FOREST INDUSTRY, FORESTRY AND BIOENERGY IN FINLAND

Canadian bioenergy mission to Finland
Ahti Fagerblom, Manager, Energy and Climate Policy

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FOREST INDUSTRY IN FINLAND

• The sector employs directly 42,000 people in Finland and abroad approx. 50,000 people

• Significant indirect effects for other sectors
  – Important customer of products and services of other industries and transportation
  – Industrial core for business services (maintenance etc.)

• The forest industry directly and indirectly employs approximately 160,000 Finns
FINLAND'S TOP EXPORT PRODUCTS

1. Paper and paperboard 7,0 bill. EUR
2. Diesel fuel 3,4 bill. EUR
3. Stainless steel 2,5 bill. EUR
4. Wood pulp 1,8 bill. EUR
5. Motor vehicles for personal transport 1,7 bill. EUR
6. Softwood sawnwood 1,6 bill. EUR
7. Electric generators and motors 1,3 bill. EUR
8. Special machinery 1,0 bill. EUR
9. Earth movers and excavators and other similar machinery 1,0 bill. EUR
10. Electricity transformers and frequency changers 1,0 bill. EUR
VALUE OF FOREST INDUSTRY EXPORT AND SHARE OF TOTAL FINNISH EXPORTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Value of exports, billion EUR</th>
<th>Share of total Finnish exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>11 650</td>
<td>21.6%</td>
</tr>
<tr>
<td>2014</td>
<td>10 300</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>9 100</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>7 250</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>5 400</td>
<td></td>
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<tr>
<td>2010</td>
<td>3 800</td>
<td></td>
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<tr>
<td>2009</td>
<td>2 400</td>
<td></td>
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<tr>
<td>2008</td>
<td>1 800</td>
<td></td>
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<tr>
<td>2007</td>
<td>1 300</td>
<td></td>
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<tr>
<td>2006</td>
<td>1 100</td>
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<tr>
<td>2005</td>
<td>1 000</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>9 100</td>
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FOREST INDUSTRY IS IMPORTANT IN THE REGIONS

Top 5 regions

<table>
<thead>
<tr>
<th>Region</th>
<th>Share</th>
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</thead>
<tbody>
<tr>
<td>South Karelia</td>
<td>70 %</td>
</tr>
<tr>
<td>Kymenlaakso</td>
<td>51 %</td>
</tr>
<tr>
<td>Central Finland</td>
<td>38 %</td>
</tr>
<tr>
<td>North Karelia</td>
<td>33 %</td>
</tr>
<tr>
<td>South Savo</td>
<td>31 %</td>
</tr>
</tbody>
</table>

Average for the whole country: 19 %

Share of Gross Value of Manufacturing, 2014:
- 35 – 75 (3)
- 25 – 35 (5)
- 15 – 25 (4)
- 5 – 15 (6)
- 0 – 5 (1)
FORESTS COVER 60% OF THE TOTAL AREA IN FINLAND

- Forest land: 60%
- Inland watercources: 10%
- Low-productive forests: 10%
- Scrub land: 7%
- Agricultural land: 8%
- Build-up areas: 3%
- Transport routes: 2%
- Agricultural land: 8%
MAINTENANCE OF FOREST RESOURCES IN A LONG TERM IS ESSENTIAL TO DEVELOPMENT OF WOOD-BASED BIO-ECONOMY

We use only domestic tree species in regeneration

SOURCE: Luke
PRIVATE FOREST OWNERS OWN 65 % OF FOREST LAND

- State: 26%
- Non-industrial private: 60%
- Companies: 9%
- Others: 5%

SOURCE: Luke
THE GROWTH OF FINNISH FORESTS

FOREST BALANCE IN FINLAND 1960-2014

Mill. m³

- Annual increment
- Total drain
- Industrial roundwood

SOURCE: Luke
FOREST MANAGEMENT AND CHAIN OF CUSTODY CERTIFICATION

• PEFC and FSC certification (FM and CoC) schemes essential to our sustainable business
  – Forest industry participates actively in different global and national process under both certification schemes

• PEFC certification
  – More than 85% of commercial forests (almost 18 M ha)
  – Forest ownership structure in Finland has been a driving force in certification under PEFC

