



# KB34-012-002/3D-2 Sustainable lignocellulosic biomass supply for the circular biobased economy

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## Background

Phasing out fossil fuels is necessary to reduce GHG emissions and prevent catastrophic climate change in the coming decades. Using sustainable and renewable biomass feedstocks especially to replace fossil fuels is one of the main options to reach this goal. However, biomass is supplied by a large array of producers (farmers, foresters) producing highly variable feedstocks, with varying economies of scale irregularly distributed over the year. This is an obstacle for efficient and circular use of this resource. Users require a constant supply of resources of a specific quality from a few large producers. Moreover, there are concerns about the sustainability of the supply, and conflicts with other ecosystem services like biodiversity protection and food supply.

## Project objectives

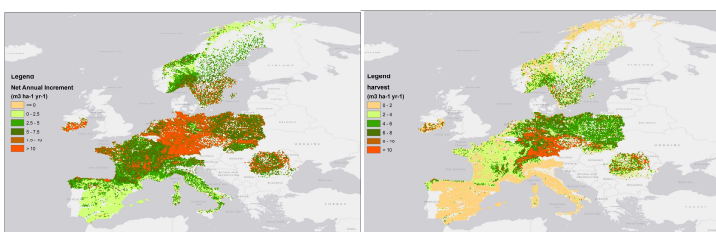
The main objective of this project is to provide insights into setting up lignocellulosic biomass supply for the circular bio-based economy at regional, EU and international scales. Specifically:

- Identify and assess value chains that use local lignocellulosic biomass for local circular economy applications
- Develop the EFISCEN Space EU forest growth model to assess potential wood supply and the associated cost and impacts on other ecosystem services.
- Understand the role of lignocellulosic commodities in linking remote biomass sources to distant markets, and how they can be brought about.

## Results so far

A report on cellulosic biomass for paper and board industry in Gelderland (<https://edepot.wur.nl/522235>) and on wood for construction industry in Gelderland have been delivered. These show the potential of valorizing local lignocellulosic biomass in the province of Gelderland. A project on valorization of herbaceous biomass in Gelderland is underway. Although there are ambitions and frameworks and many small initiatives, it is difficult to scale-up. This is due to a limited availability of resource, lack of large-scale processing facilities, limited demand for local biomass, due to small volumes and relatively high prices. Therefore, it is difficult to connect the value chains and to close the loops. Another factor is the suboptimal quadruple helix interplay (government, industry, science and citizens).

The EFISCEN Space model has been successfully applied to 15 countries in Europe, giving insight into the possibilities for increase in wood supply, as well as trade-offs with biodiversity and carbon sequestration, and barriers for mobilisation. The difference between forest growth and current harvest (see figure) can be seen as a potential for increased harvest. Further analysis indicates that two thirds of this potential will be very difficult to mobilise due to difficult terrain conditions, outdated equipment, fragmented forest ownership and conflicts with other forest functions (biodiversity, rockfall protection, recreation).



Comparison of forest growth (left) with current wood harvest (right), indicating possible regions where wood supply could be increased. Source: EFISCEN Space

## Results so far

For the commodities project the characteristics of a real biobased commodity have been defined (see Table 1) and an analysis is made of how candidate biobased commodities (e.g., wood pellets, pyrolysis oil) cover these requirements. A scientific article "To be or not to be a biobased commodity" is being prepared. Focus will be on accelerating the development of real commodities to mobilize stranded biomass.

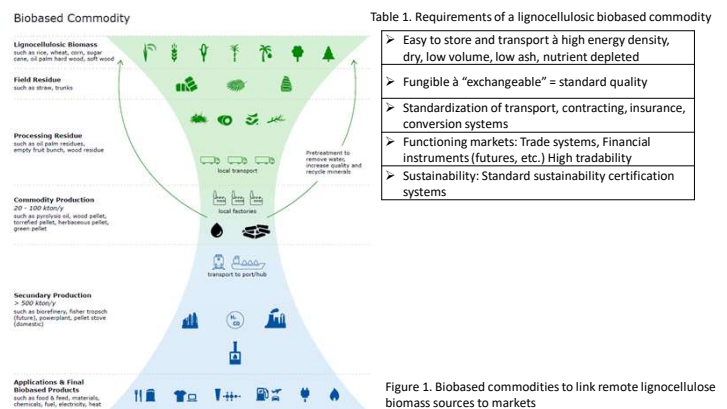


Figure 1. Biobased commodities to link remote lignocellulosic biomass sources to markets

## Expected impacts

Projects have been developed based on knowledge, models and insights collected in this KB-project:

- 4 LNV projects on circular residue valorization and monitoring.
- A project to link the commodities activities to the IEA 43 Bioenergy BioHub project.
- A DG Klima project on benefits of using wood for construction.
- Two Horizon Europe projects have started in 2021 that develop and apply the EFISCEN Space model further with regards to carbon sequestration in forest soils (HoliSoils) and resilience in forest and the wood-working industry (Resonate).
- Submission of proposal in response to the call "The contribution of forest management to climate action: pathways, trade-offs and co-benefits", with an important role for EFISCEN Space.
- We expect more questions on balancing forest production and e.g., biodiversity protection, given conflicting policy targets and plans on national level (Bossenstrategie) and European level (Biodiversity Strategy and Forest Strategy versus the Bioeconomy Strategy).
- Projects with provinces on policies to strengthen the perspectives of a circular bio-economy. A joint workshop with province of Gelderland is being organized in 2021.

## Research and outreach plans remaining time

A strategy is being developed to help provinces and other entities implement circular biomass uses policies.

- 1 Finalizing assessment of herbaceous biomass for circular biobased applications. Initializing current and future methods for increasing circularity of bio-based materials.
- 2 Developing a dynamic mortality module for EFISCEN Space, to replace the current static version. This dynamic mortality module is essential to simulate alternative forest management strategies, including taking forests out of production.
- 3 Assess the options for development of true lignocellulosic commodities and assess the contribution to circular use of biomass.

Outreach:

- Present results and our capability to answer the questions mentioned in the background section in national and international meetings and conferences.