Wood fuel market development in Northern Europe

EUBIONET2 - International training programme

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Wood fuels in Europe

- Consumption in 2002 (EU-15):
  - Total energy consumption amounts to 61.7 EJ/a (exajoule), of which 48.3 EJ/a are covered by the fossil fuels
  - Contribution of biomass was low, about 2.3 EJ/a, about 3.7% of total gross inland consumption
  - Only 1/3 of available solid biomass potential is in use
  - Contribution of biomass within the energy system varies between countries:
    - In Belgium and Italy about 1%
    - In Finland about 20%

- Focus in this presentation is in wood pellets and wood chips; Nordic countries, Baltic states and also some insights to Germany
BIOMASS TRADE IN EUROPE

- FOREST RESIDUES (sawdust, bark, chips)
- INDUSTRIAL BY-PRODUCTS
- DOMESTIC FIREWOOD
- REFINED WOOD FUELS (pellets, briquettes)
- PEAT
- OTHER (SRC, straw)

With permission of Bengt Hillring/SLU
Markets for upgraded solid bio-fuels

- Pellets and briquettes
- Clearly defined and uniform fuel properties (according standards)
- Allows the optimization of technologies (technical, economic and environmental criteria) appropriate to specific fuel property
- Known fuel quality → easier trading
- Steady quality: enables the optimization of transportations and delivery (channelling of both raw materials and end-products)
Markets for upgraded solid bio-fuels

- Large scale energy production units
  - Large CHP units that are often located in densely populated areas and outside biomass energy reserves
  - Cost-efficient transportation and storage support pellets and briquettes

- Small scale applications (<500 kW)
  - Standard fuel quality helps to adapt technologies; fully automatic performance
  - Enables over-regional fuel supply systems

- Upgrading and long transportations increase the costs

- However, well defined fuel quality is prerequisite for cost-efficient energy production
Markets for upgraded solid bio-fuels

- Rapid market expansion since the mid-90’s
- The main actors in European markets are:
  - Nordic countries: Sweden, Denmark, Finland
  - New member states within Baltic region: Latvia, Lithuania, Estonia, Poland
  - Germany, Austria
- In Nordic countries (Swe/Den) fuel demand is mainly in large scale (CHP and DH plants), in Germany and Austria pellets are mostly utilised in small scale (100-200 kW)
- Both can be better described as import markets
- In Baltic states and Finland: export markets
Pellet markets: Sweden

- Sweden is both the largest producer and consumer of pellets in the EU
- In 2004 approximately ¼ of the consumption was imported
  - From Baltic states, Germany, The Netherlands, Denmark, Finland, Norway and Canada
  - Markets: coastal market and inland market
  - Investments abroad to supply especially coastal CHP plants
Pellet market development, Finland, Sweden and U.K.

Pellet Production

Pellet Export

Domestic Pellet Consumption

Pellet Import

Data source:
European Pellet Centre
Pellet markets: Finland

- Finland is a net exporter of pellets
- In 2006 the production was about 300 kt/a
- Domestic demand only about 20-25%
- Produced pellets are exported mainly to Sweden, Netherlands and Denmark
- National markets are still immature but there is a positive development trend
- Need for market diversification
Pellet markets: Denmark

- In Denmark, the consumption of pellets doubled between the years 2001 and 2004
- Consumption increased in public buildings and residential sector
- Dependent on pellet imports
  - Main suppliers are Sweden, Estonia and Latvia
- Køge plant established in 2004 with the production of 180 kt/a
  - Uses wood residues from the flooring production
  - Pellets are used in Avedøre CHP plant
Pellet markets: Germany

- Markets are driven by small-scale consumers
- Both consumption and production doubled between 2002 and 2004
- Pellets imported about 25 kt in 2004; 97.6% from Austria
- Domestic production rapidly increasing and has already exceeded the consumption level -> imports might decrease
- Most of the consumers in Southern part of the country
- In Northern part it is expected that imports from the Baltic states as well as from Nordic countries will increase
Pellet markets: the Baltic states and Poland

- Latvia
  - Pellet production was 172kt in 2004
  - Wood energy represents about 22% of primary energy consumption
  - 12.5% of timber harvested is used in heating purposes
  - About 40kt of pellets was exported to Nordic countries

- Estonia
  - Pellet production in 2004 was about 100kt, most of that was exported to Sweden and Denmark
  - Limits of raw material availability
  - On-going conversion of oil boilers to biomass; domestic markets will develop

- Lithuania
  - Production of about 40 kt in 2004, mostly exported

- Poland
  - Production in 2004 was about 160kt; 90% exported to Sweden, Denmark and Germany
Woodfuels with medium variations in fuel properties

- Mechanical processing, e.g. chipping
- Lower energy density
- Transportation and storage will cost more; fuel is typically produced and distributed at the regional level (transportation less than 100-150km)
- Lower fuel production costs, higher technical efforts at plant
- Two main markets:
  - Large scale CHP and DH plants
  - Small scale applications
- Markets have been relatively stable
Markets of wood chips

- Markets: Pulp and paper manufacturing, board mills, energy production
- International trade much more limited than with pellets
- In 2003 largest exporters of chips for industry and energy were Germany, Latvia and Estonia
- Most of the German export was chips as raw material (total export in 2003 was about 2.15 Million m³)
- Export is decreasing because of rising domestic demand

Kaltschmitt & Weber 2006
(Biomass and Bioenergy 30)
Markets of wood chips

- Estonia and Latvia are the main exporters in Central and Eastern Europe; in 2003 they exported 2.4 million m$^3$ of wood chips
- Over 1/3 of total trade of chips and particles in EU 25
- Main importers are Sweden and Italy
- Italy uses chips mainly in furniture industry
- Opening of EU inside borders facilitates the development of international trade of woodfuels
Woodfuels with high variations in fuel properties

- Chopped firewood
  - Simple processing
  - High variations (moisture, dimension)
  - Often human work intensive
  - More technical effort in small scale
  - Time consuming
  - Local and regional markets, internet trade
  - Limited transborder trade, typically only between neighbouring countries/regions
  - Strong traditions, ownership of the resource, own use

Chopped firewood in Iceland
Woodfuels with high variations in fuel properties

- Needs fuel preparation (stationary crushing)
- Co-incineration e.g. with peat
- Expensive logistics
- Small market share
- Limited transborder trade
- Expanding local/regional markets

Lifting and hauling of stumps (Pictures: UPM)