

# **Report on Strengthening Awareness and Benefits of Building with Wood**

## **From Seed to Home: The full story of building with sustainably harvested wood**

**Tony Bull, President, EOMF**

The following report is part of an information package aiming to strengthen awareness and benefits of building with wood in Eastern Ontario. The report focusses on and summarizes key elements of an annual event, the December Forest Seminar of 2019, hosted by the Eastern Ontario Model Forest and the Canadian Institute of Forestry. As builders and homeowners are becoming more environmentally conscious in this era of climate change, they are looking for more sustainable building materials and we believe that wood from our Canadian forests can provide this. The EOMF supports collaboration with its members, the broader International Model Forest Network, and plays an important role to convene diverse stakeholders, promote sustainable forest management and the knowledge concerning the benefits of use of wood in construction.

The seminar had six presenters who focussed on telling the full story of how building with wood is the most sustainable option, from the time the tree is planted in the forest to when the final product is used for the build. We heard how a forest can be managed for multiple forest values such as recreation, wildlife, and clean water, all while providing a continuous supply of wood to feed the local mill. We also heard how building codes are changing to allow for taller wood structures, and how new technology can produce stronger wood products with less to meet these demands. It was an excellent opportunity for those who wish to understand why building with wood is a good choice, from both an ecological and engineering perspective.

This report provides a summary of the key messages of the day and can be found on the Eastern Ontario Model Forest website at this [link](#) along with all the presentations. The presenters were as follows:

### **Harvesting wood sustainably: Good for the Environment and Climate Change**

*Martin Streit, RPF, Forester, South Nation Conservation Authority*

### **The Future of Building – Wood and the Carbon Neutral Pathway**

*David Moses, PhD, PEng, PE, LEED®AP, Founder of Moses Structural Engineers*

### **Benefits of Building with Wood**

*Alex Nott, M.Eng. P.Eng. Mass Timber Engineer, Ministry of Natural Resources and Forestry*

### **Prefabrication in Timber Construction**

*Mohammad Mohammad, P.Eng, PhD, Senior Research Advisor, Natural Resources Canada*

## **A Local to Global Perspective: Linking Sustainable Forest Management to Green Buildings**

*Invited: Kathy Abusow, President and CEO, Sustainable Forestry Initiative*

## **A National Mass Timber Research Network: Connecting the Dots**

*Dr. Anne Koven, Executive Director, Mass Timber Institute*

### **Why harvesting trees, when done properly, is sustainable**

Martin Streit, Vice President of the EOMF, and Kathy Abusow, President and CEO of the Sustainable Forestry Initiative spoke to the environmental side of good forestry practices.

Martin introduced his talk commenting on climate change and the importance of forests in mitigating and helping to slow the march of increasing CO<sub>2</sub> in the atmosphere. Temperatures are increasing. We see, in this part of the world, increasing rainfall and the march northwards of invasive species.

Sustainable forestry builds resilience. It emulates natural disturbance which is a normal part of our forest ecosystems. Sustainable forestry deliberately focuses its “disturbance emulation” to produce, not only biodiversity conservation benefits, but also, over time, superior trees; higher quality, faster growing and so on, within the diverse forest structures typical of disturbance forests.

Martin likens sustainable forest management as “intelligent tinkering”, quoting Aldo Leopold “to keep every cog and wheel is the first precaution of intelligent tinkering”.

In addressing trees able to deal with climate change, those that can thrive (or survive) in a wide range of conditions and extreme disturbances made his list of “tough trees”: white pine, white spruce and white cedar, burr oak, red oak, shagbark hickory, eastern cottonwood and red maple. Two site specialists are silver maple, liking wet soils and red pine, growing well in full light on well drained soils.

Next, Martin spoke about tree marking, a management tool that is about enhancing forest health; removing defective trees and thus selecting healthier trees that are resistant to disease and insect attack. By thinning to provide more light, the trees selected to remain in the forest benefit from superior growing conditions.

Sustainable forestry also plays an important part in water conservation through:

- Flood mitigation
- Erosion control
- Maintenance of vernal pools and riparian buffers

In implementing forest operations following tree marking, careful logging is designed to handle unplanned natural events such as heavy rain that could lead to washouts.

His final thought was another Aldo Leopold quote “We shall never achieve harmony with the land, any more than we shall achieve absolute justice or liberty for people. In these higher aspirations, the important thing is not to achieve, but to strive”.

Kathy Abusow spoke of the vision of the Sustainable Forestry Initiative (SFI), “a world that values and benefits from sustainably managed forests”. These benefits include wildlife habitat, clean water, and employment providing economic and social benefits which result in healthier populations. All in line with the United Nations sustainable development goals.

SFI is one of three sustainable forestry certification systems in Canada. Currently SFI certifies 147 million ha of forest in Canada and the USA. It is currently working on a small woodlot certification system. It will likely be delivered by mills to their client wood producers via a group held certificate managed by each mill.

