EUROPEAN FOREST INSTITUTE

# Carbon neutrality of biomass in Europe

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*Nordic Baltic Bioenergy -conference, Helsinki, 29 March 2017*

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# Outline

1. Science discussion on carbon neutrality
2. Synthesis view based on the science literature
3. Policy implications


# Discussion on bioenergy carbon neutrality tends to be:

1. Selective
2. Narrow
3. Polarized

# Discussion on bioenergy carbon neutrality

- Different studies -> different conclusions
- Narrow or system perspectiv -> different conclusions
- Different methodological approaches -> different conclusions
- **EFI commissioned a report in 2016** to seek a balanced and policy-relevant synthesis on the issue

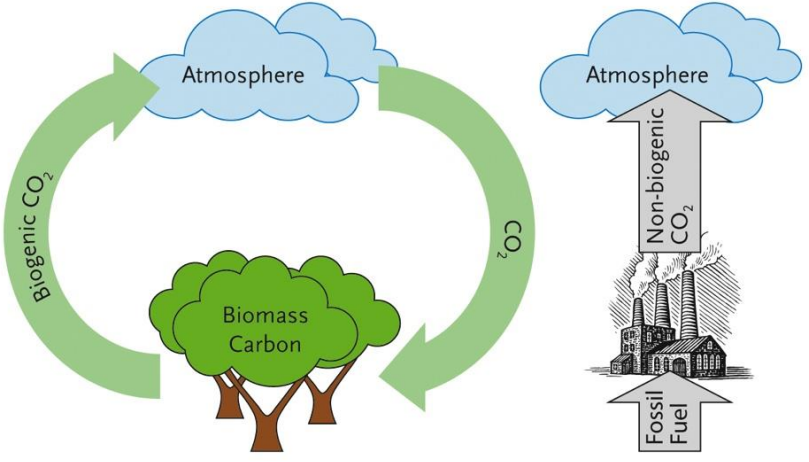
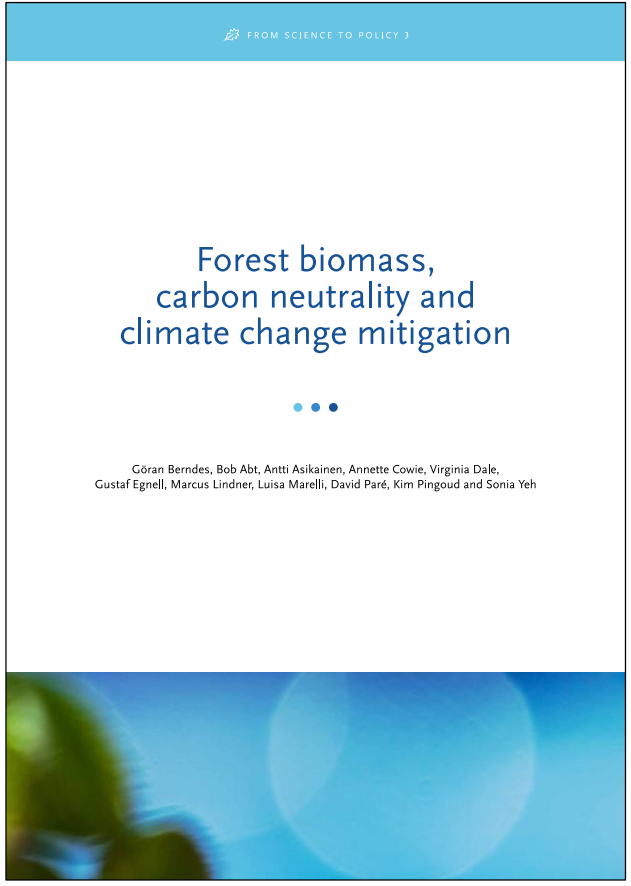



**Illustration of distinction between** bioenergy *(cyclic carbon flow)* **and fossil-based energy** *(linear carbon flow)*

# Presentation based on EFI synthesis report

*Published October 2016*

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Dowload here: http://www.efi.int/files/attachments/publications/efi_fstp_3_2016.pdf

