



EUROPEAN FOREST INSTITUTE

# Outlook for forest bioeconomy markets

Lauri Hetemäki  
*Assistant Director*  
*European Forest Institute*

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Wanha Satama, Helsinki, 13 December 2017*

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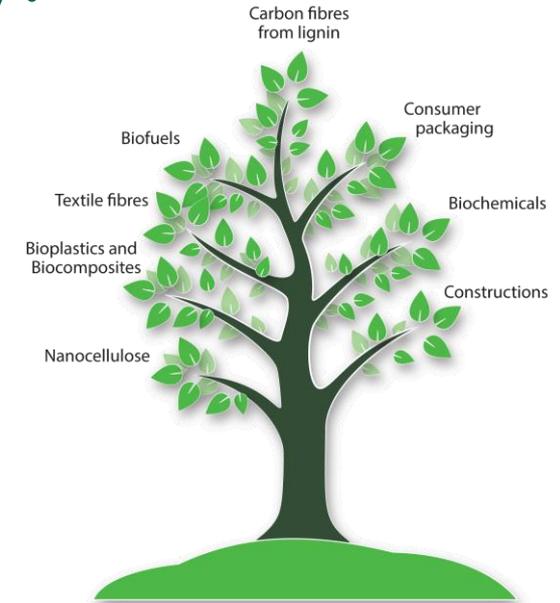
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# Outline

1. Background: why study bioeconomy markets?
2. Outlook for *traditional & novel* products
3. Bioenergy
4. Bioeconomy development: synergies and trade-offs
5. Implications

# What is forest bioeconomy?



- Many definitions of “bioeconomy”. To put it simply, using renewable *biomass* and *forests* (biome) for materials, energy and services
- Difference to past is new innovative, more resource-efficient and circular products and processes. They are a necessary for climate change mitigation, sustainability and helping world to live within the boundaries of our planet and resources (*circular bioeconomy*)

If you want to understand changes in forests,  
or environmental sustainability and circular bioeconomy,  
you have to consider also bioproducts & markets

Forest bioeconomy  
products:

- packaging
- buildings
- furniture
- chemicals
- food, medicine
- textiles
- heat, light, power
- *etc.*

