TEAMING UP 4 FORESTS study expert group

# EUROPE'S WOOD SUPPLY IN DISRUPTIVE TIMES

## BUSINESS BRIEF OF THE SYNTHESIS REPORT

This publication is based on the report "Europe's wood supply in disruptive times"
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# FOREWORD

In times of climate change and future uncertainties, we see the collaboration between industry and science as an essential part of identifying ways forward. This led us to initiate TEAMING UP 4 FORESTS, a science-business platform that brings together forest scientists, business communities, and other stakeholders in the forest-based sector, the aim being to address current and future challenges and identify specific response options.

To further this interchange, a continuous dialogue where all voices are heard, and joint solutions can be found, is invaluable to us. Under the framework of TEAMING UP 4 FORESTS, a curated expert group actively engaged to build on cutting-edge research, and to provide a summary and overview of scientific findings on the future of wood supply in Europe. These collaborative efforts have been instrumental in exploring the profound impacts of climate change on forest ecosystems, as well as a multitude of other factors that affect the future supply of wood to industries in Europe. In June 2023, a workshop was held in Vienna, Austria, where a diverse group of stakeholders' representatives came together for two days and engaged in in-depth discussions. The wide-ranging input and feedback received, combined with scientific insights and expert evaluations, led us to craft a comprehensive scientific report, from which we produced this summary tailored to the wood-based industry and business executives. Both these products provide a set of response options that may help the reader remain fully cognisant and up to date regarding current and future developments in the sector, and adaptations thereto.

We invite you to join the TEAMING UP 4 FORESTS journey, where industry meets science in a dynamic exchange of knowledge and ideas. We take pride in addressing the pressing issues that matter most to our forests and to the forest-based sector. Our aim is to connect industry and science, as our unique platform brings together key players from the wood-based industry, sciences, society and decision-makers to foster meaningful discussions. TEAMING UP 4 FORESTS is committed to driving change by its selection of topics that are not only relevant, but also of high importance to the sustainable future of our forests and the European forest-based sector.

**Dirk Längin**
*Mondi Group, Group Head of Fibre Sourcing*

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# CALL FOR ACTION

Forests in Europe are strongly affected by climate change, and the far-reaching consequences of this involve the wood-based industry and tree species of high commercial importance. Moreover, forests and wood-based industries face many additional challenges, such as political uncertainties and a fragmented forest landscape. A key challenge – and crucial factor – for Europe is to secure, maintain and enhance the sustainable supply of wood from its forest ecosystems. Businesses relying on wood as a vital resource need to start addressing these challenges now to prepare for and adapt to future developments. It will be a difficult and long-term process to secure wood supply while maintaining other vital forest ecosystem services and, at the same time, meeting climate and biodiversity goals within a context of profound socioeconomic and environmental changes. This complexity calls for immediate action, including strategic planning, implementation, learning and adaptation. By embracing these actions, wood-based industries can be at the forefront in terms of navigating uncertain times towards a sustainable future.

This publication is a concise summary of an evidence-based synthesis report, and it is addressed to wood-based industry executives and decision-makers, policymakers shaping the sector, and those involved in forest operations across Europe and its regions . The full report, which can be downloaded from our website **(https://teamingup4forests.com/wood-supply-study)**, provides a wealth of detailed information on the scientific state of the art, carefully drawn up future scenarios, detailed response options and actionable insights. As a summary of said full report, this document provides an overview of factors influencing wood supply from European forests and gives specific response options by which the wood-based industry can address emerging challenges. It underscores the urgency and complexity of addressing the impacts of climate change and other pressing challenges, and also emphasises the need for adaptation, innovation and holistic approaches to navigating the disruptive consequences of these changes.

The TEAMING UP 4 FORESTS platform aims to contribute to vital collaboration and cooperation across multiple disciplines, and to advance shared ambitions and goals within the forest-based sector. This summary has emerged from a think tank and from overarching dialogue between science and business, and it reflects an active engagement involving multi-round discussion based on the scientific evidence. We therefore invite you to stay informed regarding the ongoing process and activities, and to learn more about our initiative on our website at **https://teamingup4forests.com/**.

