BORA

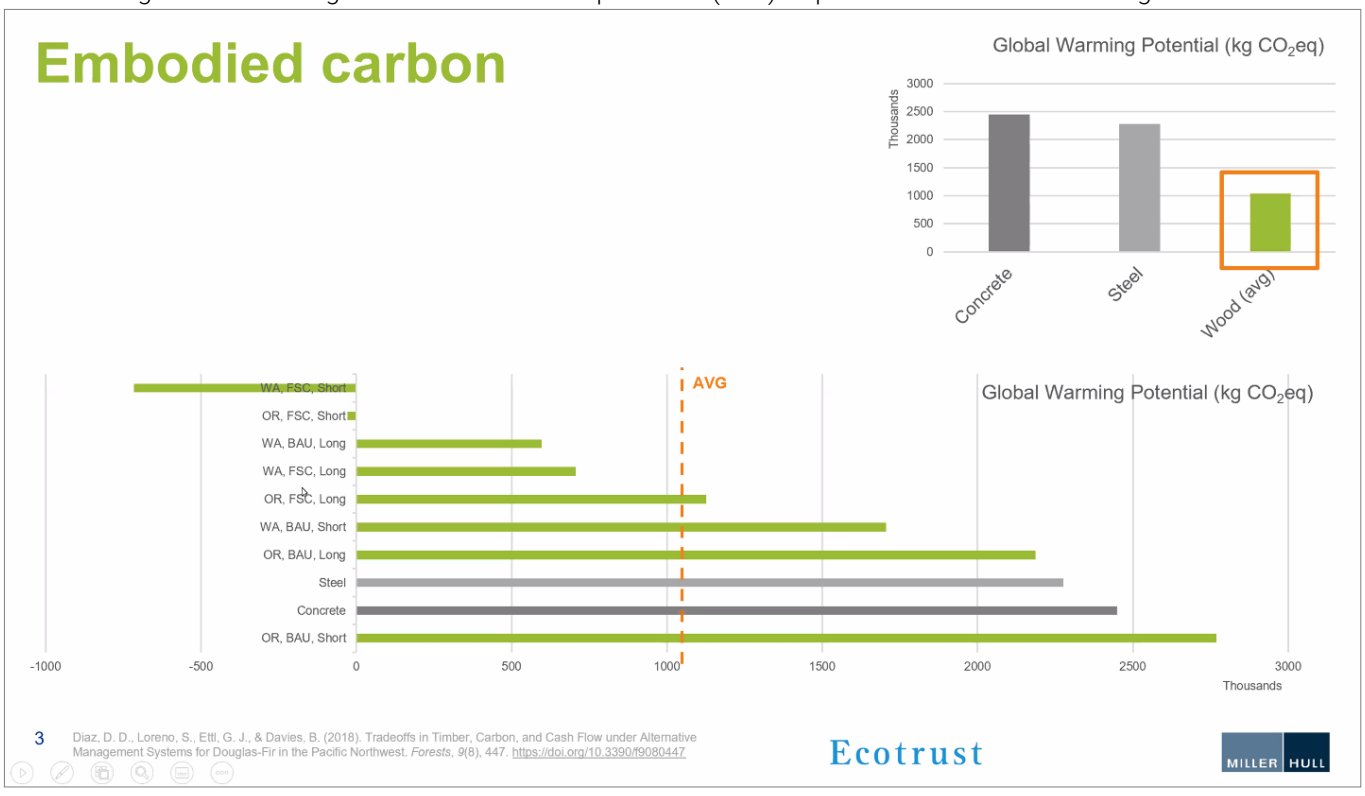
Sustainable Design with Mass Timber
April 14, 2020, by Mike Manzi

Mass timber offers numerous benefits in aesthetics, design flexibility, and biophilia. Building codes have recognized its capacity for use in low- to mid-rise structures, and manufacturers and contractors are expanding and learning how to work with it to bring costs down. **How do we ensure that mass timber lives up to its potential as a significantly more sustainable alternative to other structural systems?** This preliminary guide is a snapshot of current knowledge with respect to this question and is intended to help us promote best practices and communicate honestly about the benefits of this material.

Scope and Forestry Practices
Mass timber includes cross-laminated timber (CLT), nail-laminated timber (NLT), glued-laminated timber (glulam), other similarly joined lumber products, and mass plywood. This guide is based on the limited analysis known to date and is intended to be updated as more information becomes available. Its primary focus is the carbon footprint of mass timber use in the Pacific Northwest (PNW) region.

It is widely assumed that mass timber has a lower carbon footprint than concrete or steel. As with many things, the reality may not be so simple. A 2018 study by Ecotrust analyzed the global warming potential differences among two primary forestry practices – retention of live trees during regeneration harvests and Riparian Management Zone harvest limitations – in Oregon and Washington. Miller Hull used Tally to compare steel and concrete to mass timber, with emissions factors generated by the authors of the study (Tally only included one Environmental Product Declaration (EPD) value for the global warming potential of mass timber at the time), for the following scenarios:

- Oregon and Washington business as usual (BAU) practices for both short and long harvest rotations.
- Oregon and Washington Forest Stewardship Council (FSC) requirements for short and long rotations.



This study revealed that FSC practices in both states have the potential to produce carbon positive mass timber, while BAU practices, particularly in Oregon (due primarily to greater limitations on harvesting near streams in Washington), are not that much better than steel for long harvest rotations and are worse than concrete for short harvest rotations.

Limitations of Understanding and Other Observations
The study described above was presented and reviewed at the 2020 Winter Summit of the Sustainable Design Leaders' group and on a recent webinar. I participated in the webinar but did not attend the summit. We hope to have a follow-up discussion with the Ecotrust study authors to help us understand exactly what types of practices lead to the dramatic differences among these scenarios. While full FSC-certification is ideal, it is very often cost-prohibitive, so knowing what to look for to understand the true global warming potential of the specific timber harvested for our projects might offer realistic opportunities to improve our carbon footprint.

Additional Observations:

- Numerous other environmental, social, and economic factors that should be considered when comparing structural system options are outside the scope of this guide and the studies discussed. Some of these are likely to be substantially worse for steel and concrete due to the extreme impacts of mining associated with those materials.
- Efforts to increase the number of EPDs for wood products are ongoing.
- Because only a small percentage of wood harvested in the PNW is used for local building products, there is believed to be adequate timber to support a substantial shift towards mass timber.
- Mass timber products used in the PNW are not necessarily manufactured with timber harvested from the PNW. Similar studies to the Ecotrust study are needed for other timber sources, such as the southeast and Europe.
- Domestic mass timber products can currently be manufactured in Washington and southern Oregon.
- One Washington manufacturer, Vaagen Timbers, uses small diameter logs from deadfall and forest restoration. More research is needed to understand whether their forestry practices lead to more sustainable outcomes.

Ultimately, we need to dramatically increase the capacity of the World's forests to sequester carbon dioxide while also decreasing the carbon footprint of our buildings. Mass timber offers the possibility of doing both, but only if smart decisions, based on the best available and continuously evolving information, are made.


FSC Forestry Practices


BAU Forestry Practices