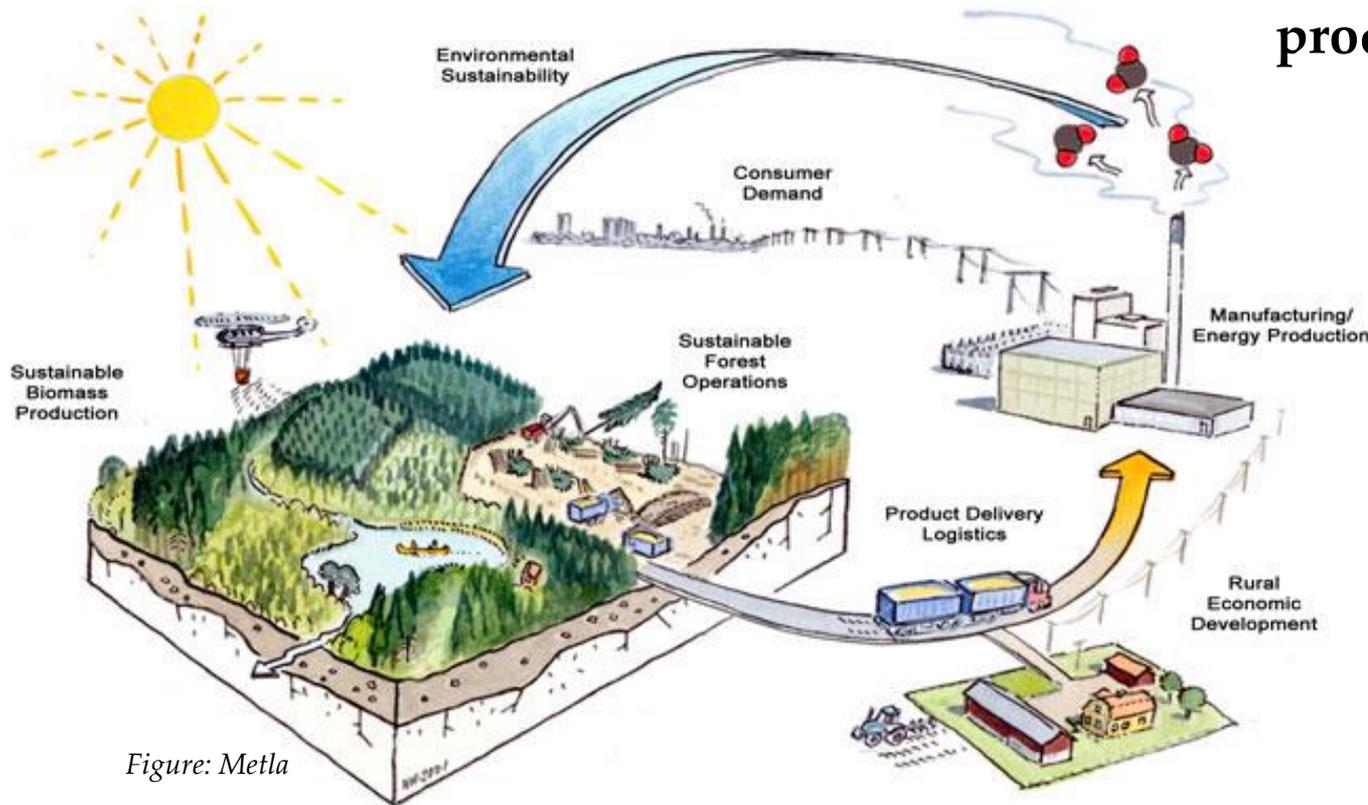


Figure: Metla

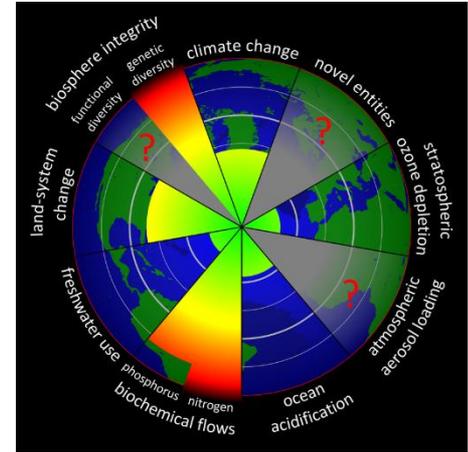
# To put it simple:

*Without knowledge and understanding of forest-based bioeconomy products and markets, we do not know how European forests will be developing in the future, and what happens to biosector jobs, incomes, etc.!*

*Yet, there is a general lack of interest on the topic by global forest research community, or any other research community  
– basically no or very little research*

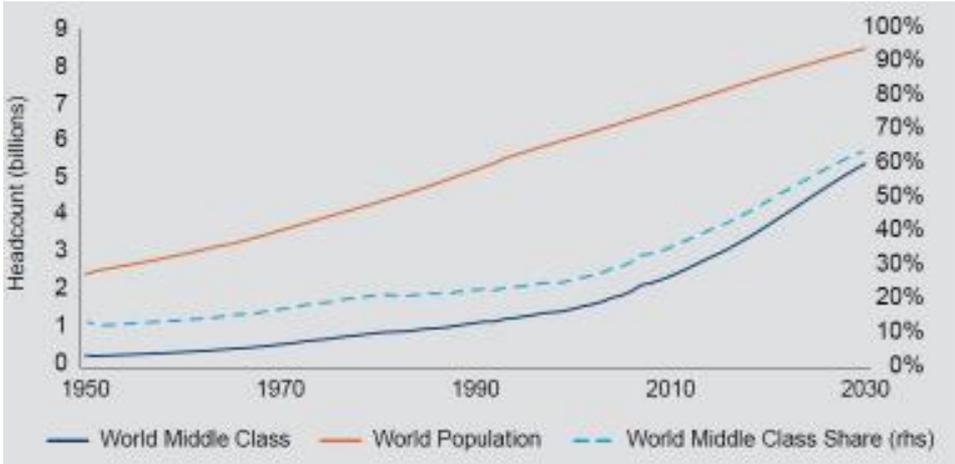
# Forest bioeconomy is going through major structural changes in coming decades, because...

