

Seeing the Forest for the Trees

Addressing the Housing Crisis with Timber Solutions: A Toolkit

2023

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& Sarah Bencic

Submitted To:



The Economic Developers Council of Ontario
for the 2023 Bright Ideas Competition

This report was submitted to The Economic Developers Council of Ontario (EDCO) for the 2023 Bright Ideas Competition.

WHAT IS THE BRIGHT IDEAS COMPETITION?

The Bright Ideas Competition is an annual idea competition for economic development practitioners of all experience levels. It is designed to give economic developers from across Ontario the opportunity to develop a modern response to proposed topics, have the work evaluated, & receive 5 professional certification points towards your designation.

The competition is to help address relevant & timely economic development challenges. Be part of a team that presents modern solutions & resources for modern times. The competition kicked off in May of this year and we're so excited to be sharing the results of our hard work!

Thank you EDCO for creating this opportunity, to all the organizers of the competition, the mentors who supported us, everyone who took part in our research interviews, the survey participants, & our workplaces for giving us the time & support - Centre for Research and Innovation in the bio-economy, and Huron County!

Thank you!

Sarah & Genny

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Meet the Team

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Sarah is a multi-disciplinary GIS & environmental professional working as the GIS Innovation Coordinator for the Centre for Research and Innovation in the Bio-Economy.

Sarah is passionate about working with CRIBE's network to support solutions & data-driven decision-making. Sarah works with a variety of stakeholders to develop free, open, & public GIS tools to support economic development across the province. If you would like to connect with Sarah:

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Genny Smith is a dynamic entrepreneur and esteemed business coach based in the vibrant community of Huron County. Genny's deep-rooted connection to the region has shaped her approach to entrepreneurship, business and community development.

Genny's personalized guidance has empowered countless individuals and startups, igniting a ripple effect of prosperity in the county. Her collaborative spirit and commitment to sustainability resonate deeply with the values of the Huron County community, positioning her as a key contributor of the region's economic growth. If you would like to connect with Genny:

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Introduction

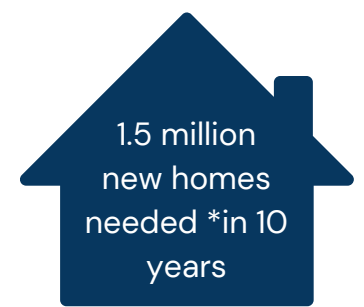
Ontario is facing a housing crisis with analysts, politicians & policy makers saying we need to build 1.5 million new homes over the next ten years to meet the increasing demand from population increase. Even though this is a really large number of units needing to be deployed province-wide; Ontario is uniquely positioned to meet this need. In our bright ideas toolkit, we are going to outline a potential solution to deploy the needed number of units, meet net-zero targets, & grow Ontario's bio-economy. Ontario's large housing needs could be met on time, with affordable solutions for its residents by leaning into mass-timber options. This tool-kit is a response and follow-up to the amazing work done by last year's competition winners Elle Crevits, Lauren MacDermid, and Harshit Sekhri. The team put together an excellent Housing Readiness assessment that is available on the EDCO website as well in our references page at the end of this toolkit.

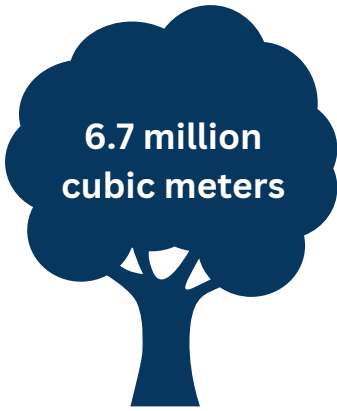
There has been amazing work done overseas, especially in the nordic European countries like Sweeden, Finland & Norway. With a very similar climate and forest composition to Ontario we are in a great position to learn from their failures & great successes. There's an amazing wealth of knowledge & experience across Canada for beautiful & cost-effective applications for a variety of applications. We also would like to acknowledge that these issues are complex and have a variety of competing drivers, issues, and experiences

that might prevent an interested stakeholder from moving forward with a mass timber or wood-based solution for their home, housing development, mixed-use building, etc. The intention of this toolkit is to provide municipalities with:

- definitions for mass timber
- examples of how it has historically & is currently being used across Canada, & around the world.
- tools & resources for attracting these types of developments.
- ways to streamline the construction process, including red tape.

The issue of housing will look different regionally across the province, & the housing types across the entire spectrum that need to be met. This toolkit can be applied to any region and any interested group. In the same way that there is a housing continuum, there is also a spectrum of what mass timber solutions can look like, For the purpose of this economic development solution, we will be predominantly focusing on market-rate housing as this was identified as the main need for supporting the existing workforce. This was highlighted in last year's housing readiness assessment tool.



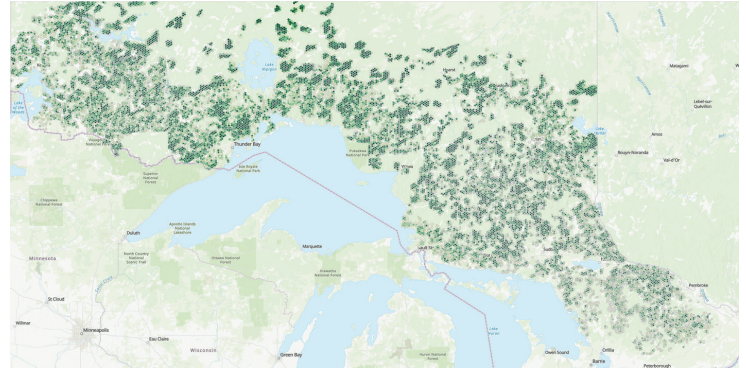


So why is Ontario so well positioned to meet its targets, and even be a leader in this space?

Ontario is the only province with a surplus of sustainably harvestable wood.

