Forest Bioenergy: Markets & Trends

Francisco X Aguilar, Ph.D.
Associate Professor, The School of Natural Resources
University of Missouri, USA
Share of Wood Energy in TPES

Share of Wood Energy in RES

Wood Energy: Sectors

- Industrial: 48%
- Residential: 35%
- Power & heat: 15%
- Others: 2%

US Pulp and Paper Production & Industrial Wood Energy Consumption

Source: Aguilar et al. 2011
Primary Energy Production in the EU-27: Wood and Wood Waste

46.6% increase from 2002

Source: Eurostat (2013)
Wood Energy: Markets

- Local
- Regional
- International

Higher energy density, lower humidity: lower transport costs
## Wood Energy: Feedstocks

<table>
<thead>
<tr>
<th></th>
<th>Wood chips</th>
<th>Wood pellets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net calorific value</td>
<td>10 GJ/ton</td>
<td>17.5 GJ/ton</td>
</tr>
<tr>
<td>Bulk density</td>
<td>290 kg/m³</td>
<td>650 kg/m³</td>
</tr>
<tr>
<td>Energy density</td>
<td>2.9 GJ/m³</td>
<td>11.4 GJ/m³</td>
</tr>
</tbody>
</table>

Source: Reesinck, GF Energy (2010)
Wood Pellet Facilities in North America

Map generated based on plant location information from wood2energy.org & biomassmagazine.com
Exponential growth strongly driven by EU 2020 targets

### Wood Pellets Trade (kilotonnes)

<table>
<thead>
<tr>
<th>Exporter</th>
<th>Importer</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>EU-27</td>
<td>14</td>
</tr>
<tr>
<td>Belarus</td>
<td>EU-27</td>
<td>100</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>EU-27</td>
<td>47</td>
</tr>
<tr>
<td>Canada</td>
<td>United States</td>
<td>40</td>
</tr>
<tr>
<td>Canada</td>
<td>Japan</td>
<td>50</td>
</tr>
<tr>
<td>Canada</td>
<td>South Korea</td>
<td>50</td>
</tr>
<tr>
<td>Canada</td>
<td>EU-27</td>
<td>1.160</td>
</tr>
<tr>
<td>Croatia</td>
<td>EU-27</td>
<td>115</td>
</tr>
<tr>
<td>Egypt</td>
<td>EU-27</td>
<td>10</td>
</tr>
<tr>
<td>EU-27</td>
<td>Norway</td>
<td>18</td>
</tr>
<tr>
<td>EU-27</td>
<td>Switzerland</td>
<td>39</td>
</tr>
<tr>
<td>EU-27</td>
<td>EU-27</td>
<td>4.403</td>
</tr>
<tr>
<td>New Zealand</td>
<td>EU-27</td>
<td>30</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Japan</td>
<td>10</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Australia</td>
<td>30</td>
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<tr>
<td>Norway</td>
<td>EU-27</td>
<td>13</td>
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<tr>
<td>Russia</td>
<td>EU-27</td>
<td>475</td>
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<td>Serbia</td>
<td>EU-27</td>
<td>47</td>
</tr>
<tr>
<td>South Africa</td>
<td>EU-27</td>
<td>43</td>
</tr>
<tr>
<td>Southeast Asia</td>
<td>Japan</td>
<td>10</td>
</tr>
<tr>
<td>Southeast Asia</td>
<td>South Korea</td>
<td>10</td>
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<tr>
<td>Ukraine</td>
<td>EU-27</td>
<td>149</td>
</tr>
<tr>
<td>United States</td>
<td>EU-27</td>
<td>1.001</td>
</tr>
</tbody>
</table>

EU-27 Imports of Sawdust & Wood Waste & Scrap, whether or not agglomerated*

*in logs/briquettes/pellets/similar forms
(Commodity Code: 440130)
Imports to the EU-27 from the Russian Federation (Commodities 440130 & 440110)

440130: Sawdust & wood waste & scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms
440110: Fuel wood, in logs, billets, twigs, faggots or similar forms

Source: UN Comtrade, as reported by the EU
Prices Industrial Wood Pellets (CIF)

Source: Industrial wood pellet information also available from Argus Biomass Markets (argusmedia.com)
Wood Energy: Outlook
U.S. Renewable Energy Supply

Source: Short-Term Energy Outlook, May 2013

Note: Hydropower excludes pumped storage generation. Liquid biofuels include ethanol and biodiesel. Other biomass includes municipal waste from biogenic sources, landfill gas, and other non-wood waste.
United Kingdom

- Big role for bioenergy:
  - “sustainably-sourced bioenergy could contribute by 2020 around 8-11% to the UK’s total primary energy (TPE) demand and around 12% by 2050”
  
  Source: DECC’s UK Bioenergy Strategy, April 2012

- Public policy instruments:
  - Renewables Obligation Credits: Require investments by power utilities
  - Carbon Price Floor: Disincentives for generating electricity from fossil fuels

Source: Hawkins Wright

Positive prospects in Germany, Denmark
South Korea

- Renewable Portfolio Standard
  - <4% in 2011
  - 6.1% in 2020
  - 11.5% by 2030
- Strict penalties for lack of compliance
- Three of KEPCO’s five regional generators plans to use pellets for co-firing
- Current pellet consumption is negligible, but future pellet demand may reach:
  - 1.6 million tons by 2014/15
  - 4.5 million tons by 2020

Source: Hawkins Wright
Japan

- Immediate need to replace nuclear energy capacity.

- Expressed biopower target capacity by 2030: 6.0 GW

- Generous feed-in tariffs introduced in July 2012 (>300/MWh).
  - Pulp & paper sector expressed interest in biomass projects
  - Not clear how power utilities will respond

- Japan still has 35.0 GW of coal-fired capacity.

Source: Hawkins Wright
Wood Pellet Capacity and Production in Canada 1997-2012

Source: CANBIO 2012, Wood Pellet Association of Canada 2013 (Courtesy W. Mabee)
USA: Natural Gas Electric Power Prices

Source: U.S. Energy Information Administration
Final Remarks

- Wood energy salient share of renewable energy production in the ECE region
- Local vs. regional & intl. markets; sectors:
  - Industrial: Closely correlated with product output
  - Residential: Strong function of alternative energy sources
  - Power: Driven by policy decisions (e.g. RPS targets, carbon prices), energy markets
- EU-27 main global market, good prospects in Asia
- Exponential growth in wood pellet trading, large investments, but risk of over capacity
- Will prospects materialize? Public policy commitments; Impact of low-cost natural gas; Hedging against potentially higher fossil fuel prices.
Thank You

Francisco X. Aguilar, Ph.D.
Associate Professor
The School of Natural Resources
University of Missouri
Columbia, MO
USA 65203

aguilarf@missouri.edu