Overview

• Canadian fibre supply
  – land base, production and trade

• End-use markets
  – Lumber, wood based panels and engineered wood products / composites
    • Residential, R&R, non-residential and industrial
  – Bio-energy and bio-chemicals

• The renaissance of our industry!
  – Product and system evolution / revolution
    • The Green Economy (?)
    • Social change (?)

Objectives…

By the end of this presentation you should be able to describe:

– The trends in “commodity” versus “value added” forest products
– The advantages of engineered wood products / systems
– The concept of the “three-legged-stool”; economic, environmental and social objectives of the forest industry
– The concept of “bio-pathways”
Overview of the Canadian forest sector

Forests of Canada

- 396.4 M hectares
  - 166.2 M certified
  - 37.3 M national parks
- 2016 (hectares):
  - 0.78 M harvest (110 M m³)
  - 17.6 M lost to insects
  - 1.4 M lost to fires
- 67% coniferous, 16% mixed wood and 11% hardwood
- 94% publicly owned
- 30% of the world’s boreal forest


Forests of Canada

Source: BC Archives
Forest industry in Canada—key facts

- Forest Sector Revenues (2014)
  - Forestry and logging $ 9.3 Billion
  - Pulp & paper $24.5
  - Wood products $26.5
- Contribution to GDP: $20.3 Billion
- Balance of Trade (2015): $22 Billion
- Average Wage per Employee (2011): $52,673
  - 16% above the national average
- Jobs (2015): 296,691
- Jobs (2013): 361,564
- Research and development (2011)
  - Wood Products Manufacturing: $95.5 Million
  - Pulp and Paper: $56
  - Forestry and Logging: $ 6

Source: FPAC; The State of Canada’s Forests, 2016 Annual Report

Structural changes in (or affecting) supply

- US housing collapse
- Drop in newsprint consumption
- Rise in lower grade demand (China, bioenergy)
- Rise in CDN $ value against US currency
- Annual allowable cut drops
  - Recently Ontario and Quebec; pending in BC with the MPB
- Increasing fiber costs
- Decreasing fiber quality
- Increasing natural disturbances
Wood supply cost in Canada


Global fibre supply changes

Source: Pöyry
Canada forest products exports

Source: Global Trade Atlas

BC / rest of Canada lumber production

Source: Statistics Canada

Canada lumber exports

Source: Global Trade Atlas
Canada lumber exports

![Graph showing Canada lumber exports over time]

Source: Global Trade Atlas

Some context: wood-use in the U.S.

<table>
<thead>
<tr>
<th>End-use</th>
<th>Lumber (bdrl)</th>
<th>Structural panels (bdrl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Residential</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>Repair and Renovation (R&amp;R)</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>Non-residential</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Industrial</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>63</td>
<td>42</td>
</tr>
</tbody>
</table>

Source: RISI, Boston, Massachusetts

U.S. housing starts

![Graph showing U.S. housing starts]

Source: US Bureau of the Census
‘Stick-built’ platform frame construction

The average cost of rough framing, sheathing, soffit, and door / window installation is as low as $8 per sq. ft. ($16,000 for a 2,000 sq. ft. home)

‘Pre-fab’ platform frame construction

Move to 6-story multi-family

Library Square, Kamloops, BC, 2010

Source: WoodWorks
Move to 6-story multi-family

Testing of 6-storey 2x4 construction in Japan

Source: FPInnovations

Move to 6-story multi-family

Residential, University of BC

Source: Adera, Vancouver, BC

Six story hybrid wood-concrete

Quebec, QC 2010

Source: FPI, Quebec
Six story hybrid wood-concrete

Concrete cores/walls to resist lateral loads

Glulam post & beam

+ Three levels of parking (concrete)

Source: FPI, Quebec

Chris Gaston     November 2018

Five story hybrid wood-concrete

Earth Sciences Building, UBC

Source: Perkins + Will

Chris Gaston     November 2018

Five story hybrid wood-concrete

Earth Sciences Building, UBC

Source: Perkins + Will

Chris Gaston     November 2018
Consumer reaction to Canadian softwoods

Source: FPInnovations

Cross laminated timber

Source: FPInnovations

Kobe-level seismic test

Source: FPInnovations
“We are in a unique moment in architectural and building engineering history when shifting world needs has asked us to question some of the fundamentals of how we have built for the last century and how we will build in the next.”