- Population and income growth
- Climate change, its mitigation & adaptation
- Boundaries of our planet and resources
- Digital technology development (inc. AI, big data)
- New forest-based technologies (*biomaterials, forest management, etc.*)
- Services - the big megatrend of the 21<sup>st</sup> Century



Steffen et al., 2015. Planetary Boundaries. *Science*

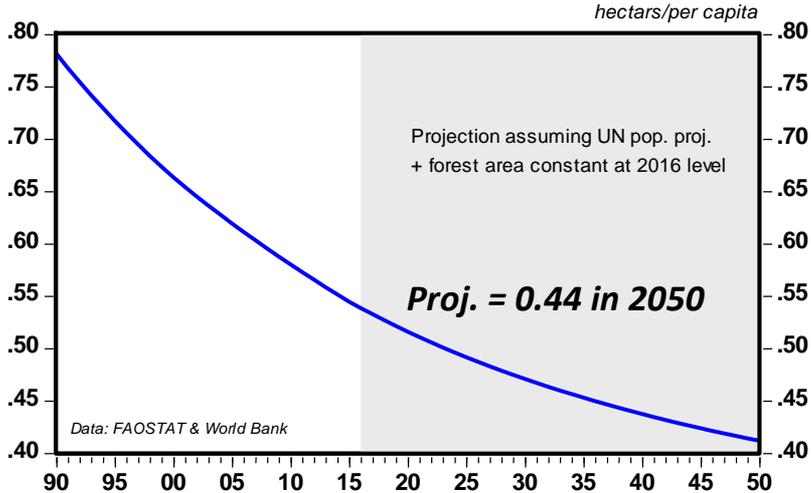
# Middle Class growth > more demand for forest-based products



Source: Kharas (2017)

Balancing demand and supply will require tackling deforestation, increasing resource-efficiency & better forest management