Unlike other materials used in buildings, especially for mid-high-rise buildings, wood grown in Ontario is extremely regulated because it is predominantly a crown resource. Ontario's forests are some of the best-managed forests worldwide, meeting or exceeding FSC, and CSA standards. The industry is also constantly looking for ways to improve its commitments to sustainability, engagement with Indigenous communities.

Ontario currently has approximately 6.7 million cubic meters/year of available wood that is not currently allocated and accounted for in supply agreements, or business-to-business arrangements (CRIBE). Unlocking this fibre for building homes in Ontario would help to bolster the existing forest products industry, and encourage ongoing innovation & research while creating jobs & boosting the economy.



Map of Available Wood in Ontario's Managed Crown Forests, This is Wood Available After Removing all Allocated Wood Consumption Agreements, Business-Business Arrangements & Biomass. - CRIBE's Economic Fibre Supply Model, 2023



Definitions

What is Mass Timber?

Mass Timber as a concept & application has been used by humans for at very least the last five thousand years in a variety of forms. Mass timber is an advanced building material made by affixing or gluing together many pieces of wood veneers, strips, or dimension lumber to form larger, stronger pieces of wood (including panels & beams).

Mass timber is revolutionizing the building industry as a nature-based climate solution. It presents a significant opportunity for Ontario's bioeconomy & the existing forest sector. As high-value wood products, mass timber can play a crucial role in growing the existing sector while contributing to the decarbonization of other sectors as well.

There are a variety of different types of mass timber products on the market today with different trade names, but based on the type of wood in the composition & by the way that they are bound together these categories will cover all current products available & the types covered in this toolkit.

Cross Laminated Timber – CLT

Panels are prefabricated using several layers of kiln-dried lumber, laid flat, & glued together on their wide faces in alternating directions using structural adhesives. Door & window openings are usually precut by the manufacturer so that each panel is ready for immediate installation when it gets to the site. CLT was originally

developed in Europe but within the past decade has started to be produced in Canada. Ontario currently has one manufacturer of CLT; Element 5 in St. Thomas Ontario.



CLT Example Illustration from government of Canada's "State of Mass Timber", 2021

Dowel-laminated timber – DLT

DLT is the only mass timber product that is 100 percent wood because it does not use glue or nails to manufacture. It is this wood-only construction that makes it suitable to be recycled easily. DLT is made with layers of softwood laminated edge-wise together using the friction created by hardwood dowels driven through all the layers, this adds dimensional stability. DLT can be used for floor, wall, & roof structures.

There are only two manufacturers of DLT in North America as it makes up less than one percent of mass timber builds.



DLT Example Illustration from government of Canada's "State of Mass Timber", 2021



Nail-laminated timber – NLT

Though NLT was originally manufactured by hand & could still be made with any of the regular dimensional lumber available in building supply stores. NLT is made in a factory setting with machine-driven nails to speed up the process. Floor panels are built from larger laminations of wood, placed on an edge, spanning between beams. The laminations are nailed together, creating a solid floor panel with excellent load-bearing capabilities. In addition to floors, walls & roof pannels are also used.

Currently, there are only four large-scale manufacturers of NLT in Canada.



NLT Example Illustration from government of Canada's "State of Mass Timber", 2021

Glue-laminated timber

Glue-laminated timber is the most popular Mass Timber product used in Canada, 88% of projects in the Canadian database use Glue-laminated timber in their projects. Glulam is one of the most common products used in structural & load-bearing applications. Glue-laminated timber is manufactured using dimension lumber glued together under pressure.

Though there are twelve facilities producing glue-laminated timber in Canada there aren't currently any commercially producing in Ontario. With the clear demand for the product this could be an area for economic development in Ontario.



Glue-laminated timber Example Illustration from government of Canada's "State of Mass Timber", 2021

Structural Composite Lumber

Laminated Strip Lumber- LSL

LSL is made from wood strands combined with a structural adhesive, the strands are formed into a large mat or billet & pressed. LSL uses trees that are abundant & fast growing with shorter regeneration cycles; Aspen, birch & poplar. These are species that often need to be utilized to help open up more blocks in Northern Ontario forests to help forest companies to access other softwood species.

Weyerhaeuser is currently the only company producing LSL in Canada & they have an amazing facility in Kenora Ontario. In 2010 Weyerhaeuser signed a historic shareholder-managed Sustainable Forest Licence agreement for the Kenora Forest. The agreement is between First Nations, Industry & government to take over management of forestry operations.



LSL Example Illustration from government of Canada's "State of Mass Timber", 2021

Laminated Veneer Lumber – LVL

LVL is made of wood veneers that are coated with a waterproof structural adhesive, & then is formed into billets by curing in a heated press. The manufacturing process enables large members to be made from relatively small trees, this like LSL enables the primary forest industry to better plan & manage their forest allocations by giving an end use to species that are not normally desired in the same way that softwood lumber tends to be.

LVL was originally used in World War II for airplane propellers. It is very strong & used in many structural components.

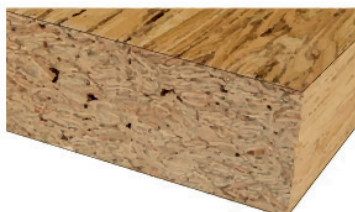


LVL Example Illustration from government of Canada's "State of Mass Timber", 2021

Paralell Strip Lumber – PSL

PSL is made from the same veneers as LVL but the veneers are sawn into strands. The strands are coated in structural adhesives & formed into a large mat or billet and then pressed. PSL has a high load-carrying capacity. PSL panels can be laminated with more structural adhesives into larger components for use as beams & columns in larger and taller wood buildings.

Similar to LSL, PSL is only manufactured by Weyerhaeuser in Canada.



PSL Example Illustration from government of Canada's "State of Mass Timber", 2021

Tallwood Buildings

The best example of a tallwood building in Canada currently is the Brock Commons Tower in Vancouver, British Columbia which at the time it was built was the tallest wood building worldwide. It has since been surpassed a few times but it set a precedent for tall buildings being built with wood.

