right in Ontario where the values of using these products are on display:

- Brantford's Wayne Gretzky Sports Centre became the first commercial building in Ontario to use CLT, along with re-used glulam;
- Glulam beams and CLT panels are featured prominently in the Orillia Waterfront Centre; and
- Part two of the Laurentian Architecture project (based in Sudbury) features a two-storey structure built with CLT and glulam.

These provide just a handful of the examples where institutions and municipalities have recognized the health, safety, and financial cases for utilizing mass timber products for community spaces.

The health benefits of exposed wood are well documented, as are the lower emissions that are involved in the production of wood versus alternative building materials. The safety of mass timber products have been called into question, particularly by materials competitors in the concrete and steel industries. However, all North American CLT suppliers have to have their products tested to meet ASTM (American Society for Testing and Materials) E119, which demonstrates a two-hour fire resistance rating (FRR). FPInnovations, a national private not-for-profit organization that specializes in “the creation of solutions in support of the Canadian forest sector’s global competitiveness”, has accredited testing labs for CLT products in B.C. and Ontario.

As for the financial benefits, those are best realized when looking through the long-term lens, appreciating the long-term operational savings that mass timber can create.

“There might be more upfront cost,” explains Marianne Berube, executive director of Wood WORKS! Ontario. “But you’ve got to look at the life-cycle of the building.”

According to Andrew Bowerbank, the director of sustainability at WSP, mass timber presents the same sort of low carbon economics that we have seen with electric vehicles, smart technologies, and renewables. And similar to the evolution seen with the green building sector, the life-cycle benefits of the environmentally friendly technologies have made higher upfront costs negligible from the lifecycle perspective.

This is the case for a proposed building project currently being worked on by Carol Phillips and her team at Moriyama and Teshima Architects (MTA). Her client is looking through that same long-term operating costs lens and realizing that, using that model for building procurement, mass timber or potentially hybrid mass timber become viable options for the building materials to be used.

MTA, along with Acton Ostry Architects, won the design competition for the mass timber building known as The Arbour. The new 10-storey structure, to be built on a 0.23-acre brownfield site as part of George Brown College’s Waterfront Campus, will house the college’s School of Architectural Studies and the School of Computer Technology. It will be home for a mass timber research hub, which the college will integrate into its existing construction industry programming.



Inside the Arbour, the proposed mass timber structure at George Brown College's waterfront campus.

That addition is key in addressing the final key barrier not yet mentioned: industry education. As mass timber is a fairly new building material in Canada, there aren't a large amount of opportunities for education, be it design and architecture, construction, or material maintenance. But as institutions learn their own lessons in the use of the material, like George Brown and the University of Toronto, there is the chance to provide wider industry education. This is much like what is now underway at Hamilton's Mohawk College, where its net zero facility has not just become a tool for student education and engagement, but also an example for the industry to learn from.

There is work being done already on educating contractors in Ontario, thanks primarily to the work being done by Mike Yorke and the Carpenters Union. They have established the College of Carpenters of Applied Trades in Woodbridge, a suburb of Toronto, where CLT, glulam, and nail-laminated timber (NLT) construction is being taught through hands-on courses.

### **Scaling up**

The ability to replicate the CCAT's programming will be a key factor in Ontario's, and the rest of the country's, ability to scale up the use of mass timber if its use sees the predicted exponential increase in the next five years.

It was thanks, in part, to funding from Ontario Ministry of Natural Resources and Forestry that CCAT was able to get off the ground. The province approached CCAT in 2017 to see if there was an opportunity to build a mass timber training program, since such a program did not exist in Canada. With the four-week course now up and running, York believes that similar programming could be established in other parts of the province should the demand warrant it. And as the aforementioned George Brown College program gets off the ground, that will also set itself up to address the forthcoming demand for training in mass timber construction.