## World forest area per capita 1990-2016 and trend projection to 2050



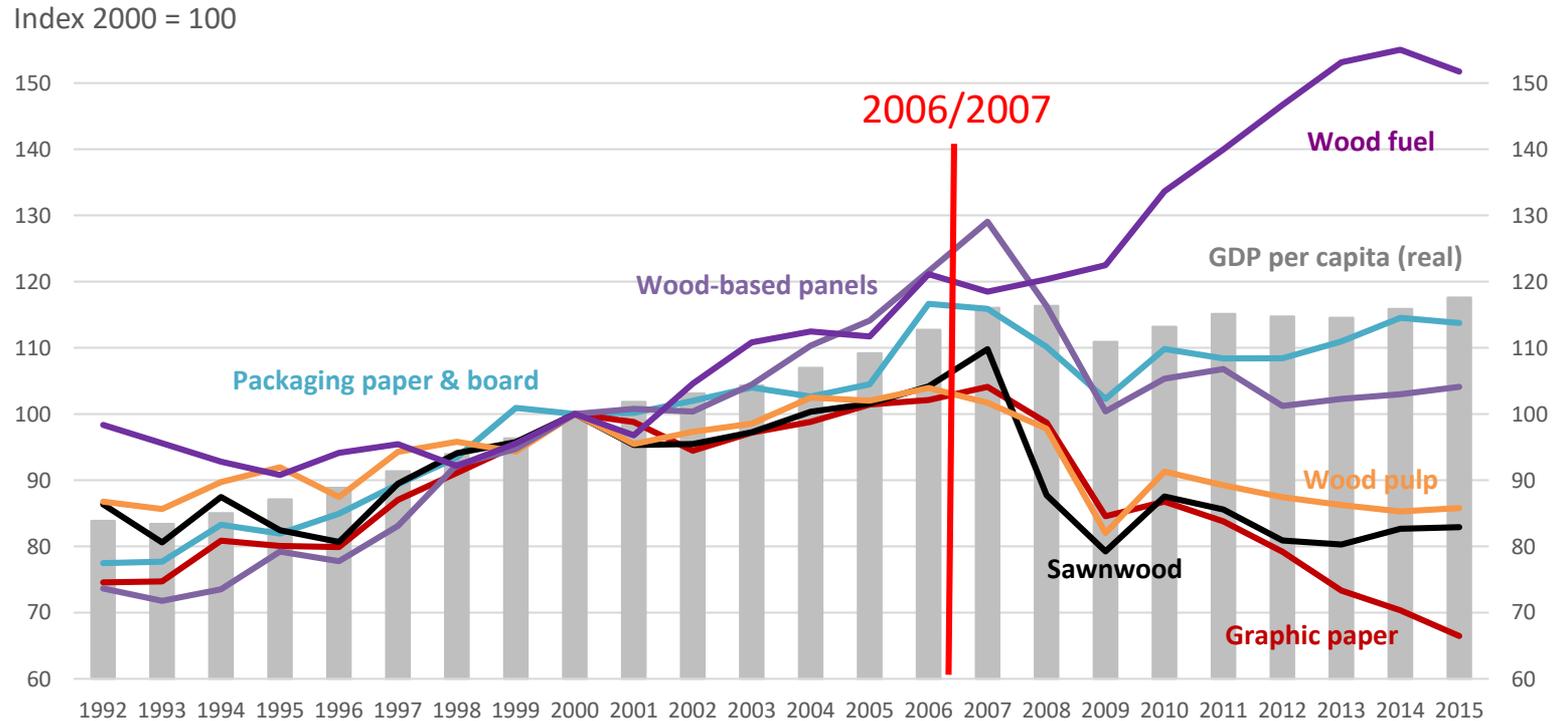
Data: FAOSTAT & World Bank

# What is the outlook for traditional forest products in Europe?



# Traditional forest products growth in Europe has been stagnating or declining since 2006/2007

Consumption per capita in Europe (excl. Russia) in 1992-2015



Source: Jonsson, R., Hurmekoski, E., Hetemäki, L. & Prestemon, J. 2017. What is the current state of forest product markets and how will they develop in the future? In Winkel, G. (ed.) What Science Can Tell Us, no. 8, European Forest Institute.

# Outlook: slower growth in EU for many products

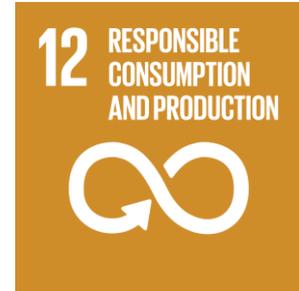
*(exl. engineered wood products, packaging)*

- The outlook in 21<sup>st</sup> century for the traditional forest-based products sector in the EU contrasts with 20<sup>th</sup> century experiences, when production and consumption of all forest-based products followed economic growth
- The changing situation is due not only to the long-lasting economic downturn, but also the result of numerous structural changes *(changing comp. advant., digital media, etc.)*

# But, creative and innovative processes have started to renew the bioeconomy sector

- Demand, R&D and innovations are driven by the structural change and global drivers – like CC & SDGs
- Forest industry and other industries (*chemicals, energy, textiles, construction*) are changing strategies and business models, investing in new bioproducts
- *Moving to a new type of forest bioeconomy*

