



Forest biomass for a sustainable future

How European managed forests and
wood can deliver EU's climate targets

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European biomass supply plays an increasingly large role in the European Union's efforts to build competitiveness and resilience. By supplying renewable strategic raw materials in a competitive way, substituting high-emission fossil-based products and contributing to the carbon pump, Europe's forests can also help the EU to meet its climate neutrality objectives for 2050.

However, this potential is threatened by climate change and a significant structural gap between demand and supply of biomass, as demand for biomass outside the traditional value chain is increasing. At the same time, the supply of biomass is increasingly restricted by regulations, natural constraints and time.

This reflection paper points to three policy recommendations for increased biomass supply:

- 1 Streamline regulatory frameworks and reduce administrative burdens**
- 2 Recognise all the positive effects of increased wood production and usage**
- 3 Increase growth and investments in the wood-based value chain, as well as in existing and new European forest areas**

The European Forest Coalition consists of like-minded forest owners, forest cooperatives, and forest and wood industries from around Europe. Together we know that European forests and wood products play a crucial role in building a stronger European bio-economy.

 Finnish Forest Industries

 FACHVERBAND
HOLZINDUSTRIE
ÖSTERREICH

FAM



 ZSD SR

 Asociace lesnických
a dřevozpracujících
podniků

**Les
Coopératives
Forestières**

Gospodarska
zbornica
Slovenije

Združenje lesne in
pohištvene industrije

 **EMPL**
Estonian Forest and Wood
Industries Association

 **Future of
FORESTRY**

The European Forests' Triple Climate Effect

Sustainably managed European forests and their value chains deliver a triple climate benefit:



Carbon pumps and sequestration

While growing, the forest is a powerful carbon sequestering “machine”, storing CO₂ in living biomass, forest soils and in harvested wood products. In 2024, the land use, land-use change, and forestry (LULUCF) sector in the EU is estimated to deliver a net sink of around 257 Mt CO₂e, counterbalancing around 7 percent of the EU greenhouse gas (GHG) emissions from other sectors.^{1,2}



Substituting fossil-based material or fossil intense production

After the harvest, wood-based materials and forest products can replace high-emission alternatives. In 2021, this material substitution effect in the EU was estimated to avoid 390 Mt CO₂e emissions. Well-designed substitution can avoid around 650 Mt CO₂e in annual emissions by 2050 under ambitious scenarios.³



Bioenergy

Efficient bioenergy production using wood residues provides renewable energy, and combined with carbon capture and storage it offers negative emissions. Demand for bio-based fuels in hard-to-abate sectors such as aviation and heavy industry will be increasingly higher.

Increased biomass use gives positive climate effects

European biomass consumption has grown over recent decades, driven partly by renewable energy policies and increased recognition of biomass as a substitute for fossil-intensive materials. This is a positive development for society and the forest sector, as higher biomass usage means less fossil use.

Projections indicate that demand will continue to grow across multiple sectors, as shown below.

The timber construction sector represents one of the largest opportunities for biomass-based fossil substitution, but also for carbon storage, as it can replace concrete, steel and plastics in numerous applications.

Packaging materials represent another high-growth application area, driven by circular economy policies targeting plastic reduction, where fibre-based packaging already substitutes significant plastic volumes. Simultaneously, the chemicals sector is undergoing fundamental transformation. The European Commission's objective that 20 percent of the chemical industry's carbon demand should derive from sustainable non-fossil sources by 2030 translates into significant additional biomass requirements.

Cost savings and EU-policy initiatives have increased the use of bioenergy.⁴ The demand for bioenergy is projected to continue to grow, largely thanks to ReFuelEU Aviation, FuelEU Maritime and demand for negative emissions via BECCS.



1 European Environment Agency, EEA greenhouse gases, data viewer <https://www.eea.europa.eu/en/analysis/maps-and-charts/greenhouse-gases-viewer-data-viewers>

2 European Environment Agency, Greenhouse gas emissions from land use, land use change and forestry in Europe, <https://www.eea.europa.eu/en/analysis/indicators/greenhouse-gas-emissions-from-land>

3 AFRY MANAGEMENT CONSULTING (2024) Substitution potential and climate impact in the EU forest value chain

4 Material Economics (2021). EU Biomass Use In A Net-Zero Economy - A Course Correction for EU Biomass

Biomass supply constrained by many factors

The total EU-27 forest area covers approximately 160 million hectares, up from 145 million hectares in just three decades, a result of natural processes and afforestation activities.⁵ However, several factors limit a further increase of sustainably managed forest areas and thus the supply of biomass in a competitive way.