Usually, Tallwood Buildings are defined as buildings greater than 10 stories. Many Mass Timber applications in this category are great examples of using each material needed to its strength. Most examples are not 100% wood but need to meet a certain threshold of material usage to be considered mass timber. These types of buildings will usually have their best application in a larger city setting, & are often mixed-use with residential, commercial & retail. In the Brock Commons example, it is used for student housing. It was done in such a way as to make it modular & repeatable.

Low Rise – Mid-Rise Buildings

A low-rise building that we will reference a few times in this toolkit is the YWCA Kitchener Transitional Housing building at Block Line Road, the second of which has also now been completed. Low-rise buildings are generally between 1-4 stories. Mid-rise will generally consist of 5-9 stories & a great example would be the Heartwood boutique condo building. It is 6 floors of mixed-use with retail on the main floor, & residences above. Was built using CLT & Glulam.

Why Mass Timber?

1 Building more homes faster

The first key reason is that mass timber in all of its forms is easily made modular for rapid deployment for all different types of housing needed in the province. Regardless of which part of the housing continuum is being built for, there is a mass timber option.

From large, panelized apartment building construction similar to Brock Commons in BC to small one-bedroom studio apartment-styled remote work-living communities there's a mass Timber application for your community. Buildings done this way and not relying on concrete cores can be built in a significantly faster time. This can be seen in the YWCA Kitchener transitional housing construction that not only built but was occupied 12 months from the tender being awarded to Element 5, Edge Architects & Melloul Blamey.

2 Green Economy

Ongoing uptake of mass timber helps with carbon sequestration, it can also help a variety of other industries to continue their decarbonization efforts. It makes for a more efficient economy utilizing wood & residual biomass not currently being leveraged. With ongoing commercialization research for using lignin in the resins & adhesives there

will likely soon be the first made in Ontario, 100% biobased composite lumber products. Ontario is consistently creating & innovating in this space at the highest level, yet many people in the province remain unaware. Improving our marketing & exposure would be a great help to expanding the use of mass-timber across the province.

3 Job creation

For many northern & rural communities job creation can be a struggle, as well as retaining workers that are already in the community. Having an increased uptake in mass timber construction would mean the necessary expansion of current manufacturers as well as the opening for new manufacturers to diversify the market. Having other locations for CLT, Glulam or even LSL throughout the province in communities closer to the fiber supply would help increase the jobs available in these communities. They're also diverse employers that will have roles from skilled labour to administration, red-seal trades & operational staff not to mention the increase in shipping by rail, semi-truck & ships on the Great Lakes Seaway.

Many of these manufacturing plants will continue to rely on a lot of automation in their processes which will continue to expand the demand for robotics & other computer-based professions as well.



4 Biophilic Design

Biophilic design is the design movement that is primarily concerned with connecting humans to nature through design & natural elements. This can look like creating spaces with views of nature, capturing natural light, incorporating plants, capitalizing on natural materials like wood & all of these elements should benefit human health & wellbeing. Humans have a deeply engrained love of nature, & there are many long-term studies showing how exposure to these elements in our natural environments has deep & lasting benefits to our mental & physical health.

This has been explored at great length by researchers in many Nordic Countries. With their increased amount of time indoors due to weather but also for their longer seasons with little to no daylight these principles are paramount to many designs. Even here in Ontario people are spending a significant portion of their lives indoors, whether at home, work, or other indoor spaces.

5 Superior Lifecycle Results

Studies completed this year for the Toronto District School Board looking at Cost & Lifecycle analysis for Schools built with mass timber, as well as by Thunder Bay's Community Economic Development Commission looking at modular housing for remote work camps, and even ongoing publications from the Canadian Wood Council consistently demonstrate that throughout the life of our commercial, retail & residential buildings; mass timber outscores conventional concrete block & steel buildings. There is still a need for

both steel & concrete in the built landscape but offsetting the carbon consumption with mass timber where applicable, increases the energetic efficiencies of the buildings. These buildings often cost less, lasting longer, & are more efficient during their lifetime. They are also not causing a future problem with disposal.

6 Carbon Sequestration

One cubic meter of wood stores one ton of carbon dioxide. From structural beams, posts, girders, wall pannels, floor & ceiling plates mass timber pound for pound is a compelling example of how much our built environment can either be a massive carbon sink or contributor not just in its lifetime but after the building has been torn down.

With the comparatively rapid replenishment of our Boreal forest in Ontario the use of timber can help continue sequestering carbon indefinitely as more trees are replanted & sustainably harvested in the future.

Steel & concrete are heavy carbon users in both their extraction & processing. They are still needed but perhaps used more sparingly as they are so slow to regenerate. They are not even in seven generations going to be replenished on the landscape.



7 Support future forest fire prevention planning

As was seen in Ontario this past year to a new unprecedented scale, forest fires are a large contributor to carbon release. Even more so they cause damage to the homes & lives of the residents affected by them. Forest fires in the boreal forest are a natural part of seasonal regeneration for the forest & are absolutely necessary for healthy forest ecology.

Using GIS & modeling to predict where the most damaging fires are going to happen would allow the forest industry to cut more of the surrounding viable trees. This would be yet another way to minimize the damaging impact on remote communities already struggling. Increasing access to necessary fibre for mass timber or other traditional forest products would help to keep costs down & benefit the more northern communities most affected by the fires.

8 Cost Savings

Depending on the type of mass timber application & materials used there are a variety of ways that developers could be saving money to build with these materials. There can be savings on materials in the short term as well as ongoing upkeep for the long term. Something else to be considered would be the savings associated as the country & province move more and more to a carbon credit economy.

It the short term there are also grants &

other government program funding currently available to leverage in offsetting new & innovative mass timber developments.

GC Wood is one of the ongoing programs that developers should consider this year for pursuing innovative mass timber designs.