SDGs



# Key is the diversity: Many possibilities

Forest biomass



*Viscose fibre*



*Textiles*



Increasing demand in textile markets to replace e.g. cotton and synthetic fibres

*Polymers*



*Bioplastics*



Increasing demand in many consumer and industry sectors

*Engineered wood products*

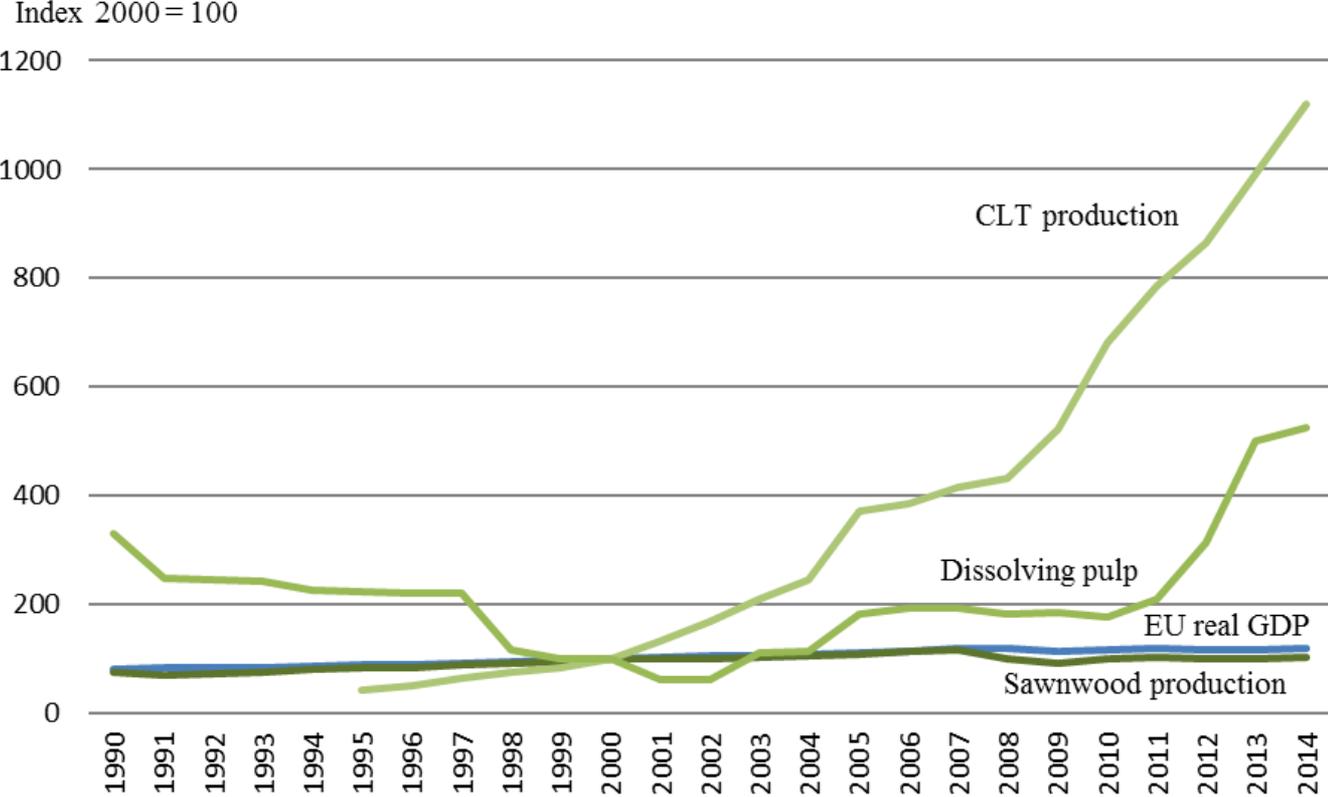


*Wood construction*



Increasing demand in building sector

# Growth determined mainly by other factors than GDP



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

**Dissolving pulp**  
 > Pöyry (2015) expects the global demand to double by 2030

Hetemäki & Hurmekoski (2016)

# Hypothetical example: EU forest-based materials gain 1% share of the global markets in 3 sectors by 2050

Market	Construction (cement/concrete)	Plastics	Textiles	TOTAL
Global market size in 2050	> 5 000 Mt	1 124 Mt	250 Mt	6 374 Mt
Growth rate <i>assumption</i>	Peaking soon	4x by 2050	4x by 2050	
Price* (value per unit)	80–2 650 €/ton	650–1 580 €/ton	600–2 300 €/ton	
<b>Forest-based 1% solution</b> (European forest-based materials gain 1% share of the global market volume)				
Production	13.7 Mt**	11.2 Mt	2.5 Mt	27.4 Mt
Revenue	~ 1–36 billion €	~ 7–18 billion €	~ 1.5–6 billion €	~ 10–60 bill. €
Wood use	68 Mm <sup>3</sup>	(no primary use – based on side-streams)	15 Mm <sup>3</sup>	> 83 Mm <sup>3</sup>

**5% share could even double the current revenue of the EU forest products industry**

# What about bioenergy?

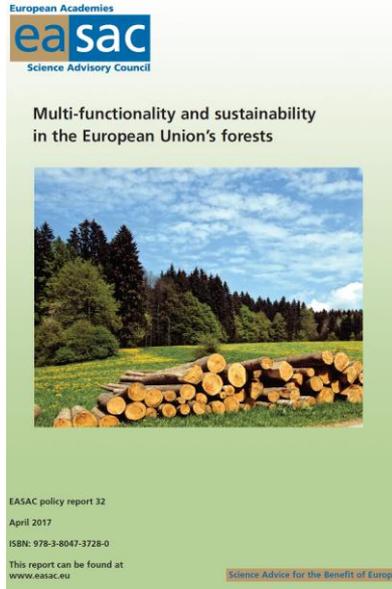
## Problem

Research Paper  
Duncan Brack  
Environment, Energy and Resources Department | February 2017

