Opportunities and challenges of forest bioeconomy

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Presentation outline

1. Main drivers and related concepts
2. Where are the possibilities and challenges?
3. An example: wood construction
4. EFI’s bioeconomy research
Why bioeconomy?

• Major environmental problems such as global warming.
• Over consumption of natural resources.
• Rapidly increasing human population.
• Need for (absolute) decoupling of natural resource use and environmental impacts from economic growth.

• (Forest) bioeconomy can be a part of the solution, but:
  • It has to be economically, environmentally and socially sustainable.

Bioeconomy is a tool, but an objective!
Circular economy (Ellen MacArthur Foundation: Towards Circular economy, vol.1”)

Biological materials (left):  
Technological materials (right):

More efficiency to bioeconomy from circular economy!

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Markets

• Biggest changes for decades are taking place in European forest bioeconomy markets.

• Some old products stagnating, new innovative bioeconomy products rising (e.g. textiles, chemical industry, …).

• Urgent need for foresight studies on the market development:
  • Hardy any existing/ongoing research.
  • Environmental, economic and social consequences of the market changes?
Diversification of the forest sector

Cross Laminated Timber (CLT)
> 15% average annual growth rate since 2007, despite the economic downturn!

Dissolving pulp
Substitution

- What is the environmental benefit, when renewable materials (e.g. timber) are replacing non-renewable ones (e.g. concrete, steel).
  - Avoiding fossil CO2 emissions from manufacturing and using these products.

- Substitution coefficients can have significant impact on CO2 balance of forestry, especially in the long run.

- High uncertainties and unknowns: especially new forest biomass based products.
"Intelligent" forest bioeconomy

Production possibility frontier 2015

To move from 2015 to 2030 frontier requires maximizing synergies and minimizing trade-offs

Ecosystem services (e.g. bd, carbon sinks)

Production possibility frontier 2030

Bioproducts (e.g. wood products, bioenergy)
• ”Intelligent” forest bioeconomy enables the move to higher production possibility frontier.

• Tools: circular economy, resource efficiency, substitution, new products, forest management, ...
Case example on the possibilities of forest bioeconomy:

Wood construction
Wood construction markets

- Traditionally used in single family buildings, especially in the Nordic countries.
- Increased use also in large-scale construction:
  - Multi-storey residential buildings
  - Office buildings
  - Schools
  - Hospitals
  - Industrial and sports halls, etc.

Metla building, Joensuu
Environmental benefits of wood

• Substituting wood for more energy intensive materials avoids larger fossil fuel consumption and consequent CO2 emissions.

• Trees sequester CO2 in forests, and store carbon in wood-based products.

- For each ton of wood products used instead concrete, there is an average emissions reduction of 2 tons of CO2 (Sathre & O’Connor 2010; see also Hurmekoski 2017).
What wood construction could mean?

- When assuming 100% market share of all buildings in Europe with 50% share of wood of building mass, this implies a 3.5% reduction of total EU CO2 emissions (Hurmekoski 2017).

- In addition to wood construction, reducing the impacts of other building materials such as concrete and steel are needed.
Conclusions

• Forest bioeconomy has interesting opportunities in different sectors such as:
  • Construction, textiles, plastics, chemicals, …

• Challenges but also possibilities in terms of sustainability:
  • Biodiversity loss, climate change mitigation including substitution, …

• Take challenges seriously, maximise synergies.
Strategic bioeconomy topics at EFI

• The future demand and supply of forest products, forest biomass and ecosystem services, and their implications for sustainable forest management as well as for afforestation and plantation forestry.

• Sustainability impact assessment and monitoring of forest-based products and services value chains.

• The future markets of increasingly diversified and cross-sectoral forest-based products and services as a result of socioeconomic and policy changes.

• The role of innovation and digitalization, and policies affecting sustainable bioeconomy development.
Thanks!