Impacts of biomass use in forest areas in Europe

Workshop on balancing bioenergy production and sustainable forest management in Mountains Areas
Biomass for bioenergy

- 50% of world's wood, and 20% of European wood is used for wood fuel
- 10-15% of primary energy from biomass, about 60% for households
Wood use in Europe 2012, million solid m$^3$

Annual increment in growing stock: 315 Mm$^3$

Stock 25 717 Mm$^3$

- Natural drain: 37.1 Mm$^3$
- Firewood: 82.1 Mm$^3$
- Small-scale use of forest chips: 9.1 Mm$^3$
- Export of wood residues: 7.9 Mm$^3$
- Export of round wood: 35.1 Mm$^3$

- Forest chips for heat and power production: 29.2 Mm$^3$
- Import of round wood & chips: 68.5 Mm$^3$

- Domestic round wood for industry: 233.3 Mm$^3$
- Sawn timber: 97.7 Mm$^3$
- Solid biofuels in sawmill industry: 35.8 Mm$^3$

- Plywood: 3.6 Mm$^3$
- Chips: 3.2 Mm$^3$
- Sawdust and chips: 109.4 Mm$^3$
- Solid biofuels in plywood industry: 1.6 Mm$^3$
- Wood industry: 53.0 Mm$^3$

- Fibre and particle board: 51.5 Mm$^3$
- Chips export: 8.6 Mm$^3$
- Recovered paper: 79.3 Mm$^3$

- Solid biofuels in board industry: 7.7 Mm$^3$
- Pulp industry: 97.3 Mm$^3$

- Solid biofuels in chemical pulp industry: 9.9 Mm$^3$
- Mechanical and semimechanical pulp industry: 30.0 Mm$^3$
- Mechanical pulp industry: 66.1 Mm$^3$
- Black liquor: 66.1 Mm$^3$

- Energy use 246 Mm$^3$

Janne Keränen & Eija Alakangas, 2013
Forest bioenergy in a bioeconomy

The competition triangle:
No level playing field for bio-based chemicals and products

Energy Shift (with Solar and Wind)

- Petrochemical Industry
- Fuel, Electricity and Heat
- Bioenergy Biofuels

- Products
- Biomass
- Industrial Material use

Access to markets
Access to feedstock

- Energy tax
- Artificial competitiveness
- Comprehensiv support system at EU and national levels
- Integration into emissions trading system
- National implementations, biofuel quota act, tax reductions
- Renewable Energy Directive (RED)

Colour legend:
- Blue: Hurdles and barriers for industrial material use
- Red: Advantages and benefits for bioenergy/biofuels leading to hurdles for other sectors

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Something missing?

Energy shift (with Solar and Wind)

- Petrochemical Industry: 90% Energy tax
- Fuels, Electricity and Heat
- Bioenergy & Biofuels
- Artificial competition

- Raw Material Shift: Industrial Revolution
- Products
- Biomass
- Access to markets
- Access to feedstock

Sustainable Forest Management

Colour legend:
- Hurdles and barriers for industrial material use
- Advantages and benefits for Bioenergy/Biofuels leading to hurdles for other sectors
Energy use of wood increasing

Mantau et al 2010
Forest resources increasing

Trends in growing stock and carbon stock in Europe

Wolfslehner et al., 2013
Harvesting intensity in EU

Verkerk et al., 2015
Impact of bioenergy scenarios

Verburg et al., 2013
But how to combine biomass and protection?

Legend
- Increased restrictions
- Intensive
- Extensive

Verburg et al., 2013
... and ecosystem services?

Verburg et al., 2013
New markets - Carbon trade and bioenergy
Limits to multi-functionality?