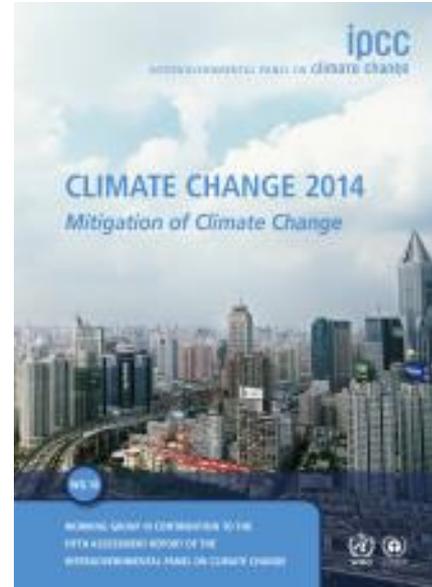
Woody Biomass  
for Power and Heat  
Impacts on the Global Climate



## Problem

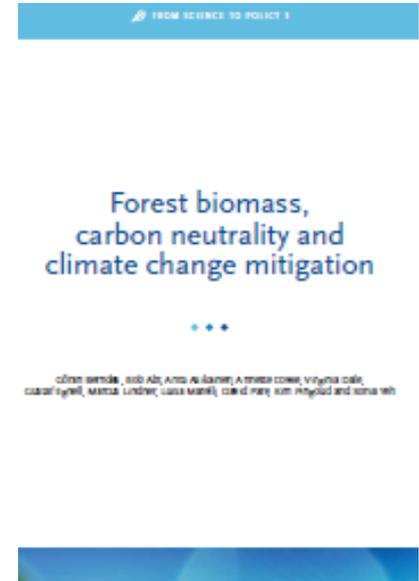


## Needed



Clarke L et al. 2014. Assessing transformation pathways Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).