EU-policies: The current LULUCF policy has failed to deliver its intended objectives. This is due to a number of reasons including forest age structures, natural disturbances caused by climate change, methodological inconsistencies between Member States and random reference levels. As a result, only a few member states are reaching their current targets. In addition, several policies, as shown below in the table, have a negative effect on the supply of primary biomass and the substitution effect, effectively hindering the EU climate transition. We must be cautious not taking forests out of use.

Climate change: All European forests suffer from the consequences from climate changes, with Southern European forests confronting the greatest climate pressures, with drought and fires threatening both carbon storage and biomass supply. This puts a limitation on harvesting levels and can be negative for new investments. At the same time, calamities like wind-throws, wildfires and insect outbreaks might increase when temperatures are increasing, decreasing the growth of the forest in some areas.

Regional variations: All European forests are unique and subject to different challenges that requires different solutions. The forest sector in Northern Europe already uses a very high proportion of available resources, making it difficult to expand the biomass supply. Other forests face different challenges, such as in central and southern Europe where small estates and ownership structures are hampering investments and harvesting levels.

	CARBON SINK/STOCK ⁶		
	Forests	Wood Products	Substitution
Biodiversity Strategy	✓	—	—
Forest Strategy	✓	—	—
Nature Restoration Regulation	✓	✗	✗
EU Regulation on Deforestation-free Products	✓	✗	✗
Land Use, Land Use Change and Forestry (LULUCF)	✓	✓	—
European Union Emissions Trading System (EU ETS)	✓	—	—
Renewable Energy Directive III (RED III)	✓	—	—
EU Taxonomy	✓	—	—
Carbon Removal Framework Regulation	✓	—	—



Supports



Has conflict with



Does not support

⁵ Future of Forestry (2024) Same but different. European forests and forestry

⁶ AFRY MANAGEMENT CONSULTING (2024) Substitution potential and climate impact in the EU forest value chain



POLICY RECOMMENDATIONS

To increase the supply of both primary and secondary sustainable biomass in Europe and to help the EU to deliver its climate goals we propose the following:

1 Streamline regulatory frameworks to reduce administrative burdens

▶ **Predictable regulatory framework for forest owners/managers and the bioeconomy**

Legislation that affects forestry and the bioeconomy needs to be predictable and stable. To strengthen investment incentives for forest owners it is essential to secure long term ownership rights. Legislation must recognise the diverse nature of our natural capital and respect that one solution does not fit all.

▶ **Reduce regulatory burden and conflicting policies**

Contradictory regulatory frameworks should be avoided. A cumulative impact assessment of all regulations that affect the forest-based bioeconomy should be carried out. The aim should be simplification and enhanced competitiveness, while maintaining the pace of decarbonisation.

2 Recognise all the positive effects of increased wood production and usage

▶ **Recognise sustainably managed forests and the use of wood products as strategic resources**

Given the crucial role that forests, forestry and wood-based products play in climate mitigation, for economic growth and in the pursuit of a more resilient society, forests, forestry and wood-based products should be designated as a strategic resource. This would enhance the status of the forest value chain in legislative processes.

▶ **Redesign the climate policy architecture**

The LULUCF sector's central role in sustainable bioeconomy development extends beyond simple carbon storage to encompass material substitution, industrial feedstock provision, and rural economic support. Realising this potential requires recognition that natural carbon removal systems possess inherent characteristics - including age structure dynamics, climate variability and measurement uncertainties.

EU climate policy therefore cannot rely on the land use sector's sinks, as carbon sinks can decline due to climate change, irrespective of EU-policies. LULUCF should instead encourage wood usage and carbon transition into long-term biomaterials.

▶ **Lead markets for timber construction and standards for wood buildings**

To accelerate the substitution of fossil-based feedstocks and stimulate demand for bio-manufactured products, the public procurement directives should establish lead markets in sectors such as construction as well as stimulate demand for forest-based products such as timber and biobased chemicals. In addition, the standardisation work on timber construction should be streamlined, making intra-EU trade easier.

▶ **Redefine long-lived products**

EU legislation needs to fully recognise the climate value of sustainably sourced renewable materials. Definitions and accounting rules for long-lived products must be updated and adapted to innovations in wood products. For example, lignin in insulation and adhesives used in glulam and construction should be classified as long-lived carbon storage, rather than short-term carbon uptake as today.