• FSC certification
  – About 7% of commercial forests (1.5 M ha): Tornator’s, UPM’s, Metsä Group’s own forests
  – Group certifications owned by the forest companies attract private forest owners
## INVESTMENT PROJECTS

**UPM, Lappeenranta**
- Biorefinery (biodiesel)
- 175 million EUR
- Ready 2015 January

**Stora Enso, Varkaus**
- Change from woodfree paper to packaging material and changes at the pulp mill
- 110 Million EUR
- Ready 2015

**UPM, Kymi**
- Pulp mill capacity increase
- 160 Million EUR
- Ready 2015

**Sappi, Kirkniemi**
- New powerplant
- 60 Million EUR
- Ready 2015

**Stora Enso, Sunila**
- Biorefinery, lignin separation
- 32 Million EUR
- Ready 2015

**Stora Enso, Varkaus**
- Wooden building elements, LVL
- 48 Million EUR
- Ready 2016

**UPM, Kaukas**
- Pulp mill improvements
- 50 Million EUR
- Ready 2016

**Metsä Group, Äänekoski:**
- Biorefinery / Softwood kraft pulp
- 1,2 Billion EUR
- Ready by 2017 Q3
- Additional investment: sulphuric acid plant, 20 mill. euros

**Kotkamills, Kotka**
- Change of production line PM2 from magazine paper to paperboard
- 100 Million EUR
- Start-up 2016 July

**Stora Enso, Imatra**
- New polyethylene extrusion coating plant and an automated roll warehouse
- 70 mill. euros
- Ready by end 2017

**Investment proposals:**

**Finnpulp Oy, Kuopio**
- Announced Feb 2015; new company
- 1,4 Billion EUR, softwood kraft pulp

**Kemijärvi Biorefinery**
- Announced Feb 2015, new company
- 700–800 Million EUR, softwood kraft pulp

**Kainuu biorefinery**
- Announced Dec 2015
- Pulp mill project, several location considered

**Kaidi biorefinery**
- Announced Feb 2016
- Biodiesel project in Kemi, Chinese investor
- 1 billion euros, start-up end of 2019

**Haapajärvi biorefinery**
- Announced in April 2016
- Biorefinery, softwood kraft pulp, 400 000 tonnes
- 500 million euro investment

**SOURCE:** Company announcements & press releases
ENERGY CONSUMPTION IN FINLAND, 2015

<table>
<thead>
<tr>
<th>Source</th>
<th>2015* TWh</th>
<th>Change%*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total energy consumption</td>
<td>361</td>
<td>-3.3%</td>
</tr>
<tr>
<td>Wood fuels</td>
<td>93</td>
<td>-1.8%</td>
</tr>
</tbody>
</table>

% change from previous year
* preliminary figures
RENEWABLE ENERGY SOURCES IN ENERGY CONSUMPTION IN FINLAND

<table>
<thead>
<tr>
<th>Year</th>
<th>TWh</th>
<th>Change%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015*</td>
<td>19</td>
<td>31.9 %</td>
</tr>
<tr>
<td>Small-scale combustion of wood</td>
<td>39</td>
<td>-0.4 %</td>
</tr>
<tr>
<td>Other forest industry by-products and waste products</td>
<td>37</td>
<td>-2.0 %</td>
</tr>
<tr>
<td>Black liquor and other concentrated liquors</td>
<td>16</td>
<td>-4.8 %</td>
</tr>
</tbody>
</table>

% change from previous year
* preliminary figures
WOOD PROCESSING – A CORNER STONE FOR NATIONAL ECONOMY AND CLIMATE SOLUTIONS

- Packaging
- Buildings and interior design
- Wood and other materials together
- Medicine and wellness
- Energy and biofuels
- Biopolymers and bio plastics
- Pulp and paper

The variety of climate friendly export products

The share of renewable energy produced by forest-based industry

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THE BIO-ECONOMY WHEEL OF FORTUNE

- Take responsibility
- Less CO₂
- Base for bio-economy
- Replace non-renewables
- More renewable energy
- Variety of products
- Organic
- New opportunities
- Economy ¥€$