Attraction & Incentivization

How to Bring Mass Timber to Your community

Promoting the use of mass timber in municipalities across Ontario to address the housing challenge can be achieved through a combination of regulatory, financial, & educational incentives. Here are some strategies to consider:

Financial Incentives:

- **Grants and Subsidies:** Offer grants or subsidies to municipalities for the construction of mass timber buildings. This could help offset the potentially higher upfront costs compared to traditional construction methods.
- **Tax Credits:** Provide tax incentives for developers and builders who choose to use mass timber in their projects. This can encourage the adoption of sustainable construction methods.
- **Development Charge Rebates:** Consider reducing or waiving development charges for projects that incorporate mass timber, to make it more economically viable for developers.
- **Connect developers with the current & upcoming Green Construction through Wood initiative program** to offset some costs associated pushing the boundaries of Mass Timber in Canada

Regulatory Support:

- **Zoning and Planning Changes:** Update zoning codes & planning regulations to explicitly permit & encourage the use of mass timber in construction. This could include higher allowable building heights, density bonuses, or reduced setbacks for mass timber projects.
- **Streamlined Permitting Process:** Establish a streamlined permitting process for mass timber projects to reduce administrative burden and expedite approvals.
 - Consider following the example of other districts that have created a set of pre-approved designs that have already been successfully deployed & meet Ontario/Canada building code

Education and Training:

- **Workforce Training Programs:** Provide funding or resources for training programs that educate local builders, architects, & contractors about the benefits & best practices of using mass timber in construction.

Information Dissemination:

- **Organise workshops, seminars, & conferences** to disseminate knowledge & best practices related to mass timber construction techniques.





Recognition and Awards:

- **Recognition Programs:** Establish awards or recognition programs for projects that demonstrate excellence in mass timber construction. This can create positive competition and inspire more municipalities to adopt this approach.

Public Awareness and Perception:

- **Marketing & Public Relations:** Launch a marketing campaign to raise awareness about the benefits of mass timber construction for both developers & the general public. Highlight its sustainability, aesthetic appeal, & other advantages.
- If you have a local post-secondary educational institution; work with them to encourage the development of a skilled trades certificate or specialization in an existing program on this type of construction project. Promoting your community as a learning hub for modular/mass timber building methods.

Collaborative Initiatives:

- **Public-Private Partnerships:** Encourage partnerships between public & private entities to jointly fund & develop mass timber projects. This can help share the financial burden & leverage the strengths of both sectors.

Research and Development Support:

- **Grants for Innovation:** Provide grants for research & development projects focused on advancing mass timber technology,

such as developing new manufacturing techniques or improving the resins & adhesives used in making CLT, LSL, & to be 100% biobased (lignin-based).

- Organizations in Ontario like the Centre for Research & Innovation for the Bio-Economy (CRIBE) are a great resource for completed Case Studies & Projects that are publicly available to learn more about what has already been found effective in the Ontario context. They also have funding challenges in biocomposites & advanced building materials at different times. If you have a project you could leverage more funding to incentivize the use of these advancements.

Environmental Considerations:

- **Carbon Offsetting:** Recognize the environmental benefits of mass timber construction, particularly its potential for carbon sequestration, & provide incentives or credits for projects that contribute to carbon reduction goals.
- Work with architects & developers to complete lifecycle analysis research on their proposed large infrastructure builds.
 - Toronto District School board recently completed its life cycle assessment for schools made in mass timber compared to their traditional concrete block buildings. In the study for TDSB mass timber outperformed in every category including costs in the building's life, and carbon capture for both the building & servicing of the building.



- Thunder Bay's Community Economic Development Commission also completed a life-cycle assessment for modular remote work-living facilities. The study found immense cost-saving benefits & better living conditions improving worker retention for these remote jobs.

Showcase Projects:

- Demonstration Projects: Fund & support showcase projects that use mass timber in high-profile locations. These projects can serve as tangible examples of the benefits and feasibility of mass timber construction

Recognition and Awards:

- Recognition Programs: Establish awards or recognition programs for projects that demonstrate excellence in mass timber construction. This can create positive competition and inspire more municipalities to adopt this approach.

Long-Term Economic Benefits:

- Stimulate Local Economies: Highlight the potential for the mass timber industry to create jobs & stimulate the local economy, which can be a compelling argument for municipalities to support its adoption.
- Smaller Communities may find more success in working together to attract the development of enough units across a few smaller communities instead of trying to attract enough separately
- As our only truly renewable resource & Ontario specifically being the only province with surplus available wood it is crucial to start considering the immediate &

long-term benefits of the expansion of production in Northern Ontario.

- locations including Sault Ste. Marie, Thunder Bay, Pembroke, Kenora, Dryden & Others are optimal locations for access to wood fibre (keeping cost of delivered wood low) & the necessary infrastructure for rapid shipping
- There are also opportunities for co-location with existing mill facilities decreasing the operating costs for both existing & new industries.
- incentivizing this type of development would not only increase the supply of the needed wood products for building, but also continue to keep these materials available at a reasonable cost to the consumer, create jobs, & build more homes at rates people can afford
- With density issues in Southern Ontario & lack of skilled workers across the province (which is felt more severely across much of northern Ontario, & rural communities) it would be of great benefit to encourage more people to relocate to Northern Ontario (both east & west).
 - A part of the ongoing cycle concerning these communities; is the need for more workers & simultaneously more homes to put them in.

By implementing a combination of these incentives, municipalities in Ontario can be encouraged to embrace mass timber construction as a sustainable & effective solution to the housing challenge in the province.



