On the use of biomass in the Finnish forest sector

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Outline

• Harvests and wood use in Finland, what has changed

• A glance to the investment plans & their impacts on the wood markets

• Some imaginary alternatives for getting more wood for *industrial use* without considerable increase in harvests

• Conclusions
There’s a lot of market hype, but:

Finnish forest industry used less wood in 2017 than in early 2000s

Only the chemical pulp output exceeds the former peak levels in Finland

Forest industry production, Mm³, Mt

Source: FAO (yr 2000), Natural Resources Institute Finland
Only chemical pulp output exceeds the former peak levels in Finland – also next year according to Luke’s forecast.

Forest industry production, Mm$^3$, Mt

Source: FAO (yr 2000), Natural Resources Institute Finland

Use of roundwood in the forest industry was in 2017 still below 2000 level.

Source: Natural Resources Institute Finland
Yet, the domestic wood harvests has increased from 2000 to 2017 by 11 million m³

3 reasons

Harvests in Finland have increased because of

1) Less roundwood imports

-5 Mm³ from 2000 to 2017
The forest industry uses more domestic roundwood

Harvests have increased because of

2) a heavy increase in use of roundwood for energy

+ 4.5 Mm3 from 2000 to 2017
More domestic roundwood also to energy production

Roundwood harvests for energy +4.5 Mm3 from 2000 to 2017

- Harvest: industry
- Harvest: industry + energy

Harvests have also increased because of

3) Forest industry makes less mechanical but more chemical pulp.

Chemical pulp needs about twice as much wood per tonne of pulp than mechanical pulp.
Decline in mechanical pulping has «freed» 3 Mm³ pulpwood

Use of wood for pulp making, Mill. m³

Source: Natural Resources Institute Finland

### Pulp mills

<table>
<thead>
<tr>
<th>Pulp mills</th>
<th>Chemical pulp (Millions tonnes)</th>
<th>Wood use (Millions m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaicel Fibers</td>
<td>Paltamo</td>
<td>0.6</td>
</tr>
<tr>
<td>Finnpulp</td>
<td>Kuopio</td>
<td>1.2</td>
</tr>
<tr>
<td>Boreal Bioref</td>
<td>Kemijärvi</td>
<td>0.5</td>
</tr>
<tr>
<td>Metsä Fibre</td>
<td>Kemi</td>
<td>0 – 0.6</td>
</tr>
<tr>
<td><strong>Pulp mills, total</strong></td>
<td></td>
<td><strong>2.3 Mt</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>13-16.5 Mm³</strong></td>
</tr>
</tbody>
</table>

### Biofuel plants

<table>
<thead>
<tr>
<th>Biofuel plants</th>
<th>Biofuels</th>
<th>Wood use (Millions m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanteleen Voima</td>
<td>Haapavesi</td>
<td>65 kt (ethanol)</td>
</tr>
<tr>
<td>North European Bio Tech</td>
<td>Kajaani II, Pietarsaari</td>
<td>60 Ml (ethanol)</td>
</tr>
<tr>
<td>Haapajärvi-Nivala</td>
<td>Nivala</td>
<td>130 kt (bio oil)+</td>
</tr>
<tr>
<td></td>
<td>gasified biomass</td>
<td></td>
</tr>
<tr>
<td>Sunshine Kaidi New Energy</td>
<td>Kemi</td>
<td>225 kt (diesel, nafta)</td>
</tr>
<tr>
<td>Green Fuel Nordic (GFN)</td>
<td>Lieksa</td>
<td>180 kt (bio oil)</td>
</tr>
<tr>
<td>Nurmes Biopark</td>
<td>Nurmes</td>
<td>?</td>
</tr>
<tr>
<td><strong>Biofuels total</strong></td>
<td></td>
<td><strong>&gt;&gt; 5 Mm³</strong></td>
</tr>
</tbody>
</table>
Plans that would mean increase in the use of pulpwood & residues are abundable

Pulp mill projects:  $+13 - 17\,\text{Mm}^3$
Biofuel plant projects:  $>5\,\text{Mm}^3$
Total:  $>>>18\,\text{Mm}^3$

Forest growth – removals was $\approx 23\,\text{Mm}^3$ in 2017, with new Äänekoski pulp mill not in full operation.

