TRADE OF SOLID BIOFUEL, AND FUEL PRICES IN EUROPE

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International trade and fuel prices of solid biofuels

- Study was carried out by the AFBnet- European bioenergy network (now EUBIONET) in 1999
- Summary report and 20 country reports published in internet (http://afbnet.vtt.fi - publications, Task 2)
- European international trade volume is about 50 PJ/a.
- Estimated biomass resources 4 500 PJ/a and current use 1800 PJ/a

EUBIONET - European bioenergy networks
BIOMASS TRADE IN EUROPE

EUBIONET - European bioenergy networks
Biofuel trading in large-scale

COMPANY WITH DIVERSIFIED ACTIVITIES
- biofuels
- wood for industry
- energy production

Purchase from wood processing industry
- Cutter shavings
- Grinding dust e.g.
- Sawdust
- Bark
- Chips from edgings, slabs
- Cutter shavings

CUSTOMER
- Municipal CHP plant
- Industrial CHP plant

CONTRACTORS
- Wood fuel harvesting/bundling/baling/chipping
- Logistics
- Global positioning systems
- Fuel quality control

Wood fuel harvesting/bundling/baling/chipping
- Wood chips
- Straw bales
- Logging residue bundles

Trade basis: energy content and measured properties (€/MWh, €/GJ)
Biofuel trading - Small-scale district heat

- Purchase from Wood processing industry
- Endings Slabs Wood chips Rotten wood
- CUSTOMERS • Communities (< 1 MW) • SME

ENTREPRENEUR OR CO-OPERATIVE
- BIOFUELS
- Services Operation and maintenance
- Wood chips Small straw bales

- Trade basis: Heat production (€/MWh, €/GJ)

FUEL HARVESTING
- CHIPPING
- TRANSPORTATION

RA di ato rs
- Trade basis: Heat production (€/MWh, €/GJ)
Biofuel trading for households, farms etc.

FUEL PRODUCER = SUPPLIER

BIOFUELS

- Logs
- Wood chips
- Straw bales

CUSTOMERS
- Households
- Farms

Most of fire wood is not traded (purchase from own forest or “black markets”)

ELECTRONIC BIOFUEL MARKET PLACE e-trade

Biofuel database
- suppliers
- volumes
- typical properties

Order via Internet

Trade basic: Volume or package basis (€/m³ loose, €/m³ stacked)
Why international trading?

- Surplus or lack of own biomass resources
  - Denmark; use of pellets bigger than own production
  - Sweden; over capacity of pellets
  - Netherlands; lack of own biomass resources

- Better prices from abroad
  - In Baltic countries and some CEE countries prices of fossil fuels are low
    ⇒ poor competitiveness of solid biofuels in domestic market
    ⇒ better price by exporting

- National support incentives boost trading
  - Big differences in support mechanisms in Europe
  - Germany; new RES-E act; energy producer can pay high price for solid biofuels (4-9 EUR/GJ)
  - CO₂ taxes in fossil fuels (Sweden, Denmark and Finland)
    ⇒ imported fuels may be cheaper than own production
Problems

- No good information on spot markets
  - no good statistics of biofuel prices and traded amounts
  - difficult to calculate the influence of different support mechanisms on fuel price

- Influence on other biomass resource markets
  - forest industry and energy sector can start competing with each other for use of wood resources
  - there can be also influence on material recycling

- Biofuel standardisation needed
  - ongoing work in CEN TC 335-Solid biofuels
Local or internationally traded?

- Forest chips and straw are local fuels
  - high transportation costs (30–50% of total cost)
  - low calorific value per volume (moisture content 50%)
  - bundling can be integrated into timber and pulp wood procurement chain ⇒ same equipment and logistics management can be used in forest haulage and on-road transportation
  - straw needs special boilers and bale handling systems

- Refined biomass fuels are more suitable for international trading
  - high calorific value per volume (3 times higher than forest chips)
  - homogenous material suitable for pneumatic unloading
  - production capacity is increasing
  - can be crushed and used also by cofiring with coal in pulverized combustion boilers
  - liquid biofuels for heating (e.g., pyrolysis oil) under development
Transportation costs of logging residues chips €/GJ (Finland)

- Logging residue, loose
- Chipping at road-side terminal
- Bundling of logging residues
- Chipping at a stand
Storage space need for different biofuels
Comparision with light fuel oil

10 MWh = 1 m³ light fuel oil = 36 GJ

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Storage Space, m³/10 MWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>1</td>
</tr>
<tr>
<td>Wood chips (bark, dry)</td>
<td>3.2</td>
</tr>
<tr>
<td>Wood chips, bundler</td>
<td>8.4</td>
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<tr>
<td>Logging residue chips, dry</td>
<td>11.5</td>
</tr>
<tr>
<td>Logging residue chips, fresh</td>
<td>11.5</td>
</tr>
<tr>
<td>Logging residue bundler</td>
<td>12.5</td>
</tr>
<tr>
<td>Sod peat</td>
<td>8</td>
</tr>
<tr>
<td>Milled peat</td>
<td>11</td>
</tr>
<tr>
<td>Shredded bark, dry (birch)</td>
<td>8</td>
</tr>
<tr>
<td>Shredded bark, fresh (pine)</td>
<td>21</td>
</tr>
<tr>
<td>Big straw bale</td>
<td>19</td>
</tr>
</tbody>
</table>

10 MWh = 1 m³ light fuel oil = 36 GJ
### Example

**Wood fuel prices - €/GJ for DH plants (1 - 5 MW<sub>th</sub>) in 1999**

<table>
<thead>
<tr>
<th>Country</th>
<th>Wood chips</th>
<th>Bark, sawdust, chips</th>
<th>Wood pellets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>4.50</td>
<td>4.20</td>
<td>5.00</td>
</tr>
<tr>
<td>Finland</td>
<td>3.00</td>
<td>1.60</td>
<td>7.50</td>
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<tr>
<td>Germany</td>
<td>3.70</td>
<td>3.10</td>
<td>6.10</td>
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<tr>
<td>Sweden</td>
<td>3.40</td>
<td>2.90</td>
<td>4.80</td>
</tr>
<tr>
<td>France</td>
<td>4.00</td>
<td>1.10</td>
<td>10.60</td>
</tr>
<tr>
<td>Latvia</td>
<td>1.60</td>
<td>0.80</td>
<td>3.30</td>
</tr>
</tbody>
</table>
Conclusions

- New directives RES-E, WID and green certificates will boost trading
- More comprehensive analysis of solid biofuel trade is needed
- Development of customs statistics
  - Tariff nomenclature should to include different biofuels
- Continuous follow-up of biofuel prices
- International trading will change
  - Sweden from importer to exporter?
  - Competition between different countries: Germany, Denmark
  - Effect to forest industry; availability of wood raw material