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Mass Timber Projects
Nation Wide on Mass
Timber Dashboard

Examples

Made-in-Ontario developments using
Mass Timber



Examples

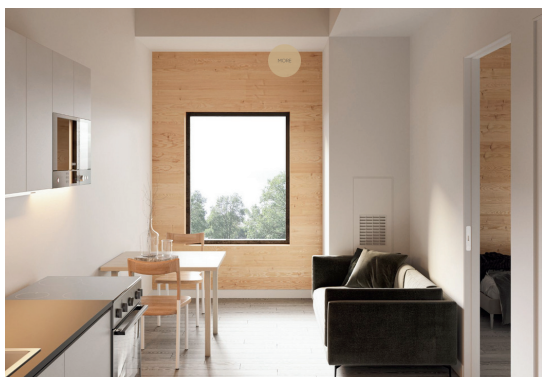
Looking across Canada there are examples of Mass Timber being used across the housing continuum, we have specifically used examples within the Ontario Context in most instances. It was identified in last year's housing readiness work that market housing (in other reports even more specifically "the missing-middle" was the portion of housing that there is the greatest need for to help in the Ontario housing crisis while also maintaining or growing our pool of skilled workers.



Non- Market Housing

YW KW SUPPORTIVE HOUSING

Our most highlighted project was the Transitional Housing build in Kitchener for the YWCA on city property. The building has 41 - units, the main structure of the building was finished in just 20 days & was occupied 12 months after the initial tender was awarded. The \$6.9 million affordable & supportive housing project was funded by the federal government's Rapid Housing Initiative and financially supported by the City of Kitchener which approved a 50-year lease, on city land that is valued at \$2 million, to the YWCA for \$1. This is such an amazing example of the boundaries of what mass timber can push in terms of rapid housing deployment, on budget & with an amazing final product. There has now been a second building added next to the original. The original building featured in this example was for transitional housing for women, helping to get them off the street & out of at-risk situations/environments.



Link to Timelapse Video: <https://www.youtube.com/watch?v=5y1OvSd5HXE>

“The wood solution delivers other benefits as well, most notably for building occupants. The partially exposed CLT structure creates a warm and welcoming atmosphere and, while for some that may seem like a ‘nice to have’ and not necessarily a priority when looking to quickly deliver affordable housing, the physical and psychological benefits of incorporating natural elements like wood into buildings have been proven by research to directly contribute to the health and well-being of building occupants.” – Element 5

This building was designed by EDGE Architects, The lead architect Matt Bolen was interviewed for this toolkit & offered valuable insight on building with mass timber, materials supply & perspective on innovation in this space.

“Our design response achieved optimal utilization of the site through a narrow building form comprised of prefabricated cross-laminated timber structural elements in an arrangement that maximized material efficiency and minimized the installation time. The mass timber elements were exposed to impart a sense of warmth and well-being.” – EDGE Architects

Non- Market Housing

WOODGREEN – SUPPORTIVE & AFFORDABLE SENIORS HOUSING

Currently still in the planning stage WoodGreen Community Services will own and manage the 50 new affordable homes for seniors in the to-be-transformed Danforth Baptist Church at Bowden Street and Danforth Avenue. WoodGreen has contracted R-Hauz as the builder, manufacturer, & developer for the 60 Bowden St. project. The development concept for the building includes the installation of mass timber over the retained church basement in the northern half of the facility.

WoodGreen will bring a holistic, integrated care & service model to the residents.



Non- Market Housing

PASSAGE HOUSE

“ Passage House, the new 18-unit transitional housing development, began welcoming residents in fall 2022. Passage House is located on The Landing campus at 18838 Highway 11. Two existing emergency housing facilities are currently located on this site: Porter Place for men and Leeder Place for families. Passage House will help create additional capacity for transitional housing for individuals experiencing homelessness. The residence in East Gwillimbury for the Blue Door, an emergency housing provider, was completed under the CMHC’s Rapid Housing Initiative (RHI) in mass timber through a partnership between architect R-Hauz Solutions Inc. and mass timber manufacturer Element5. ”

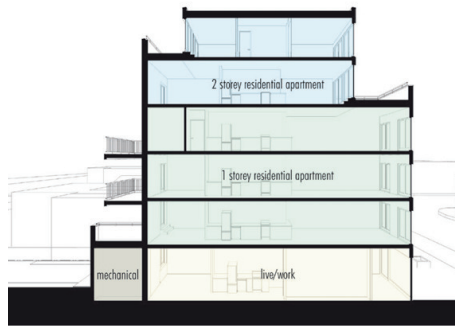


Market Housing

R-TOWN

The R-Town V6 pilot project was the first 6-story, mixed-use, multi-unit residential building developed in Ontario that uses mass timber as the main structural system. The project was completed in 2021 & features: 4 units of commercial space at street level & a total of 18 residential units in the 5 storeys above, all of which have direct elevator access.

The building is fully electric with no natural gas hook up, no underground parking or basement. The building has a green roof and each residential unit has a balcony or patio and is flooded with natural light, a result of the through-unit access to front and rear views. This building was constructed using CLT including for the elevator cores & exit stairs.

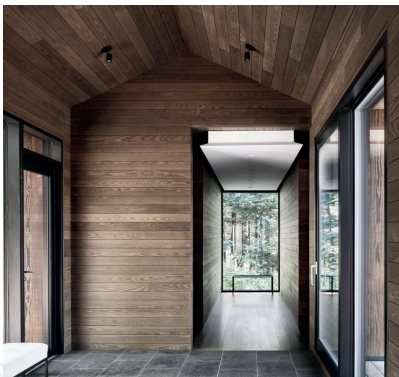


Market Housing

Metrick Cottage & Boat House

Completed in 2017, designed by Akb Architects this multi-generational family cottage on Lake Joseph, Ontario is 5400 sqft with unobstructed surrounding lake views.

“The visible structural components such as the exposed roof rafters and the scissor joist, were carefully crafted, prefabricated, Douglas Fir. In order to accentuate the wood structure and create a seamless method of construction, a unique, custom anchoring and fastening system, developed with the structural engineer, was used and strategically lit to further emphasize its beauty. The hidden structural components used throughout were prefabricated wood TJI joists, wood wall structure framing & LVL beams which allowed for ease of transportability & reduced site waste.”



Market Housing

Heartwood

Toronto's first 6-storey wood condo made from CLT & Glulam, The condos were completed in 2021 and were completely sold. There are 47 units with penthouses, large terraces, executive finishes & a great use of exposed mass timber.