3

Increase growth and investments in the wood-based value chain as well as in existing and new European forest areas

European biomass supply can increase through sustainable active forest management, appropriate to local circumstances, where key strategies include:

► **Improved active forest management**

We need to continuously develop active forest management practices, as resilient and higher productivity forestry requires adaptation to climate change and measures tailored to local conditions. Improved forest management can increase yields per hectare while maintaining ecosystem services and can offer more rapid carbon sequestration and higher wood quality.

Active sustainable forest management with, for example, seedlings from nurseries, thinning and precisely timed final harvesting is crucial for boosting forest productivity, resilience and harvested wood quality. An improved active forest management, adapted to regional variations and specifics, could, among other, focus on the following:

- **Climate adaptation:** climate-adapted tree species selection and diversification can improve productivity under changing climate conditions and reduce risks of damage.
- **Improved seed and seedling material:** better material can give a long-term, significant boost to growth and an aid in adapting to climate warming.
- **Rapid regeneration:** ensures forest vitality immediately after harvesting and prevent growth losses.

► **Increased growth in the wood-based value chain**

While the forest-based value chain offers numerous solutions to Europe's challenges, these solutions can only be realised by addressing the innovation gap in Europe. Europe excels in fundamental research, but more emphasis is needed on scaling research into commercial applications. This is especially true for our sector, given that piloting, demonstration and upscaling are costly and risky phases of innovation. The entire innovation chain needs to be considered in the allocation of the EU's R&D funding.

► **Afforestation**

The supply of European biomass can also increase by targeted afforestation that respects regional conditions, as European afforestation potential varies by region, climate zone and land availability. Afforestation on mainly abandoned or low utilization forests contributes to several strategic values, such as: carbon sequestration additionality, regional supply of wood, high biodiversity values, new bioeconomy potential, energy resilience and job opportunities in rural areas of Europe.

Potential for afforestation

In central Europe the major leaps will come with increased sustainable and adaptive forest management, as the forest otherwise risks suffering from calamities as storms, fires and insect attacks.⁷

Northern European Intensification: Scandinavian countries possess limited additional land for afforestation but could enhance productivity through improved forest management. Sweden could e.g. increase sustainable yield by 20-40 % through optimised management practices.⁸

Eastern European Expansion: Countries such as Poland and Lithuania possess substantial afforestation potential on former agricultural lands and degraded areas. Poland's forest coverage has for example increased from 20.8 percent in 1946 to 29.6 percent in 2021, demonstrating successful afforestation capacity. Until 2050, the forest coverage is planned to increase to 33 percent, increasing the forest area with one million hectares.¹¹

Mediterranean Restoration: Southern European regions offer opportunities for climate-adapted afforestation focusing on drought-resistant species. Spain, Portugal and parts of Italy could expand forest cover on marginal agricultural lands, though careful species selection is essential given climate change projections.^{9,10}

Assessment of potential gross afforestation area in the EU

According to JRC¹², CAP¹³, and Estel et al.¹⁴ (2015), the EU has and will have in gross between 10 and 20 million hectares of land that could be used for afforestation. Some of this land has already been afforested (passively or actively), for example in the Baltic states and Poland. There is also some, though smaller, potential in countries like Ireland, Sweden, and Croatia.

Afforestation potential in the EU (million hectares)

	Min	Max
Baltics	0.5	1.2
Bulgaria	0.7	1.5
Greece	0.7	1.5
Italy	1.0	2.0
Poland	0.7	2.0
Romania	1.0	2.5
Portugal	0.7	1.5
Spain	3.0	4.5
Germany	0.5	1.5
France	1.0	2.0
Total	10	20

7 <https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2024.1450374/full>

8 <https://www.skogsstyrelsen.se/miljo-och-klimat/skogliga-konsekvensanalyser/skogliga-konsekvensanalyser-2015/>

9 <https://nhess.copernicus.org/articles/25/77/2025/>

10 https://efi.int/sites/default/files/files/publication-bank/2018/tr_24.pdf

11 <https://nhess.copernicus.org/articles/25/77/2025/>

12 JRC Policy Insights: Agricultural land abandonment in the EU within 2015-2030 October 2018.

13 CAP Strategic Plan country Reports

14 Estel, S., Kuemmerle, T., Alcántara, C., Levers, C., Prishchepov, A., Hostert, P., 2015. Mapping farmland abandonment and recultivation across Europe using MODIS NDVI time series. Remote Sens. Environ. 163, 312–325. <https://doi.org/10.1016/j.rse.2015.03.028>.



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