- Protection
- Biomass
- Climate change mitigation
- Hunting
- Biodiversity
- Water resources
- Recreation
What Science
Can Tell Us

Forest Bioenergy
for Europe

Paavo Pelkonen, Mika Mustonen, Antti Asikainen, Gustaf Egnell,
Premod Kant, Sylvain Leduc and Davide Patronella (editors)
In a fragmented policy environment

EU-Seven Flagship Initiatives (till 2020)

Smart Growth:
- Digital Agenda*,
- Youth,
- Innovation Union

Sustainable Growth:
- Resource Efficiency,
- Industrial policy

Inclusive Growth:
- Skills and jobs*,
- Platform against poverty

Ten EU Commission priorities 2014–2019

- More democratic union
- Digital Single Market*
- Resilient Energy Union
- Employment*
- Internal market
- Climate change policy
- Energy policy
- Transport policy
- Employment policy
- Anti-pollution policy
- Product policy
- Competition policy
- Construction policy
- Trade policy
- Waste policy
- Free Trade
- Monetary Union
- Migration
- Stronger global actor
- Justice and fundamental rights

Forest-based sector value chain
## Policy impacts

<table>
<thead>
<tr>
<th>Policy</th>
<th>Description</th>
<th>Effects</th>
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<tbody>
<tr>
<td>Common Agricultural Policy and Rural Development Policy</td>
<td>They aim at the competitiveness of the primary sector and at promoting rural development, amongst other things by offering financing opportunities to farmers and forest owners.</td>
<td>Forestry measures and related activities aimed at producing forest energy wood can be directly financed. These policies determine the availability, types and costs of forest woody biomass to the energy sector.</td>
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<tr>
<td>Directive 2002/91/EC on energy performance of buildings</td>
<td>It promotes energy performance of new and existing buildings, for example by fostering the efficient use of installations like boilers and air-conditioners, and of renewable energies.</td>
<td>It stimulates demand for energy wood, since this is among the energy sources most broadly used for efficient heating technologies like the cogeneration of heat and electricity and district heating.</td>
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<tr>
<td>EU Emission Trading Scheme (Directive 2003/87/EC)</td>
<td>The core of EU climate change policy – it applies a market system to cost-effectively reduce greenhouse gas emissions. It applies a ‘cap and trade’ system: it imposes a limit to industries’ total emissions, and it allows trading the assigned ‘emission allowances’ which can be used to emit or can be sold on the market.</td>
<td>By putting a price on greenhouse gas emissions, it fosters the substitution of fossil fuels with less carbon-intensive energy sources, therefore strengthening the economic competitiveness of woody biomass and other renewable energy sources.</td>
</tr>
<tr>
<td>Renewable Energies Directive (Directive 2009/28/EC) and Biofuels Directive (Directive 2003/30/EC)</td>
<td>By establishing individual legally binding targets for the share of renewable energies consumed in the various EU Member States, they promote an increased use of renewable energy sources for all energy sectors and in particular for the transport sector.</td>
<td>They force EU Member States to increase the use of wood and other renewable energy sources to reach the mandatory targets.</td>
</tr>
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Impacts on forests

+ increased tending and thinning activities to improve resilience and stand quality
+ increasing the viability of the forestry sector and revenues
+ diversification of markets
- Intensified wood harvest may counteract with other ecosystem services
- Intensification of forest use may increase conflict with nature protection and other ES
- Stronger use of residues may increase nutrient loss
Opportunities

- Better quality of silviculture by making pre-commercial products economic
- Make use of non-commercial coppice and short rotation forests
- Make better use of underused resources in rural areas -> rural development
- Improve efficiency of local energy supply
- Increase local energy-self sufficiency and decrease dependence on fossil fuels
Threats

• Increased tension between use and non-use forests
• Segregation of forest ES?
• Illegal activities to get even more attractive?
• Removal of environmental assets, e.g. old trees, dead wood, residues
• Intensification and mechanisation of harvesting
• Nutrient loss on poor stands
• Afforestation of marginal land -> biodiversity loss
• Displacement effects to remote forest areas
What is needed

- Site assessment for suitability of forest stand for increased wood use -> hot-spot zoning of priority areas
- A realistic view on forest owners perspectives
- A concept of energy efficiency rather than energy provision
- A clear analysis of the CC mitigation potentials of forest bioenergy
- A clear understanding of cascade use and its potentials
- A coordinated policy framework for bioenergy-sustainability criteria
Thank you for your attention

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What does it mean for mountain forests?

- Wood mobilisation in remote areas
- Improved accessibility of forest areas
- Need to harmonise forest functions and ecosystem services
- But opportunities to increase resilience and adaptive management, e.g. in over-aged protection forests