# The carbon neutrality debate: a distraction from critical issues

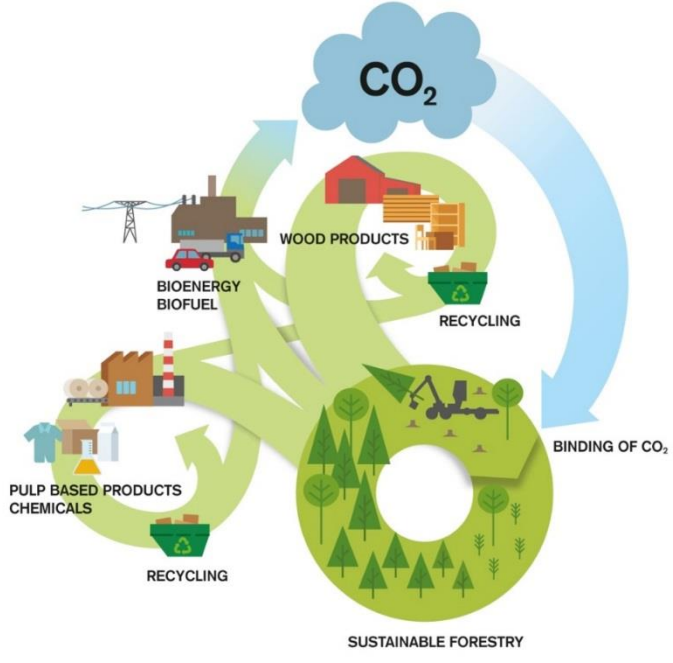
- Assessing GHG balances and climate effects of forest bioenergy is essential for informed policy development and implementation
- On 'carbon neutrality' of bioenergy there is no clear consensus among scientists, and their messages may even appear contradictory
- 'Carbon neutrality' concept itself is ambiguous and the debate distracts from the broader and much more important question:

**How European forests and associated industries can contribute to climate change mitigation through carbon sequestration, carbon storage and fossil fuel displacement while serving many other functions?**

# Lets look the analysis and policy implications more closley

# How is forest bioenergy produced?

- Integrated systems that deliver bioenergy and other forest products
- Process by-flows, residues and low grade / small diam. stems from forest operations
- Process energy in forest industry, fuels and electricity for other markets
- Low fossil fuel inputs in common supply chains



# Forest Bioenergy: A Thousand Different Things

**All these can be different:**

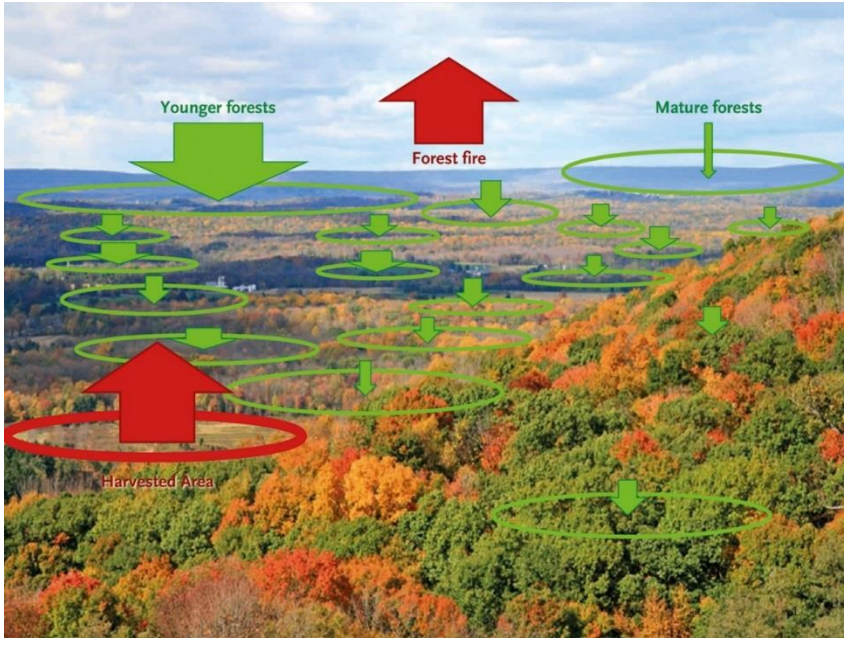
1. Forest biome, management, forest ownership and industry structure
2. Forest biomass rawmaterial source (e.g., forest, industry, post consumer wood)
3. Logistics to mill (e.g. 50 – 7000 km circle from the mill)
4. Energy conversion technology (e.g. type of stove, fermentation, syngas, pyrolysis)
5. End product (heat, power, heat+power, transportation fuel)
6. End markets (e.g. city district heating within 20 km, biofuels exports to other countries)

→ The energy flow combinations could be more than 1 000. **Each may have different *environmental*, *economic* and *social impacts***