SFI has 4 “pillars” or streams of delivery. They are:

- SFI certified forests and products in order to advance sustainable forestry and responsible purchasing on a global scale
- SFI conservation programs to deliver forest focused solutions to sustainability problems associated with biodiversity, carbon capture, clean water, etc.
- Delivering recreation, environmental, social and health benefits to local communities in collaboration with the SFI network in the context of local sustainably managed forests. For instance, in the USA and Canada 40 indigenous community forests have been certified, and
- Delivering educational programs to expand knowledge, skills, and opportunities for the benefit of local communities and their association forest areas. For instance, “project learning tree” has reached 138 million students via 765 thousand educators since its inception.

On the construction side of the equation Kathy made reference to many builders and architects such as Michael Green in Vancouver who are increasingly turning to wood as a major component of buildings replacing steel and concrete. This was also featured in the recent Green Building International Conference in November in Vancouver.

She spoke of connecting the building construction conversation with the forest conservation conversation. She pointed out, for instance that LEED, the Leadership in Environment and Energy Design standard recognizes and gives points for the use of wood from sustainably managed forests.

### **Why building with wood is so sustainable**

Four speakers provided a lot of information about the revolution in using wood in various engineered forms such as glue lam timber, cross laminated timber, mass plywood producing huge sheets. All this, along with changes in building codes, makes possible the construction of multi-story buildings made entirely of wood.

David Moses spoke about the two main sources of CO<sub>2</sub> associated with buildings. The one that is most often talked about is the energy efficiency of the building, which takes into account a reduction in CO<sub>2</sub> over the building's life cycle, typically 50 to 100 years. The most immediate impact to worldwide CO<sub>2</sub> production, however, is with the "embodied energy", the early stages of material extraction, processing, and construction. It is this phase that (omit) where reductions in CO<sub>2</sub> levels will have a greater impact over the short term, and where wood has huge advantages over other materials such as steel and concrete.

Concrete (cement) currently accounts for approximately 7% of global CO<sub>2</sub> GHG. Is this significant in Canada? Canada is the 10<sup>th</sup> largest GHG emitter in the world (2015) and has one of the highest emissions per capita globally. In order to reach our target emissions reduction of 30% by 2030, we need to look at the more immediate reductions such as reducing the embodied energy required for new buildings. Wood is a good solution as 2 cubic metres can sequester up to 1 tonne of CO<sub>2</sub> from the atmosphere.

David provided many examples illustrating how the use of wood for mass timber projects has increased over the years. As an example of a low embodied energy building the Brock Commons 18 story building in Vancouver, built of wood has resulted in 1,753 metric tonnes of stored carbon. For those who worry about how a widespread adoption of wood for high rise construction, it is estimated that in Canada and the US the wood needed to build this building was grown in 6 minutes.

In conclusion, as tall buildings made of wood show their mettle in strength and durability (they already demonstrate much reduced cost in terms of money and time to erect) there will be a consequent increased demand for wood in construction. More standardization will be required to meet this increased demand, and education will be required for developers, institutional decision-makers and building officials.

Turning to residential construction, speaker, Mohamed Mohamed described that in the next 20 years there will be a need for another 3 billion living spaces. And most of these will be in urban areas as urbanization will increase from 50% today to 75% globally in 2040. With the increase interest in building sustainably, we are seeing more demand for wood construction and prefabrication. Currently most buildings are built on site, stick by stick, with each stage in construction needing to be completed before the next one. But here too a revolution in construction is underway. It is cheaper to assemble houses or parts of houses in a climate-controlled factory and take them to a building site to be assembled. And building this way accelerates the time taken to complete a house. Furthermore, prefabrication results in reduced waste, greater accuracy in cutting and assembly, reduces/eliminates the exposure of elements, and more control of building process and project schedules.

Alex Nott addressed the benefits of building with wood from a human health perspective. He used the term "biophilia" and quoted E.O. Wilson "The innate attraction that humans have to living organisms and life-like processes.". Through biophilic design,

we form a connection with nature within our built environment. This is especially important for Canadians who, in 1995, spent 88% of their time indoors and a further 6% in their cars.

Research has shown that people have lower stress in interiors that feature wood. Less absenteeism in schools; better staff retention in offices; faster learning and more creativity has also been proven. Hospitals that were built using wood in their interiors (e.g. Surrey Memorial Hospital) have shown faster healing rates combined with lower pain for patients and less stress for doctors and patients. These benefits have led to increases in productivity and revenues for businesses among numerous other positive outcomes.

Anne Koven ended the speaker session with a presentation on the Mass Timber Network and we need to be able to make mass timber become a form of building material that is accessible and used by the construction industry. The Mass Timber Network is a Pan Canadian consortium/collaborative network of research partners and other stakeholders. Anne spoke of the new Element 5 plant to be built in Southern Ontario, that will help meet the new demands for mass timber. Of the 71 million hectares of forest land in Ontario, 6.1 million hectares is on private land, mostly in the south. Private landowners will need to take collective action to get into the mass timber markets; perhaps this can be done through organizations like the Eastern Ontario Model Forest.