

Climate change mitigation as driver towards bioeconomy

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Presentation outline

- 1. EFI & Bioeconomy
- 2. Forests and climate
- 3. Bio-based products
- 4. Key messages



Bioeconomy programme at EFI

- Building a better understanding of future **markets** of forest products
- Assessing the **sustainability** of value chains for forest products and services
- Linking smart forest management to products and services under climate change
- Promoting science-policy dialogue on sustainable bioeconomy development



Forest Bioeconomy Network

Develop and circulate knowledge on bioeconomy, forests, and circular economy through:

- Collaboration: we facilitate cooperation across disciplines, connecting research and policy-makers
- Activities: we organize and distribute know-how online, meetings and courses
- Knowledge: we make knowledge available to research, policy and society
- Engage: we connect people and organizations join our research network
- Coordinated by: Camilla Widmark, SLU

Decoupling (UNEP's International Resource Panel)



Emission pathway consistent with limiting global warming to 1.5 degrees by 2100 (Rockström et al. 2017):



A global carbon law and roadmap to make Paris goals a reality

Carbon stocks and flows (Nabuurs et al.)



Forests, our most important biological infrastructure

- Covering 43% of EU land
- Key for biodiversity, water and soil
- Climate change mitigation effect equivalent to 13% of CO₂ emissions
- Main source of non-food, non-feed renewable biological resources



Climate Smart Forestry (CSF)

- Use triple S impacts sink, substitution and storage.
- Country differences: tailoring policies and incentives at the regional level one size does not fit all.
- Finding synergies between climate and other benefits (e.g., bioeconomy, biodiversity, recreation).

What CSF could contribute

- Current annual mitigation effect from EU forests via contributions to the forest sink, material substitution and energy substitution is estimated to be 569 Mt CO2/yr (i.e. 13% of total EU emissions).
- According to Nabuurs et al., it would be possible to achieve an additional mitigation impact through CSF of 442 Mt CO2/yr by 2050.

Wood construction

- For each ton of wood products used instead concrete, there could be an emission reduction of 2 tons of CO2.
- 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.



Wood-based fibres for a sustainable textile industry

- Global production of textile fibres:
 - 93 Mt (2016)
 - 250 Mt (2050)

• Carbon footprint from wood-based textile fibres can be significantly lower than synthetic ones



Substitution?

- Many roles: forest carbon sinks, wood products as carbon storage, substituting greenhouse gas intensive materials
- Contribution of wood products to mitigation not well understood
- Lack of up-to-date knowledge
- Need to understand impacts to develop optimal strategies for forests/forest sector to contribute to climate change mitigation



Results

51 studies: 433 separate substitution factors

Study area



Life cycle stages considered

Sectors and materials



Average substitution effects

Product categories	Average substitution effect kg C / kg C wood product	Average substitution effect kg CO2 eq. / kg wood product
Structural construction	1.3	2.4
Non-structural construction	1.6	2.9
Textiles	2.8	5.1
Other product categories	1 – 1.5	1.8 – 2.7
Average across all product categories	1.2	2.2*

* 95% of the substitution factors between [-1.3, 9.3]

From products to market level



Role of circularity in bioeconomy: Case textiles (Lauri Hetemäki)

- Bioeconomy alone is not enough, but the recycling and circularity has to be built already at the <u>design states</u> of new products and businesses
- Textile industry is a big sector, in which recycling is in a bad shape, or it does not even exist
- Circular bioeconomy requires that those businesses, like forest industry, which are entering the sector, have to start to establish <u>recycling institution</u>, together with customers and policy makers (c.f. paper recycling)



Climate change mitigation through product substitution: Participative backcasting on the uses of wood in Finland (Janni Kunttu)



- Sidestreams are mostly used for energy to date
- How to allocate wood flows for high DF material uses in the future?
- Technical development (energy efficiency, alternative energy sources) is one driver in this transition

7 key messages

- Use of wood and wood-based products is associated with lower fossil and process-based emissions when compared to nonwood products
- 2. Average substitution effect of 2.2 kg CO2 eq. / kg wood product
- 3. Balance between sinks and bioeconomy



Key messages

- "Close the loops" also with wood-based products
- Lack of knowledge on climate impacts of emerging forest products – textiles, packaging, chemicals
- **6. Better product portfolios** needed in the future for mitigation
- 7. SDG # 12 can maximise synergies and minimize trade-offs





Thank you!

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