## Needed



Also: IEA 2017. Technology Roadmap. Delivering Sustainable Bioenergy

# Evolution of the discussion in this century

Level of approval for bioenergy

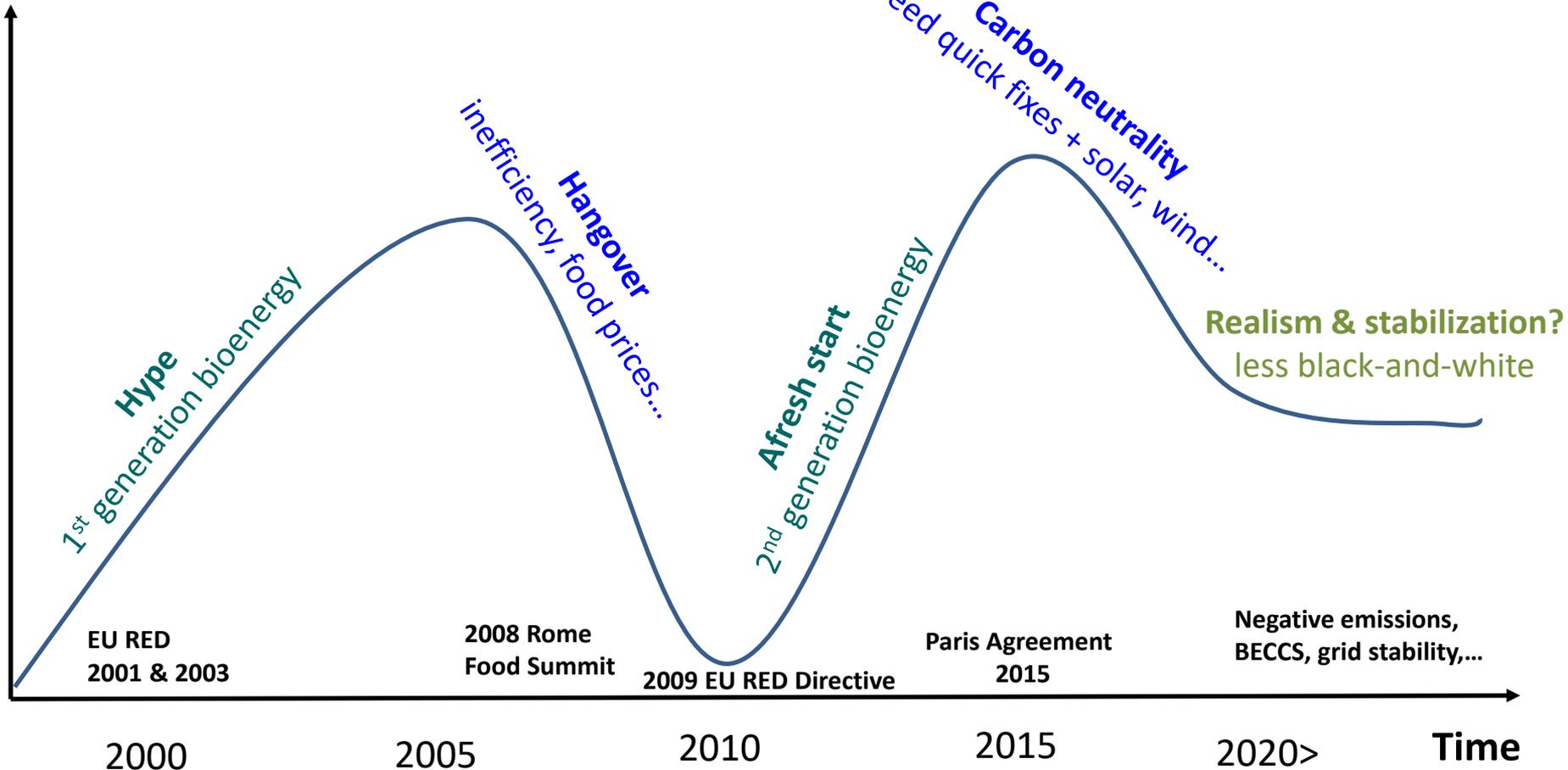
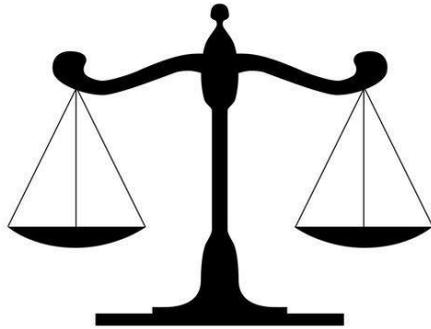