Proportionally more of the forest growth is utilized now than before
Reference forest management sinks ≠ reference GHG impacts of wood consumption

Removals & Forest net carbon sink & forest growth, % = removals/growth

Concerns about forest carbon sequestrating...

Compared to the reference period in the EU LULUCF policy, 2000-2009, the forest management in Finland was in 2017 more intensive*, because of

• domestic wood-based energy replacing fossil fuels
• more biomass from the domestic carbon stock instead of foreign one (the origin of carbon used has changed with decreased imports)

The ratio (removals/growth) used as a measure of intensity.
If such intensity of forest use was used as measure stick, not much room for additional industrial capacity investments without carbon sinks declining respect to that.

Investments would also show in the price of wood ↑↑↑

Tentative calculations with a Finnish forest sector model SF-GTM (Model in the process of calibration to a new base year!! The figures will change…)

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Potential market impacts of the pulp investments vary –
(preliminary, tentative results)

Possibilities to clear room for some new industrial capacity

• **What if** we wanted to get **5 Mm³ of additional wood** to forest industry, without increasing the domestic harvests: that would allow e.g. to feed an additional pulp mill.

Three imaginary options
Possibilities to get e.g. 5 Mm$^3$ wood for new industrial capacity without increasing domestic harvests

Three considerations

1) Fuelwood down

1) Take it from households?

- Often polluting & inefficient way to heat
- Low degree of added value (harvest -> chop -> burn)
- Not always a necessity (like many things in life…)

Yet, -Necessity in some rural regions: alternatives?
  - How to discourage the «non-necessary use »?
  - How to monitor: own use or gray business between neighbours?
  - May contribute to better forest management
  - 60 % birch and other deciduous
Possibilities to get e.g. 5 Mm³ wood for new industrial capacity without increasing the domestic harvests

Three considerations

1) Fuelwood down
2) Import more and export less of wood

Increase net imports

- Import 5 Mm³ more of roundwood or sawmill chips, particularly from the countries not in the LULUCF agreement = Russia.

- Problems & considerations
  - Political risk of continuity, which investors might not take
  - Some other EU countries likely to compete on this option
Possibilities to get e.g. 5 Mm³ wood for new industrial capacity without increasing harvests

Three considerations

1) Fuelwood down
2) Import more and export less of wood
3) Change the structure of the industry: sawlogs - pulwood

Some imaginary options

1) Fuelwood down
2) Import more and export less of wood
3) Change the structure of the industry: sawlogs - pulwood
Cycle more fibre to the process by shifting harvest to more sawlogs

<table>
<thead>
<tr>
<th></th>
<th>Roundwood for sawmills</th>
<th>Roundwood for pulping etc.</th>
<th>Sawmill chips for pulping</th>
<th>Total harvest</th>
<th>Total fibre</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>29.2</td>
<td>33.0</td>
<td>10.2</td>
<td>62.2</td>
<td>72.4</td>
</tr>
<tr>
<td>Alternative structure</td>
<td>39.1</td>
<td>23.1</td>
<td>15.2</td>
<td>62.2</td>
<td>77.4</td>
</tr>
<tr>
<td>Change</td>
<td>9.9</td>
<td>-9.9</td>
<td>5.0</td>
<td>0.0</td>
<td>+5.0</td>
</tr>
</tbody>
</table>

Assumed that for each 1 m³ of new sawlogs 50% goes to pulpwood. Some of that is from energy sector which gets sawdust etc. for exchange.

Considerations:
- Is this harvest schedule feasible (forest structure)
- Sawnwood & plywood production (Mm³/yr) should increase by ~ 5 Mm³
- Pulp production should decrease
- Leakage!! Changes in harvests and in the industry structure would roughly be matched with the opposite changes somewhere else.
- Markets decide what is produced.
Conclusions

• Due to the coming reference levels for the forest carbon sinks and pressures for increasing wood prices, i.e., both economic and environmental reasons, there is rather limited room for new forest industry capacity investments.

• By changing the structure of the wood use would give some possibilities to increase use in the forest industry (energywood>pulpwood, domestic >foreign, pulpwood>sawlog).

• Obstacles: markets & challenges of policy design. We do not live in the central planning economy.

Last but not least: leakage!! Whatever Finland does, there is almost a similar opposite move elsewhere.