Supertall Timber
Impossibly high wooden skyscrapers

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TESTING METHODS

Evaluation of Structural Bamboo Products based on Timber Standards

BS 373-1954 (Small Specimens) and BS EN 408:2010 (Big Specimens)

Compression parallel to grain
Tension parallel to grain
Shear Parallel to grain
Flexure
Stewardship
People
Environment
220 million m³ each year
15 billion m³ every 70 years
Material Production

Concrete  0.20 tCO$_2$e/t
Steel    1.46 tCO$_2$e/t
Timber   0.42 tCO$_2$e/t
<table>
<thead>
<tr>
<th>Structural System</th>
<th>CO₂e/t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>0.17</td>
</tr>
<tr>
<td>Steel</td>
<td>0.32</td>
</tr>
<tr>
<td>Timber</td>
<td>0.42</td>
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</tbody>
</table>

The diagram illustrates the relationship between strength and modulus normalized by density for different materials: Concrete, Hardwood, Softwood, and Steel.

Ramage et al. (2017) Renewable & Sustainable Energy Reviews, 68(1)
Embodied CO$_2$

Concrete  310 tCO$_2$e  2.46x
Steel    498 tCO$_2$e  3.95x
Timber  126 tCO$_2$e

1kg TIMBER
holds 1.8 kg CO₂
LVL HONEYCOMB DIAGRIDS

SOFT MATERIAL STIFFNESS BALANCED BY MATERIAL CONCENTRATION AT THE OUTSIDE

CROSS BRACING ENGAGING WHOLE STRUCTURE

AXIAL FORCE UNDER LATERAL WIND

STRUCTURAL FINITE ELEMENT MODEL

GLULAM CROSS-BRACING

DIAGRIDS TO PROVIDE FENESTRATION AND AVOID LOCALIZED BEAM/COLUMN MOMENT CONNECTIONS

FLEXIBLE FRAME

TRIANGULATION ACTIVATES TIMBER AXIAL STIFFNESS MAXIMIZING THE SYSTEM EFFICIENCY

OPTIMIZE FLEX CHARACTERISTICS OF WOOD

GLULAM TRUSS

GLULAM INTER-CORE DIAGONALS

CLT CORE WALLS

CLT FLOOR SLABS