Wood WORKS! BC Mandate

Increase demand for BC’s wood products and systems

Enhance BC’s wood design and construction leadership

Support BC as an Innovation Hub for wood design, construction, supply and sustainability
Education and training
Wood Design Awards
“The Act requires the use of wood, as the primary building material, in all new provincially funded buildings, in a manner consistent with the Building Code”

What projects does it cover?

“All new buildings and any expansion that increases the square footage of an existing building, including projects by Ministries, Crown Corporations, School Districts, Health Authorities and Municipal projects that receive unconditional Provincial funding”
Number Of Publicly Funded Buildings: 1-4 (2012-16)

- Educational bldgs
- Other Health Treatment & Medical Bldgs
- Hospitals
- Amusement, Social and Recreational Bldgs
- Government Service Buildings & Other Public

Source: CMD 2017; FPI Est 2018
Projects – Total Monitored by WW BC

Lower Mainland: 58%
North: 13%
Southern Interior: 9%
Vancouver Island: 20%

A total of 314 projects are currently being monitored and assisted by WW staff.

Okanagan College Trades Expansion Project
A total of 314 projects are currently being monitored and assisted by WW staff.

Smithers Airport Expansion Project
Radium Community Centre
2009 BC Building Code Update

From 4 stories to 6 stories in Light Wood Frame

Actual Code Changes Implemented:
Building Height – Article 3.2.2.45
Building Area – Article 3.2.2.45
Exterior Cladding Materials – Article 3.2.2.45
Shear Walls – Article 4.1.8.10
Building Diaphragms – Article 4.1.8.15
Hold-Open Devices – Article 3.1.8.12
Consideration of Structural Wood Shrinkage – Subsection 4.3.1
Results of 2009 Code Change

Wood Consumed 123 MMfbm
CO₂ eq. Sequestered 153,200 T
CO₂ eq. Avoided 295,000 T

Source: CMD 2017; FPI Est 2018
Prefabrication...
forcement recommandé
Mid-rise hotel in Fort St. John
Early Tall Wood in Vancouver

The Landing
Vancouver, 1905
Height: 30 m

National Building Code

- NBCC 1941
- NBCC 2015, catching up to BC
- NBCC 1953
Model Building Codes – Prescriptive Requirements

Construction types:

**CANADA**

- “Noncombustible construction means that type of construction in which a degree of fire safety is attained by the use of noncombustible materials for structural members and other building assemblies.”
- “Combustible construction means that type of construction that does not meet the requirements for noncombustible construction.”

**UNITED STATES**

- Type I and Type II: mostly noncombustible structural materials
- Type III: exterior walls of noncombustible or FRTW; interior structure of any materials permitted by code (incl. lightweight wood/lumber)
- Type IV: exterior walls of noncombustible, FRTW or CLT; interior structure of heavy timber
- Type V – any materials permitted by the code
### Model Building Codes – Prescriptive Requirements

**Current Codes: Tall Buildings**

<table>
<thead>
<tr>
<th>CANADA</th>
<th>UNITED STATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• <em>Noncombustible construction</em></td>
<td>• Dependent on Use; in general (e.g. Residential or Business):</td>
</tr>
<tr>
<td>• Automatic fire sprinklers</td>
<td>• Type I Construction</td>
</tr>
<tr>
<td>• 2-h FRR</td>
<td>• Automatic fire sprinklers</td>
</tr>
<tr>
<td>• Unlimited height, unlimited area</td>
<td>• I-B: 2-h FRR – 12 stories &amp; 180 ft max.</td>
</tr>
<tr>
<td></td>
<td>• I-A: 3-h FRR – unlimited height</td>
</tr>
<tr>
<td></td>
<td>• Unlimited area</td>
</tr>
</tbody>
</table>
Tall Wood Buildings: Transforming the Built Environment

Model Building Codes – Process

Tall Wood Buildings

CANADA

• National Building Code of Canada
• Target: 2020 Edition

UNITED STATES

• International Building Code
• Target: 2021 Edition
## Tall Wood Buildings: Transforming the Built Environment