"Heartwood is a small boutique building that provides an intimate and warm atmosphere, utmost privacy that is unrivaled by most condominiums."



Market Housing

880 Eastern Avenue TAS

This project is still currently in the planning stage but is attempting to be Toronto's first net-zero mid-rise. They are looking at not only mass-timber materials but also geothermal heating & cooling, a green roof, low-carbon concrete & stormwater recycling to lower the carbon emissions of the building. They are using people centred design principles & trying to optimize for human wellness.

This build is hoping to new energy and density to the Leslieville neighbourhood with this multi-use mid-rise construction, set to start in 2024.



Why you Woodn't use Mass Timber

While mass timber has gained popularity as a sustainable & innovative building material, there are several valid arguments that municipalities in Ontario should consider before widely adopting it as a solution to the housing crisis. In our Interviews with engaged people from around the province, many of these important concerns were raised. We thought it was important to address these legitimate concerns in this toolkit. We hope that these informed responses will assist you in your presentations to councils, in meeting with the public & helping in your own research to attract new housing developments in your community.

ISSUE	DETAILS	RESPONSE
Limited Supply, Competition & High Demand for Timber	The widespread adoption of mass timber construction poses challenges related to limited supply & high demand for specific wood product types like cross-laminated timber (CLT) & glue-laminated timber (glulam). The escalating global demand for these materials may lead to shortages & escalated costs, potentially resulting in higher construction expenses & extended project timelines. Furthermore, there is a concern about the availability of timber resources, with the potential for widespread mass timber construction leading to forest depletion & potential impacts on biodiversity. This could drive up timber costs & have environmental repercussions.	Ontario is the only district in Canada with a surplus of available wood & a net increase yearly of planted trees. Ontario has some of the best most sustainably managed forests worldwide with a heavily regulated sector for wood production. The forest industry in Ontario deeply committed to the success of the Province's forests & are committed to continuing to improve the sustainable reforestation programs that they deploy. Most of Ontario's forest actively participate in third-party certifications like FSC & CSA. Unlike concrete, steel or fossil-based alternatives Ontario's Boreal forest regenerates naturally every 80-100 years, compared to thousands - millions.
Market Acceptance and Perception:	There may be public resistance or scepticism regarding the safety & viability of mass timber buildings, especially for larger and higher-risk structures. Addressing these concerns & building public trust in the technology may take time and effort.	WoodWorks of Canada's Wood Council has an abundance of resources & examples around the effectiveness & safety of wood construction from Tallwood buildings to low-mid rise construction applications. July 2022; Ontario has approved encapsulated mass timber buildings up to 12 storeys. In Vancouver they completed Brock Commons in 2017 is 18 storeys, it was the tallest wood building in the world when it opened.

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Environmental Concerns:

While wood is often considered a renewable resource, the mass production of mass timber could put pressure on forests. Overharvesting or mismanagement of forests can lead to deforestation & loss of biodiversity. It's important to carefully consider the long-term sustainability of this approach.

Ontario's unique Boreal forest composition makes it ideally suited to address the housing need in our own province & worldwide. Similar to our Nordic collaborators our forests naturally regenerate within 80-100 years, which is substantially more beneficial to the mineral-heavy alternatives which would take hundreds of thousands to millions of years to regenerate. With ongoing improvements to our currently exceptional reforestation management forests are our only truly renewable resource. More education on this topic is needed for the public

Fire Safety & Perceived Fire Risk:

Perceived fire risk surrounding mass timber construction persists, despite its engineered fire-resistant qualities. This concern arises from the established safety records of traditional concrete & steel structures, leading municipalities to hesitate in adopting mass timber, particularly in densely populated urban areas. Skeptics may question the fire resistance of mass timber compared to its tried-and-true counterparts, fostering lingering doubts & misconceptions.

Even though modern mass timber is meticulously engineered for high levels of fire resistance there is still a perception of a reduction in safety. Thankfully there is a wealth of published research well respected in the industry with clear, measurable standards for rates of burn, char & overall fire resistance. For every mass timber application, there is a product best fit to achieve & surpass Ontario Building code fire resistance ratings.

Institutional Knowledge & Training:

The construction industry is well-versed in working with concrete & steel for larger institutional or mid-high rise buildings. Shifting to mass timber could require significant retraining for architects, engineers, contractors, & tradespeople. This transition may lead to initial inefficiencies & increased costs.

Many people don't realize that stick frame homes are one portion of the spectrum of mass-timber. This is something that we do really well & abundantly in Canada already for single family market housing. With an increase of education on these topics; most architects & structural engineers are already familiar with mass timber materials & design. The important focus area would be to help the contractors gain access to more hands-on training for the actual implementation of the build. Many of the larger applications of Mass Timber require a high degree of coordination & planning even before materials arrive onsite. Different doesn't always mean more difficult, but change can be difficult for many already trained in one method.

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Resistance from Traditional Construction Industry:

The existing concrete & steel construction industry might resist the shift towards mass timber, as it could disrupt established practices & business models. This resistance could potentially slow down the adoption of mass timber.

Most heavy industry is already looking at ways to decarbonize; projects with Algoma Steel as an example – they are overhauling their current processes & looking for ways to push their decarbonization efforts even further which is an admirable business model. There will always be a need for mineral-based materials because wood can't do everything. Mass Timber is looking to maximize wood for the appropriate application, not fully displace other suitable materials.

Limited Availability of Skilled Labor:

Ontario may face a shortage of skilled labour capable of working with mass timber. This could further exacerbate construction timelines & costs, potentially slowing down efforts to address the housing crisis.

The considerations for modularizing many of these applications would help to keep most of the production indoors like Element 5's facility in St. Thomas or companies like Relay which are looking to grow & engage more of the available workforce. The processes for building become more like a factory & require less highly skilled labour. People can also work mostly indoors making the processes more consistent.