One of the biggest hurdles to overcome right now is the supply chain. At this moment, only one company in all of Ontario is producing engineered wood products for mass timber: Weyerhaeuser makes laminated veneer lumber (LVL) at its mill in Kenora. But as of right now, no company produces glulam or cross laminated timber in the province. That has added to the cost of the products, but also the length of time it takes to get the building products. Cindy Gouveia, president of the George Brown College Foundation, noted that the school will have to wait 18

months and tie up millions of dollars in order to obtain the mass timber products needed for the construction of The Arbour.

Building a mass timber products industry in Ontario makes a lot of sense and cents. A push for mass timber products in southern Ontario has the potential to create an economic boom for northern Ontario. Abandoned sawmills in small towns that relied on booming sawmills for survival could be reopened as CLT/glulam/LVL mills to meet the demands of a growing mass timber industry. Or, the addition of CLT/glulam facilities at existing sawmills could severely reduce the potential for a second shutdown, resulting from lower export demand and the like, thanks to the diversification of the mill's products.

There is no shortage of wood available to support exponential growth in the mass timber industry. According to Natural Resources Canada's 2018 State of the Forests report, an estimated 767,000 hectares of forests were harvested, producing nearly 155 million cubic metres of industrial roundwood. It is estimated that Canada has an annual sustainable wood supply of approximately 223 million cubic metres, over 40 per cent greater than current harvest levels.

One step forward has already been made for the Ontario supply chain, as Element5 has announced plans for a \$32 million CLT/glulam plant to be located in St. Thomas, with a \$5 million investment from the provincial government. This is Element5's second such plant, with one plant already established in Ripon, Quebec approximately 100 kilometres northwest of Ottawa. However this will be their first venture into Ontario, choosing to place their plant closer to the materials market rather than the wood supply.

### **Market opportunities**

As the new building code is ushered in and municipalities loosen zoning by-laws once they become educated on the inherent value of engineered wood materials, there will be significant opportunities to integrate mass timber in facilities beyond educational buildings, municipal sports and recreation centres, and corporate head offices. In British Columbia, Brock Commons and the proposed six-storey affordable housing residence at UBC Okanagan in Kelowna are opening the door to the use of CLT and glulam in the construction of multi-residential buildings. And according to Moses, engineered wood products present a real opportunity for some types of bridge replacements, inserted in a similar fashion to what is already seen with concrete rapid bridge replacements throughout Ontario.



Mid-rise residential seems the most likely secondary market for the use of engineered wood products in construction, especially in scenarios where governments are contributing some funding and lower long-term expenses are important for the end user, such as affordable housing complexes and long-term care facilities.

### **Next steps**

So how does the mass timber industry drive its potential for exponential growth in Ontario? It starts with education. The wood industry has a long way to go in educating government stakeholders, asset owners, and the general public on the values of building mass timber structures using engineered wood products. The Canada Wood Council and the Mass Timber Institute are key players in that education, as are the institutions and communities that have chosen to incorporate mass timber. These are the industry's ambassadors that can sing the praises of the benefits they have already reaped from the choice to go with wood.

On the construction industry side, there is expertise quickly being built within Ontario. Companies with international footprints are looking to their European partners for a better understanding of the situations where CLT, glulam, NLT, LVL and others are smart choices in overall building construction. Others are learning from resources closer to home, gaining their education from the successful projects that have emerged in British Columbia, Quebec, and parts of the United States.

Then, the key will be the procurement process. Some procurement regimes are already moving towards outcomes-based systems, which is where mass timber can best be presented. This will allow for life-cycle costs, rather than just upfront costs, to be evaluated and give engineered wood products the potential to present similar or better value than traditional <sup>[1]</sup><sub>[SEP]</sub>building products.

Much like what we have seen with recent modular infrastructure projects, such as the Humber River and Mackenzie Vaughan hospitals, the decision to incorporate mass timber needs to come at the beginning of the procurement process, rather than an after thought after the initial design is complete, just like other elements of the project design that provide tangible environmental benefits, such as building envelopes, integration of renewable energy assets, and green roofs.

When they build it, you should come. There is no better time to learn how mass timber infrastructure can build healthy, environmentally friendly communities.

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