

EUROPEAN FOREST INSTITUTE

Sustainable future through forest bioeconomy

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11.4.2018 WWW.EFI.INT

Outline

I. What is European Forest Institute?

II. How are forest products markets changing and what impacts will this have on the forest sector and society?

European Forest Institute

European forests

- Cover 43% of EU land
- Key for the sustainability of: biodiversity, water and soil
- Capture 13% of CO2 emissions
- Main source of non-food, non feed renewable biological resources



Owners of EFI

- Currently, a total of 28 European States have ratified the Convention on EFI.
- EFI has c. 115 member organisations in 36 countries.

Affiliate Members: Canada, P.R. China and USA

EFI Strategy 2025 and how we implement it



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Thematic framework

Bioeconomy, Governance & Resilience



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Science informed policies

 We want to increase the relevance and impact of forest-related research on European policies, and support policy makers and practitioners in the transition toward a circular, bio-based society.



EFI funding



Expertise and knowhow at EFI

Johanna Kokkola

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Core research tools at EFI

- Models
 ➢ EFI-GTM
 ➢ EFISCEN
- 2. Decision support tools ToSIA
- 3. Databases e.g., Forest Products Trade Flow Database
- 4. Thematic maps e.g., Forest maps and other
- 5. Policy support publications and events

For more info, please visit <u>https://efi.int/</u>

Structural changes in forest products markets

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Five ways of understanding 'forest-based bioeconomy'

Interpretation	Share of European experts
1. A vision for the future (substituting fossil resources)	75%
2. A concept to analyze and describe real changes (such as the diversification of the end uses of wood)	11%
3. A synonym for the forest sector	11%
4. A useful lobbying concept that, for instance, gives a new identity and critical mass for the bio-based sectors	3%
5. A problematic lobbying concept that, for instance, narrows down the perspective on forests to biomass and industrial uses	0%

What do the forest products encompass?

Products:

- 1. *Traditional products* (sawnwood, pulp, paper)
- 2. *Traditional products with newly increasing demand* due to changes in the operating environment, e.g., dissolving pulp
- **3.** *Novel products* or products with radical improvements, e.g., nanopulp and biopolymer derivatives, 2nd generation biodiesel, prefabricated CLT modules

What is the outlook for the bioeconomy products in Europe up to 2030?

- Most recent systematic outlook studies: EFSOS 2010; EUwood study (2010) – These are largely outdated
- So short answer: we do not know!
- Long answer: next slides

Market diversification



Market diversification – new products



Hetemäki & Hurmekoski (2016)

Technically, you can manufacture anything out of wood



Example – textiles value chain





Example - Competitive advantages of wood construction

- Benefitial strength-to-weight ratio of wood compared to concrete, which allows efficiency gains through industrial prefabrication that could address many pressures:
 - Efficiency (productivity, time of construction, overall construction costs)
 - Safety and quality (standardized working conditions)
 - Convenience (less disturbance for the surroundings of the construction site: traffic arrangements, dust and noise emissions)
 - Environment (climate & resource use)
- Government support due to societal interest that goes together with a high forest resource endowment (resources per capita)
- However, the soft values and environmental issues are not emphasised in the construction sector decision-making – perceived risks matter the most

30.11.2012, 8:02

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Vanhoista vessanpöntöistä syntyy taloja – korvaa perinteisen sementin

Puukerrostalojen rakentaminen yltyy buumiksi: suunnitteilla kymmenkertainen määrä nykyiseen verrattuna

Limestone Based Cement Reduces Energy Consumption and CO2 Production by 97 Percent

February 21, 2012 by Staff

The World's Most Advanced Building Material Is... Wood

And it's going to remake the skyline

Posted 02.26.2014 at 9:53 am

4.12.2012, 7:44

Uudella tekniikalla syntyy sementtiä kokonaan ilman päästöjä - ja halvemmalla

Puukomposiittituotteet mullistavat rakentamisen teknologian

15.5.2014

Kiinalaisfirma printtasi kymmenen taloa päivässä

Jättimäisellä 3d-tulostimella tehty talo maksaa vain 3 600 euroa

30.4.2014,9:36

What would 1-2% share of five global markets imply in 2030?

	Textiles	Construction	Biofuels	Biochemicals	Plastics and packaging	Total
Production value, billion €	1-6	4-46	4	4	4–15	18-75
Sawlog demand, million m ³		7-117				7-117
Pulpwood demand, million m ³	7-15				2	8-16
Byproduct demand, million tons		2	28-38	33-45	2	66–88

Production value:

- > 10–43% of the current forest industries
- Cf. projected decline of global graphic paper industry revenue of 5.5 billion euros by 2030

Wood use:

- > 2-21 % of current industrial roundwood use
- > Cf. primary wood vs. byproducts

Sustainability case – CO₂ emissions of construction

- <u>Cement</u> production accounts for 5% of total CO₂ emissions in the EU
 - Energy intensity requires a temperature of around 1,400 °C
 - Calcination process 1 ton of cement produced releases <1 ton of CO2
- Using wood to replace concrete and steel may reduce the emissions:
 - Substituting wood for more energy intensive materials avoids larger fossil fuel consumption (EE) and consequent CO2 emissions (EC) (substitution), in absolute terms
 - Trees sequester CO2 in standing forests through *photosynthesis*, and store the carbon in wood-based products for the duration of the life cycle of the product (storage)
 - Use of sidestreams for **bioenergy** (energy self-sufficiency) or for other products

Sustainability case – CO₂ emissions of construction

➢On average, building with wood compared to concrete can save around 30% (20-50%) of the embodied carbon of building products

➢As the emissions from cement and steel used for buildings is around 5% of the total EU CO₂eq emissions, wood construction could on paper save around 1.5%

≻How to interpret this figure?

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>Major uncertainties in the assumptions (modelling needed), e.g.

> What is a realistic market share?

➢ Rate of decarbonisation of the economy?

> Energy efficiency (life cycle emissions) matters the most

> Paris agreement necessitates taking all possible measures!

Take home points



> Outlook for traditional product markets incoherent

- Many new products emerging impact on the industry depends e.g. on the position of forest industry firms in the targeted value chains
- External factors decisive, such as climate, energy and land use policies, crude oil price, and innovation in competing industries in the energy, construction, chemicals, and textiles markets
- Surprisingly little academic (peer-reviewed) research on forest products markets, despite major structural changes
- >Long-term sustainability not self-evident, it needs to be guaranteed

References

- Hetemäki, L., and Hurmekoski, E. 2016. Forest Products Markets under Change: Review and Research Implications. Curr. For. Reports 2: 177–188. doi:doi:10.1007/s40725-016-0042-z.
- Hurmekoski, E., Lovric, M., Lovric, N., and Winkel, G. 2018a. Frontiers of the forest-based bioeconomy – a European Delphi stud. Submitted manuscript
- Hurmekoski, E., Jonsson, R., Korhonen, J., Jänis, J., Mäkinen, M., Hetemäki, L., and Leskinen, P. 2018b. Diversification of the forest-based sector: Role of new products. Submitted manuscript
- Jonsson, R., Hurmekoski, E., Hetemäki, L., and Prestemon, J. 2017. What is the current state of forest product markets and how will they develop in the future? *In* Towards a sustainable European forest-based bioeconomy – assessment and the way forward. *Edited* by G. Winkel. What Science Can Tell Us, European Forest Institute, Grano Oy, Joensuu, Finland. pp. 126–131.

Thank you!

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