Resilience to Climate Change & Natural Disasters:

Ontario is susceptible to a range of environmental challenges, including extreme weather events. Traditional building materials like concrete & steel often have established track records of resilience to these conditions. It's important to thoroughly assess how mass timber structures would perform under similar circumstances.

Where Ontario is just really getting into mass timber as an increasingly popular option; we have a wealth of knowledge to draw from countries who have established track records, research & deployment of mass timber buildings of all sizes, uses & types. The amazing opportunity to learn from their well-documented successes & failures makes this a low-risk undertaking. Even in Canada Thunder Bay CEDC's recently published report on the assessment for remote northern work housing for mines showed that not only are the mass timber housing solutions proposed cost-effective but also perform better in extreme northern temperatures.



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Uncertain Long-Term Durability:

While mass timber has been shown to have excellent structural performance, there could be concerns about its long-term durability, especially in comparison to materials like concrete which have a long history of use.

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Regulatory Hurdles and Building Codes:

Introducing mass timber as a standard construction material may require substantial changes to existing building codes and regulations. This could be a lengthy & potentially costly process, which might deter some developers from adopting it.

Ontario already has an expansive building code including mass timber buildings up to 12 storeys. Canadian Wood Council has also produced very expansive documents including a Complete Guide to Encapsulated Mass Timber & a Guide to Mid-Rise Wood Construction.



Navigating Community Resistance to Densification for Rapid Housing

With many larger mass timber projects contributing to increased density; focusing on educating municipalities on the benefits of housing density could be met with push back, some counterarguments might include:

Resistance from Local Communities:

- Residents in some areas might resist higher-density housing due to concerns about increased traffic, noise, and changes in neighbourhood character. Convincing communities to accept higher density can be a significant challenge.

Infrastructure and Services:

- Higher-density housing often requires significant investments in infrastructure and services, such as public transportation, schools, and healthcare facilities. Some municipalities may be hesitant to commit to these additional costs.

Zoning and Land Use Policies:

- Outdated zoning and land use policies may need to be amended or overhauled to accommodate higher-density housing. This can be a complex and politically sensitive process.

Preservation of Green Spaces:

- Critics might argue that a focus on housing density could come at the expense of preserving green spaces and natural environments, which are important for quality of life and the environment.

Potential Gentrification and Displacement:

- There is a concern that increasing housing density in certain areas could lead to gentrification and potentially displace lower-income residents. Balancing the benefits of increased density with the need for affordable housing is a delicate task.



Conclusion

In recent years, the field of architecture has experienced a notable shift towards the utilization of sustainable construction materials and methodologies. Among these, mass timber has emerged as a leading contender, offering a multitude of advantages with the potential to significantly enhance communities throughout Ontario. This versatile and environmentally-conscious material has the capacity to revolutionize our construction practices, ultimately fostering a more resilient, sustainable, and prosperous future for our communities.

The decision to embrace mass timber is not only a demonstration of environmental responsibility but also carries significant potential to positively impact communities across Ontario. Its sustainability, economic benefits, design adaptability, construction efficiency, and inherent resilience make it an appealing choice regardless of location. Through the integration of mass timber into our building practices, we have the opportunity to establish a legacy of sustainable, vibrant, and resilient communities poised for enduring vitality.

It is important to note that mass timber stands as one of the few presently available solutions with demonstrated applicability and examples for communities of all types and sizes across Ontario. For First Nations communities in Ontario, there exists an abundance of readily accessible resources and examples to draw inspiration from.

Environmental Sustainability:

A compelling rationale for adopting mass timber lies in its exceptional environmental credentials. In contrast to conventional concrete and steel, mass timber actively sequesters carbon dioxide, thereby contributing to the mitigation of climate change. Through the process of photosynthesis, trees absorb and store carbon, rendering mass timber a carbon-neutral or potentially carbon-negative building material. By prioritizing locally sourced timber, we can further reduce transportation emissions, thereby supporting a more ecologically sound and sustainable future for Ontario.

Economic Growth and Job Creation:

The embrace of mass timber has the potential to stimulate economic growth within Ontario communities. The production and manufacturing of mass timber components yield job creation and drive economic activity, particularly in rural areas endowed with abundant forest resources. Moreover, the installation process often requires skilled labor, thereby contributing to the development of a specialized workforce within the construction industry. This economic stimulus can have a ripple effect, positively impacting local businesses and communities.



Design Flexibility and Aesthetics:

Mass timber provides architects and designers with a versatile medium for creative expression. Its inherent strength allows for extended spans and innovative structural configurations, enabling the construction of iconic and visually striking buildings.

Communities in Ontario stand to benefit from the aesthetic appeal of mass timber structures, which can serve as landmarks that attract residents and visitors alike, thereby contributing to a sense of pride and identity.

Improved Construction Efficiency:

Mass timber systems are prefabricated, facilitating faster and more efficient construction processes. Components are precision-manufactured off-site, reducing on-site labour and construction time. This efficiency can lead to cost savings and expedited project completion, particularly significant in a high-demand construction market such as Ontario. Additionally, the lighter weight of mass timber reduces the need for heavy machinery, minimizing environmental impact and disruption to surrounding areas.

Resilience and Adaptability:

Ontario communities contend with a range of challenges, including extreme weather events and evolving building codes. Mass timber excels in both resilience and adaptability. It has demonstrated exceptional performance in fire resistance tests and can withstand seismic forces. Furthermore, mass timber buildings can be easily modified or expanded to meet changing community needs, ensuring they remain functional and relevant for generations to come.

Considerable assurance has been established through extensive engagement and expertise in projects using mass timber. Ongoing collaboration with individuals distinguished by their established track record in this field is paramount. There exist numerous professionals who have proficiently implemented mass timber applications, underscoring the urgency to proactively investigate the potential of this toolkit in order to educate and enlighten communities about the manifold advantages that mass timber offers to Ontario.



