Comparing the Environmental Impacts of Using Mass Timber and Structural Steel

XL Construction Project

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Although mass timber has seen a gradual rise in demand in the past, there has been a lack of extensive research on the environmental impacts of using mass timber as a primary structural framing material. This paper compares structural steel, and mass timber's total embodied carbon emissions. Accurate estimates were made using plans and specs for different projects retrieved from semi-structured interviews. The estimates were input through the EC3 Calculator to provide extensive total carbon emissions measurements between each construction material. Using structural steel framing increased the project's overall environmental impact by roughly 84% compared to using mass timber. The results had sufficient evidence supporting the use of mass timber framing.

Key Words: Mass Timber, Structural Steel, Embedded Carbon Emissions, EC3 Calculator, Framing

Methodology

- Perform semi-structured interviews with three professional contacts
- Obtain construction documents and do accurate estimates of structural framework
- Input estimates in EC3 Calculator to find total embodied carbon emissions of each construction material

Gilbane Building Company	XL Construction	Confidential Client
• Steel (Conservative): 20.71× 10^6 $kgCO_2$ • Steel (Achievable): 13.31× 10^6 $kgCO_2$	• Mass Timber (Conservative): 6.99× 10^5 $kgCO_2$ • Mass Timber (Achievable): 3.51× 10^5 $kgCO_2$	• Steel (Conservative): 6.96× 10^5 $kgCO_2$ • Mass Timber (Conservative): 2.74× 10^5 $kgCO_2$

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Steelee Knight Morgan | smorga06@calpoly.edu | (805) 361-3492
Khang Hoang Nguyen | knguy234@calpoly.edu | (669) 225-5898