# Assessing bioenergy climate impacts

**Methodological choices influence outcome:**

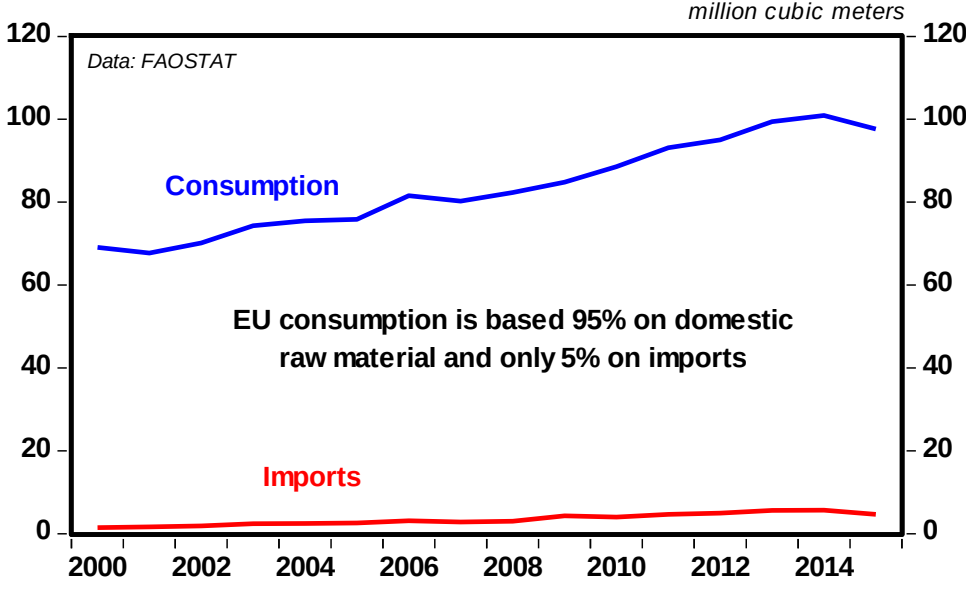
- Definition of counterfactual (reference) ”no bioenergy” scenario
- Time frame: short-term or long-term evaluation period
- Spatial scale: forest stand level or landscape level
- Scope: one product life cycle or system level assessemnt
- Metric choice, e.g., GHG balance or warming contribution



# Impacts outside the EU?

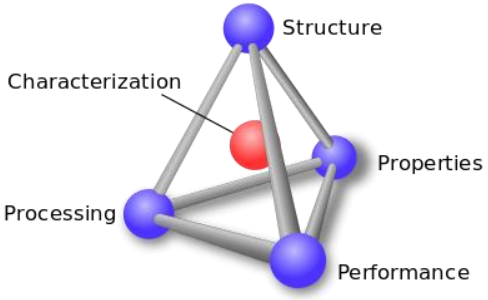
- Forest feedstock imports to EU for bioenergy do not play a big role *(see Figure)*
- Pellets exports from Canada and SE US to EU corresponds to a few percent of harvested wood products in those areas
- Pellet demand have some influence but higher value markets most important for land management planning

**EU energy wood* consumption & imports 2000-20015**




**Energy wood = wood fuels = forest residues, pellets, firewood, saw chips, bark, sawdust used for purposes such as heating or power production and biofuels.*

# A synthesis of science knowledge




- Difficult to meet long-term climate targets without bioenergy
- Fossil fuel displacement efficiency critical
- Variation in results calls for stronger efforts to ensure that results are carefully explained and interpreted correctly
- Need holistic assessment. Even if looking only climate impact, important to consider the economic structure and societal perspectives, since these have feed-back impacts to carbon balance

# A synthesis of science knowledge

- Impact of bioenergy on net GHG emission savings is context- and feedstock-specific due to that many important factors vary across regions and time
- Depending on specific circumstances, forest bioenergy production can result in a ***positive***, ***negative***, or ***neutral*** influence on the development of forest carbon stocks and GHG emissions
- It is clear that there can be trade-offs between carbon sequestration, storage and biomass production. There can also be trade-offs between short- and long-term climate objectives
- **A strong focus on short-term GHG targets may result in decisions that make longer-term objectives more difficult to meet**

# Policy Implications

- European forests and associated industries play important role in GHG balance > ***sequester, substitute*** and ***store***
- Critical that policies create a situation where promotion of bioenergy and other non-fossil energy options lead to **fossil fuel displacement**

**Consider simplified choice:**

Think that energy could be produced only from ***forest biomas*** or ***coal*** – which is more helpful for long-term climate mitigation?

# Policy Implications

- **Use of forest bioenergy is likely to make economic and environmental sense, if accompanied by a package of measures to promote best practices in forest management for climate change mitigation, and energy-efficient production systems**

- These should consider diversity of forest types, management systems and industry structures across Europe, ensure biodiversity safeguards, and aim to balance all forest functions

- With right incentives, EU forest sector can make an important contribution to climate change mitigation while also serving other objectives

# *Thank you!*