Comparing Carbon Footprints of Steel and Timber Systems Equitably

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THE HYBRID DILEMMA

Comparing Carbon Footprints - Steel, Concrete, and Timber
Steel Mill Certs & EPD’s
(Upstream sourcing disclosure beyond industry averages is greatly improving)
CONCRETE
Concrete Batch Tickets & EPD’s
(Upstream sourcing disclosure beyond industry averages is greatly improving)
Wood & EPD’s
(Upstream sourcing isn’t differentiated across North America, all impacts are reported as carbon neutral)
Mass Timber Sourcing Disclosure (Questionnaire)

Disclosure that rewards those “doing better”

1. APPENDIX: MASS TIMBER SUBCONTRACTOR RFP FOREST SOURCING DISCLOSURE QUESTIONNAIRE (3/29/2022)

Responses to this questionnaire are to be collected by the project general contractor, accompanying the subcontractor bid submissions for the sourcing of at least 90% of the structural mass timber to be used on the project. This information will be evaluated by the owner and/or the owners designated representatives (who may include a forestry consultant hired on behalf of the owner).

The questions are to assist in a comparative and competitive bid evaluation of the climate smart and ecologically sensitive characteristics of the sourced timber. Chain of custody will be valued higher than self-declaration from the winning bidder at the time of material delivery to the owner, to verify accuracy of the data provided.

Subcontractor bids should include a baseline bid that is the performance characteristics identified within the design and considered adequate by the owner. A competitive subcontractor submission includes a clear demonstration that the sources of the timber are climate smart and ecologically sensitive, as evidenced by a baseline bid that is 3% below the base bid, which includes an alternative bid to the base bid which provides a negative material sourcing than the base bid. Provide any supporting documentation.

Each subcontractor’s bid cost and margin shall be considered and evaluated by the owner or owner’s designated representatives using pre-assignment materials coming from FSC-certified sources.

Please share documentation for responses to the below questions:

1. Is timber being proposed for use on the project from the project owner, and/or is the material traceable to the species?
2. Is forest material certification is being provided, and if so, the material certification (FSC, SFI, PEFC, other)?
3. Can a third party developed source forest(s) specific to the project landscape(s) divided by the timber output consider a window of initial planting to first harvest, and if so, how is the forest involved and regeneration is not possible, using averaged yearly data for all of the areas involved? 1
4. Additionally, please provide written answers and documentation for the following questions:
   a. What practices do the forest managers use to mitigate the impacts of climate change and increase resiliency for the forest ecosystem?
   b. Please characterize the silviculture used on the source forest(s) and share documentation of the source forest(s) forest management plan. Include stream buffers, the controls to protect soils and biodiversity, the controls to protect the habitat for any rare, threatened, or endangered plant or animal species that occur on the source forestlands, and the controls to prevent excessive soil erosion.
   c. What are the rotation lengths between final harvests at the source forest(s)? Do the forest managers use pre-commercial or commercial thinning to enhance forest quality?
   d. Confirm that no rare old-growth or forest conversion harvesting from prime, not previously logged forest lands will be included within the sourced material unless such sourcing is from an ecologically restorative forest management plan that is attempting to maintain the values associated with the stand (e.g., removal of non-native species, conduct controlled burning, and thinning from below where restoration is appropriate).
   e. Please share documentation of the material sourcing control from the source forest(s) to the material delivery to the site. This shall include satellite photos images less than 5 years old, with GIS polygons identified, for the source forest(s) showing the forest management unit(s) where timber has been harvested for the project, and the year when harvesting has occurred.
   f. Has the source forest(s) been used to generate independently verified forest carbon credits? If so, please describe and provide documentation of the credit restrictions.
   g. What other characteristics do the source forest land(s) include that make their management climate smart or why?

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The Impact of GWP Questions at Bidding

Average GWP, kgCO2e/m3

5000 psi Ready-Mix Concretes in Seattle

+/-20% Reduction!

Year

2019

2020

2021

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Floor System Case Study

- MASS TIMBER
- STEEL (COMPOSITE)
- POST-TENSIONED CONCRETE
- HYBRID TIMBER/STEEL/CONC
Floor System Case Study

- Building considered in floor study
- Mass Timber
- Steel (Composite)
- Post-Tensioned Concrete
- Hybrid Timber/Steel/Concrete
New Building Types – IBC 2021

**TYPE IV-A**
IBC 2021

**TYPE IV-B**
IBC 2021

**TYPE IV-C**

**TYPE IV- HT**
IBC 2015

**BUSINESS OCCUPANCY [GROUP B]**

*BUILDING FLOOR-TO-FLOOR HEIGHTS ARE SHOWN AT 12'-0" FOR ALL EXAMPLES FOR CLARITY IN COMPARISON BETWEEN 2015 TO 2021 IBC CODES.*
Full Structure Case Study

Mass Timber Floor Framing

Hybrid Floor Framing

(TYPE IV-HT)

(TYPE IV-C not advantageous due to 85’ limit...for this bldg.
Mass timber surfaces exposed)
Mass Timber Floor Framing

Hybrid Floor Framing

Full Structure Case Study

TYPE IV-B

(~20% of Ceiling or ~40% of Wall can be exposed)
Full Structure Case Study

Mass Timber Floor Framing

Hybrid Floor Framing

TYPE IV-A
(100% fire protection on all surfaces)
Full Structure GWP Comparison
(Industry Average EPD’s)

- Fireproofing
- Structural Steel
- Reinforcement
- Concrete
- Timber
- Result

Lower Uncertain
Upper Uncertain

TYPE IV-HT
TYPE IV-B
TYPE IV-A
Per Square Foot GWP Comparison
(Industry Average EPD’s)
**Full Structure Case Study**

**Next Steps**

Expand study to include multiple building heights for each structural material across three geographical regions

Considering varying proportions of each material in hybrid schemes

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### Southeast U.S.

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Hybrid

USE MATERIALS WHERE THEY ARE MOST EFFICIENT AND EACH DOES MORE THAN ONE JOB

LOWER COST & CONSERVATION OF RESOURCES

(Industry Average Data doesn’t support making definitive carbon claims, you need to know where it comes from and how it was sourced....for all materials)