# SEIZING TOMORROW: A BLUEPRINT FOR WOOD SUPPLY RESILIENCE

Wood supply in Europe is influenced by several complex factors that are strongly interlinked. The wood-based industry is facing significant ecological, political, socioeconomic and technological shifts. In this era of change, the way forward for industry leaders, decision-makers, forest managers and subject matter experts is to proactively shape the future of wood supply and facilitate strategic actions. To enable informed decision-making, some key aspects that impact the future of wood supply, and need to be addressed so that we can adapt to future developments, are summarised below.

### Tackling environmental factors to shape wood supply in a changing climate

In the face of climate change, the future of wood supply is at a critical juncture. Environmental factors take centre stage, directly impacting forests' composition, structure and productivity. Anticipated temperature increases and shifting precipitation patterns are a challenge to tree survival, health and growth. The intensification of disturbances – such as droughts, storms, bark beetle calamities and fires – creates uncertainties regarding wood production. The trajectory of wood supply strongly depends on climate change scenarios and adaptive forest management.

### Advocating best policies for sustainable wood supply

Policy factors, including governance aspects, political developments and emerging policies, intersect with wood supply. European and national forest-related policies, laws, and property rights create a complex web of challenges that impacts forest management. The lack of policy coherence leads to trade-offs across governance levels and sectors, complicating wood supply dynamics. Conflicting priorities, from biodiversity conservation to wood production, shape a policy landscape littered with hurdles. The future of wood supply is intricately tied to policy, legal, and institutional developments. It is essential to survey potential scenarios, from environmentally friendly policies restricting wood supply to bioeconomy-friendly policies that foster innovative wood applications.

### Incorporating socioeconomic factors to address wood supply challenges

When considering the future of wood supply in depth, it is crucial that socioeconomic factors be taken into account. Ranging from forest ownership structures to demographic shifts and geopolitical developments, each aspect contributes to the overall complexity of the topic. The diverse ownership landscape, changing motivations of private forest owners, and demographic trends towards an ageing, urbanised population paint a multifaceted picture. Geopolitical shifts and trade developments add layers of challenge. The future of wood supply also depends on demographic trends, geopolitical dynamics and trade relations, all of which make for formidable tasks facing the European market.

### Adopting technological and market factors to identify solutions

Global markets signal a growing demand for wood-based products. Technology and market trends shape

*Photo © Gerda Wolfrum*

the wood supply landscape, driven largely by technological advancements and digitisation. Emerging technologies such as biorefineries, novel process technologies and new concepts in wood construction promise increased value and support for a sustainable forest-based bioeconomy. Market forecasts project rapid expansion in engineered wood products, textiles, biorefineries and bioenergy. These aspects – complemented by collaboration and technological innovation – facilitate a transition towards added-value products, a key development to ensure the permanence of the wood-based sector.

## CRAFTING SCENARIOS FOR STRATEGIC INSIGHT

The use of scenario development during this study helped stakeholders to engage in dynamic discussions and to envision potential futures. This goes beyond the making of assumptions by generating narratives that integrate diverse ideas into the big picture. By understanding new circumstances and perspectives, actionable strategies for a resilient wood supply future can be defined. Considering different conceivable future scenarios for wood supply can help to anticipate change and to prepare for an uncertain future. The full report of this study presents three different future alternatives (1. 'Environmental Sustainability First', 2. 'Bioeconomy in a Divided World' and 3. 'Fossil Economy First'). The work of the study's expert group and the exploration of potential response measures built upon this scenario-based approach.

# FACTORS IMPACTING EUROPE'S WOOD SUPPLY

- ✔ Forest types and growth
- ✔ Climate change
- ✔ Forest management

## ENVIRONMENTAL

- ✔ EU and national forest-related policies and laws
- ✔ National forest policy priorities
- ✔ Forest property rights

## POLITICAL

- ✔ Forest ownership
- ✔ Demographic developments
- ✔ Market trends
- ✔ Geopolitics and international trade

## SOCIOECONOMIC

- ✔ Innovative wood-based technologies and their developments
- ✔ Emerging wood-based products and their market trends

## TECHNOLOGICAL

# STRATEGIC EVOLUTION IN EUROPE'S WOOD-BASED INDUSTRY

In the dynamic landscape of global wood-based industries, demand for both short-lived and long-lived wood products continues to rise, necessitating transformative actions. Emerging added-value wood-based products are less dependent on certain tree species than traditional products, reducing reliance on specific wood species and allowing for diverse wood feedstock. Technological and, in particular, digital innovation, as well as cascading use of wood, is driving the transition towards a circular bioeconomy and promotes adaptation to future changes in wood supply.