Appendix A:

Examples of Mass Timber with Applications in Canada

State of Mass Timber in Canada – Interactive Map

- <https://nrcan-rncan.maps.arcgis.com/apps/dashboards/041e338d2a4d4b3a82ff2c238a9f0f93>

Wood Works! Innovation Network – Projects Map

- <https://www.woodworksinnovationnetwork.org/en-ca/projects/?boundingBox%5BnorthEast%5D%5Blat%5D=55.372401031079846&boundingBox%5BnorthEast%5D%5Blng%5D=-57.02415508459946&boundingBox%5BsouthWest%5D%5Blat%5D=26.22370952120282&boundingBox%5BsouthWest%5D%5Blng%5D=-114.41673320959946&page=1>

EDGE Architects in Kitchener – Projects

- This is the architect firm that designed the Kitchener YWCA housing was built in days , from approval to occupation in days. Time-lapse video: <https://www.youtube.com/watch?v=5y10vSd5HXE>
- <https://edgeld.ca/projects>
- <file:///C:/Users/SLB/Downloads/affordable-housing-brochure-22.07.pdf>

Passage House

- <https://elementfive.co/projects/east-gwillimbury-affordable-housing/>

Metrick Cottage & Boat House

- <https://www.akb.ca/projects/metrick-cottage-and-boathouse/>

Heartwood

- <https://mosesstructures.com/2016/02/26/heartwood-the-beach-is-torontos-first-six-storey-wood-condo/>

880 Eastern Avenue

- <https://tasimpact.ca/project/880-eastern-avenue/>

YWCA Kitchener

- <https://elementfive.co/projects/east-gwillimbury-affordable-housing/>

WoodGreen

- <https://www.akb.ca/projects/metrick-cottage-and-boathouse/>

R-Town

- <https://r-hauz.ca/r-town/>



Appendix B:

Building Resources

Kenora District Housing Strategy

Published by the Kenora District Services board in the spring of 2023 takes a deep dive into the many factors, issues and solutions surrounding housing in their district.

- https://kdsb.on.ca/wp-content/uploads/2023/07/2023-07-17-KSDB-Housing-Strategy_Updated-Final.pdf

The Canadian Guide to Mid-Rise Wood Construction:

Published by the Canadian Wood Council this comprehensive guide to Mid-Rise construction answers all your potential questions pertaining to building code and applications of mass timber for mid-rise construction.

- <https://forms.office.com/pages/responsepage.aspx?id=YcoZSkRK-k-2z4egXpkc43zNlkH6OfJBtvvTqP11wJZUMUdaMzE5OVg1VUhWSzMyMkE5QTQ5SDZQQy4u>

The Benefits of Mass Timber Workforce Communities

Published by the Thunder Bay Community Economic Development Commission (CEDC) & The Centre for Research and Innovation in the Bio Economy.

- https://gotothunderbay.ca/wp-content/uploads/2023/09/2023-09-11_Mass-Timber-Workforce-Communities_public_FINAL.pdf?utm_source=tbnewswatch.com&utm_campaign=tbnewswatch.com%3A%20outbound&utm_medium=referral

Ontario's Need for 1.5m More Homes

Published by Smart Prosperity Institute

- https://gotothunderbay.ca/wp-content/uploads/2023/09/2023-09-11_Mass-Timber-Workforce-Communities_public_FINAL.pdf?utm_source=tbnewswatch.com&utm_campaign=tbnewswatch.com%3A%20outbound&utm_medium=referral

Relay Developments Canad's Most Sustainable Modular Home Builder

Created by Relay for outlining the benefit of modularizing construction especially in Northern Ontario.

- <https://www.tbchamber.ca/wp-content/uploads/2023/03/Relay-Presentation.pdf>

Fire Design of Mass Timber Members Code Applications, Construction Types and Fire Ratings

Published by WoodWorks - Wood Product Council, authors Richard McLain, PE, SE • Senior Technical Director • WoodWorks Scott Breneman, PhD, PE, SE • Senior Technical Director • WoodWorks

- https://www.woodworks.org/wp-content/uploads/Wood_Solution_Paper-Fire-Design-of-Mass-Timber-Members-WoodWorks-Apr-2019.pdf



References

The State of Mass Timber in Canada 2021

Published by the government of Canada in 2021, this document was completed as a part of the Green Construction Through Wood Program (GCWOOD).

- <https://dlied5g1xfgp8.cloudfront.net/pdfs/40364.pdf>

A toolkit for understanding housing supply

Published by the government of Canada – Statistics Canada October 25, 2023, by Florian Mayneris & Radu Andrei Parvulescu. This article draws together a variety of publicly available data sources into a toolkit of indicators that can be used by researchers, practitioners, & the public to describe housing dynamics from a supply-side lens.

- <https://www150.statcan.gc.ca/n1/pub/46-28-0001/2023001/article/00003-eng.htm>

Kenora District Housing Strategy

Published by the Kenora District Services board in the spring of 2023 takes a deep dive into the many factors, issues and solutions surrounding housing in their district.

- https://kdsb.on.ca/wp-content/uploads/2023/07/2023-07-17-KSDB-Housing-Strategy_Updated-Final.pdf

Forest Biomass Action Plan

Published by the government of Ontario in March of 2022, the document is a culmination of input from government staff, the primary forest industry and other organizations.

- <https://files.ontario.ca/ndmnr-forest-biomass-action-plan-en-2022-03-28.pdf>

Home Stretched: Tackling Ontario's Housing Affordability Crisis Through Innovative Solutions and Partnerships

Published by the Ontario Chamber of Commerce

- <https://occ.ca/wp-content/uploads/OCC-Housing-Affordability-Brief.pdf>

Algoma Steel considers using local forest byproducts for fuel

David Helwig – Oct 31, 2022 11:31 AM

- <https://www.northernontariobusiness.com/industry-news/manufacturing/algoma-steel-considers-using-local-forest-byproducts-for-fuel-6031257>

We Spend 90% of Our Time Indoors. Says Who?

Tristan Roberts

- <https://www.buildinggreen.com/blog/we-spend-90-our-time-indoors-says-who>



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