Michael Green
Tall wood structures

UBC Brock Commons

Source: https://www.naturallywood.com

Eight-story condominium—Portland, Oregon

"...made with mass timber that accounts for 223 metric tons of avoided carbon dioxide emissions, while also storing 577 metric tons of CO2 in the wood itself. That’s the equivalent to taking 169 cars off the road for one year."

Source:

18-story high-rise—Norway

“It took 12,000 trees to make the manufactured structural elements for the building.”

The state legislature earlier this year called on the Washington State Building Code Council adopt rules for CLT use when building residential and commercial buildings. The move represents ongoing efforts to bring CLT into mainstream use for residential and commercial construction, which would create commercial value for the small-diameter trees that are contributing to poor forestland health in Washington state.

It’s value was recognized by the state Department of Natural Resources in its 20-year forest health plan as a way to minimize project costs.

Source: TJ Martinell, July 2018

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Tokyo 70-story building announced!

Sumitomo Forestry (90% wood, 10% steel)


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Wood pellets

Source: www.pellet.org
Industry transformation

Forest Industry Transformation (IFIT) program provides significant industry support to help with the "valley of death".
Life cycle assessments

Economic, environmental and social

Wood-plastic composites
Plastic-wood composites

Chemically modified (acetylated) wood

Source: Accsys Technologies

Pulp-based hybrids

Source: https://www.dascanova.com/en/home.html
**Light weight panels / partition walls**

![Light weight panels / partition walls](image)

Source: http://www.gutex.de/en/Products/Installation_and_Product_Information/

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**Wood fibre insulation**

Steico, Actis, Pavatex, Gutex and others

Source: http://www.gutex.de/en/Products/Installation_and_Product_Information/

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**Bio-plastics**

![Bio-plastics](image)

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Biodiesel

Rudolf Diesel designed his engine in Germany in 1893 running on nothing but peanut oil.

Biochemicals / bioproducts

Nanocrystalline Cellulose
Advancing the Canadian Bioeconomy

Cellulose Filaments:
An exciting opportunity for Canada’s forest sector.
Star Trek replicator

Source: http://www.technewsworld.com/story/83035.html

3-D printing

Source: http://www.collective-evolution.com/2014/03/22/scientists-develop-3d-printer-that-can-build-a-house-in-24-hours/

3-D printing
4-D printing… the addition of time

**4D PRINTED WATER PIPES**

Sultan Teknol is trying to program water pipes that contract and expand like muscles, Teknol’s pipes can expand and shrink in response to changes in water volume, and circulate eventually. The goal is a “self-regulating system,” where pipes could even repair themselves in cases of a puncture.

Source: http://www.smithsonianmag.com/innovation/

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The 4th industrial revolution!

**1st**
Mechanisation, water power, steam power

**2nd**
Mass production, assembly line, electricity

**3rd**
Computer and automation

**4th**
Cyber Physical Systems

Source: https://www.simfactory.io/news/what-is-industry-4-0-and-how-did-we-get-here/

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Aboriginal Capacity Building

B.C. Coast Carved Door Case Study

Chris Gaston, PhD
Economic, environmental and social

Opening Doors!


A partnership approach

Traditional Aboriginal Doors

WRC harvesting: Nuxalk Nation lands at Bella Coola, BC
Nuxalk Nation WRC lumber milling and kiln drying

WRC edge-glued door panels: the canvas

Door carving at the Aboriginal Gathering Place, Emily Carr University of Art + Design
Door carving at the Aboriginal Gathering Place, Emily Carr University of Art + Design

Carving instructor Xwalacktun (Squamish / Kwakwaka’wakw)

WRC door panels, near completion
WRC door panels, near completion

WRC door panels, finished door

Yellow cedar door panels
Ready for exhibition

Door panel scanning for CNC reproduction

The making of “limited edition prints”
Opening Doors exhibition in Vancouver

Opening Doors, the Roundhouse, Yaletown

Opening Doors exhibition in Vancouver
Parliament Building, Ottawa

BC Wood Global Buyers Mission

Media attention

Governor General visit March 03, Aboriginal Gathering Place, Emily Carr University of Art + Design.

Japan Home Show

Robot technology (CAWP)
3-D carving

Questions?

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