Figure: Lauri Hetemäki, EFI

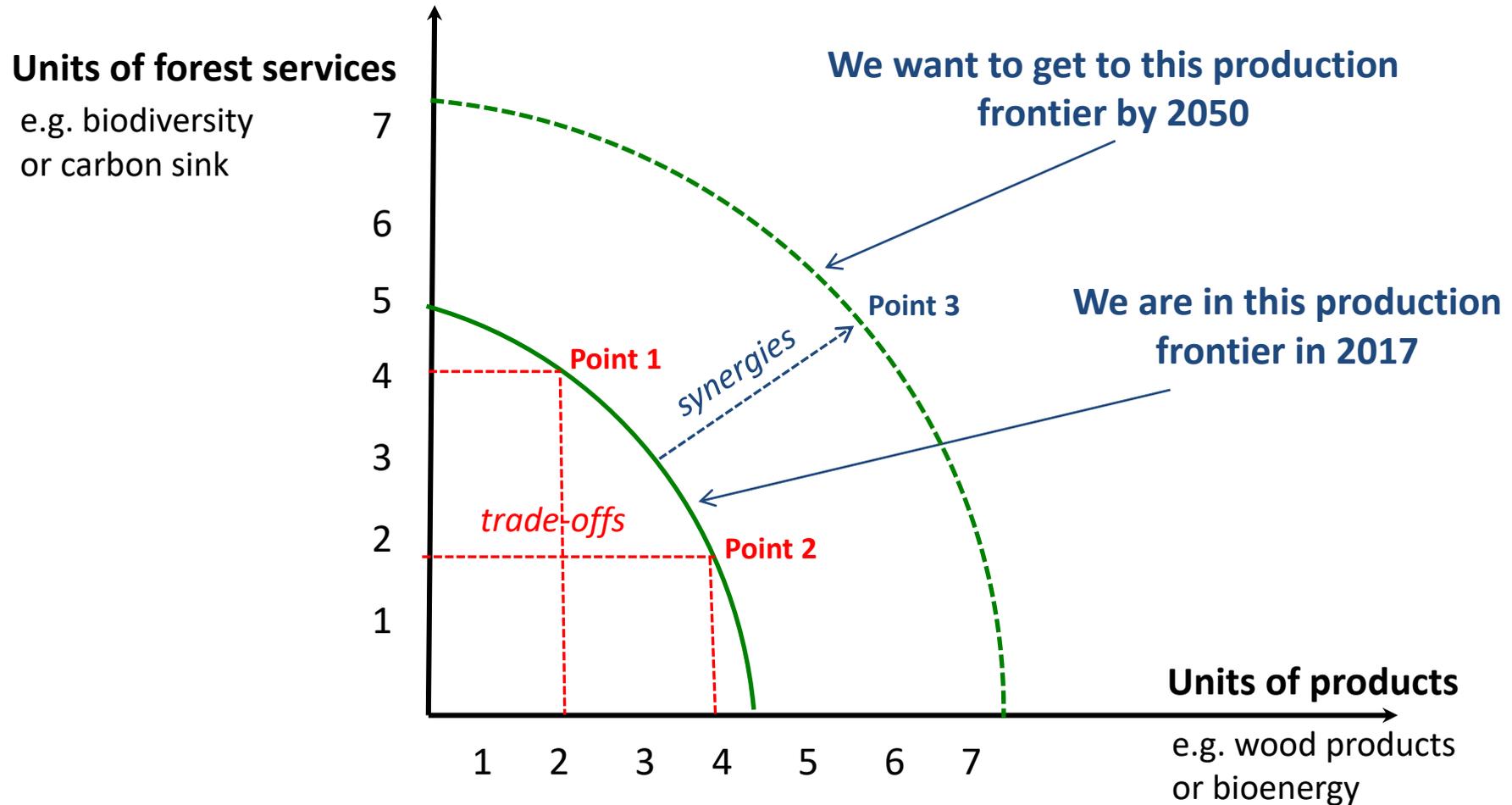
# 3 key messages on bioenergy

1. There are large number of different combinations and regionally different bioenergy production chains. *Some making economic and environmental sense, some not*
2. “Of the 116 scenarios, that were assessed in the IPCC’s AR5 consistent with a high probability of achieving the 2 °C target, 104 scenarios use BECCS and most of them at a large scale.....(Fuss et al. 2016)”. Combined with BECCS, bioenergy can be one contributor to negative emissions
3. Implement GHG-efficient and sustainable bioenergy options, and tackle bioenergy related black carbon and fine particles issues causing health problems

# Bioeconomy development requires to tackle synergies and trade-offs



# Critical question for bioeconomy development: How to maximize synergies and minimize trade-offs?



# Bioeconomy and biodiversity: get married



- Adaptation to climate change is likely to require bioeconomy to provide incentives and resources for the adaptation measures (*e.g., planting adaptable species, minimizing forest fires, etc.*)
- Adaptation on the other hand helps to safeguard biodiversity
- But, without biodiversity we would lose renewable natural capital that is the basis of bioeconomy

# What to do?

 FROM SCIENCE TO POLICY 5

## Leading the way to a European circular bioeconomy strategy



Lauri Hetemäki, Marc Hanewinkel, Bart Muys,  
Markku Ollikainen, Marc Palahí and Antoni Trasobares

*Foreword*

Esko Aho, Cristina Narbona Ruiz, Göran Persson and Janez Potočnik

# Priorities for circular bioeconomy strategy



1. Create a science-based circular bioeconomy *narrative*
2. Do not assume a bioeconomy is *sustainable*
3. Abolish fossil subsidies and increase the role of CO<sub>2</sub> price
4. Invest in *R&D*, innovations and new skills
5. Provide the right *regulatory framework* & EU-level *common standards*
6. Enhance *risk-taking* capacity
7. Embrace biobased *services*
8. Make use of the opportunities that *forests* provide



# *Thank you - Tack!*



*Photo: Erkki Oksanen*

**Lauri Hetemäki**

Phone +358 (0) 10 773 4316

Email: [lauri.hetemaki@efi.int](mailto:lauri.hetemaki@efi.int)

For more information on EFI, please visit [www.efi.int](http://www.efi.int)

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