### Model Building Codes – Prescriptive Requirements

#### Tall Wood Buildings: Mass Timber

<table>
<thead>
<tr>
<th>CANADA</th>
<th>UNITED STATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Residential &amp; Office occupancies</td>
<td>• Most use types permitted</td>
</tr>
<tr>
<td>• Some mixed use permitted on lower storeys</td>
<td>• Maximum stories:</td>
</tr>
<tr>
<td></td>
<td>Type IV-A: 18 stories</td>
</tr>
<tr>
<td></td>
<td>Type IV-B: 12 stories</td>
</tr>
<tr>
<td></td>
<td>Type IV-C: 8 stories</td>
</tr>
<tr>
<td>• Maximum of 12 storeys</td>
<td>(where some use types are lower)</td>
</tr>
<tr>
<td>CANADA</td>
<td>UNITED STATES</td>
</tr>
<tr>
<td>--------</td>
<td>---------------</td>
</tr>
<tr>
<td>In general, ‘encapsulation’ of mass timber elements using noncombustible materials</td>
<td>Exposed wood permitted:</td>
</tr>
<tr>
<td>Some exposed wood permitted</td>
<td>• Type IV-A: none;</td>
</tr>
<tr>
<td></td>
<td>• Type IV-B: some;</td>
</tr>
<tr>
<td></td>
<td>• Type IV-C: all;</td>
</tr>
<tr>
<td></td>
<td>Use of noncombustible materials to provide fire protection: 2/3 of required fire-resistance rating in Type IV-A and IV-B</td>
</tr>
</tbody>
</table>
Demonstration projects are critical

- Completed Fall 2015
- Prince George, BC
- CLT, post & beam
- 29.5 meters tall (8 stories)
- Lessons learned - innovations

Wood Innovation Design Centre
Brock Commons Student Residence at UBC

- World’s tallest wood building
- 53 m/ 18 storey student residence
- Wood delivered June 6, 2016
- 18th storey completed early August
- CLT and Glulam – wood is covered
- Concrete stairwells
- Several months ahead of schedule
- Building Information Modelling essential for schedule savings and high quality
Prefabricated components
Brock Commons Carbon Impact

Volume of wood:
2,233 cubic meters of CLT and Glulam

U.S. and Canadian forests grow this much wood in:
6 minutes

Carbon stored in the wood:
1,753 metric tons of CO₂

Avoided greenhouse gas emissions:
679 metric tons of CO₂

TOTAL POTENTIAL CARBON BENEFIT:
2,432 metric tons of CO₂

Equivalent to:
511 cars off the road for a year

Energy to operate a home for 222 years

Source: US EPA
Study of GHG emissions of a floor structure 6m x 6m in an office building.

Steel deck and Concrete Solution

Wood Solution
Steel-Concrete Solution

Potential GHG emissions

<table>
<thead>
<tr>
<th>Quantity of materials</th>
<th>Concrete</th>
<th>Steel deck</th>
<th>Steel girders</th>
<th>Steel reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 m³</td>
<td>0.4 tonnes</td>
<td>0.2 tonnes</td>
<td>0.03 tonnes</td>
</tr>
<tr>
<td>Potential GHG emissions</td>
<td>540 kg CO₂</td>
<td>868 kg CO₂</td>
<td>198 kg CO₂</td>
<td>27 kg CO₂</td>
</tr>
</tbody>
</table>

Results

1633 kg CO₂ éq.
# Wood Solution

## Potential GHG emissions

<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity of materials</th>
<th>Potential GHG emissions</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood floor trusses with OSB</td>
<td></td>
<td></td>
<td>276 kg CO₂ éq.</td>
</tr>
<tr>
<td>Truss plates</td>
<td>0.05 tonnes</td>
<td>63 kg CO₂</td>
<td></td>
</tr>
<tr>
<td>Nails</td>
<td>0.04 tonnes</td>
<td>37 kg CO₂</td>
<td></td>
</tr>
<tr>
<td>OSB</td>
<td>75 m²</td>
<td>75 kg CO₂</td>
<td></td>
</tr>
<tr>
<td>Softwood lumber</td>
<td>0.9 m³</td>
<td>32 kg CO₂</td>
<td></td>
</tr>
</tbody>
</table>
ENVIRONMENTAL IMPACT OF WOOD

Solid wood sequesters CO₂. Life Cycle Assessments (or LCA) of building materials show the environmental impact of wood is lower than steel or concrete when compared with seven key measurements.
Lessons Learned

- Wood use legislation, ensure wood gets equal opportunity
- Forestry community commitment to wood structures
- Building code advancement
- Wood system testing for updated codes
- Wood design education and training
  - Architects, engineers, contractors
  - Building code and fire officials
- Supplier development and support (CLT)
- Demonstration projects require some funding
- Promote sustainability and carbon benefits
- State and federal government focus