Strategic investments in new technologies, co-production and efficient logistics are paramount. Public-private partnerships support this transformation. Sustainable strategies for wood mobilisation, at a level from regional to Europe-wide, are – along with furthering of cooperation for the transition of the forest-based sector – pivotal in a resource-competitive global market.

Furthermore, ensuring the sustainable mobilisation and efficient logistics of woody biomass are critical factors for future viability. Strategies include diversifying tree species, monitoring wood supply evolution, measuring consumption for adaptive planning, and incorporating used wood into the material mix to advance the concept of the circular bioeconomy. In the light of global competition, collaboration among European stakeholders is essential. By understanding the complex wider framework and conditions, and by leveraging EU initiatives, industries can promote sustainable growth in a climate-neutral (net-zero) economy.

In conclusion, wood-based industries can stay ahead by investing in cutting-edge technologies, diversifying their materials and resources, and embracing flexible transformation processes that lead to the creation of integrated value chains. Given this, essential elements for success are the leveraging of information technologies, the application of cutting-edge scientific findings, and the forming of public-private partnerships.

The forest-based industries will need to reflect on their current business models, since the era of linear growth is ending due to the finite nature of resources and increased competition. As an example, the concept of the circular bioeconomy allows – in some cases – sustainable expansion and growth into a prosperous future, as it requires risk-sharing of investments, co-creation and co-production, as well as extension of the resources mix.

## ▮▮▮ Wood-based industry measures

**Upscale technological developments**

- Invest in and diversify added-value fibre technologies, and new wood and wood-based materials
- Develop new co-production concepts for greater efficiency in energy and materials use
- Invest in and operate flexible transformation process technologies
- Enhance the creation of integrated value chains from sourcing to market
- Benefit (with bespoke solutions) from tools for information and communication technologies
- Create public-private partnerships for risk-sharing and for long-term investments

**Enhance logistics concepts and efficiency**

- Move away from the current high dependency on softwoods as the core business operations, diversify with at least three tree species in the short term to cope with climate change impacts
- Set new milestones to monitor and analyse the evolution of wood supply until 2030 and beyond
- Define and measure consumption per capita in Europe for adaptive planning
- Include used and underused wood in the supply mix to enlarge the material source and develop new supply chains for collecting and sorting used materials and waste

**These measures enable**: Sourcing of many types of wood / enlarged material source; less dependency on specific wood species / sources and qualities compared to traditional products; less vulnerability to market fluctuations; reduced time to market; risk minimisation; adapting to disruptions; and use future opportunities

# FUTURE FOREST MANAGEMENT THROUGH ADAPTATION AND EMPOWERMENT

There is an urgent need for adaptive measures by forest owners and managers in the face of climate change. As temperatures rise and precipitation patterns shift, along with increased natural disturbances such as storms and fires, proactive forest planning and management is essential. Focusing on wood production requires a strategic approach, promoting diverse and resilient forests through a wide array of silvicultural measures, including natural regeneration and species migration.

Adaptive management practices include reducing the reliance on climate-sensitive species (such as Norway spruce in lower-elevation Central Europe) and favouring alternative species that are better adapted to future climates. Financial support from governments is crucial in restoring forests after disturbances. Of equal importance is genetic and silviculture research for identifying and managing species suited to future climates. Adaptive management can stabilise growing stocks and timber harvests under moderate climate scenarios. For this, increased collaboration at a higher level among forest owners, managers and industry partners is essential to adequately address challenges, enhance transparency, build resilient and integrated supply chains, and boost awareness campaigns aimed at bridging the rural-urban divide.

Climate change has profound effects on ecological variables and forest processes. Essential climate factors such as precipitation, temperature, and levels of carbon dioxide (CO2) and other greenhouse gases, intricately shape productivity, standing stocks, tree mortality, and forest structure. Forecasts predict more frequent extreme weather events of higher intensity – including wind, fire, floods and pest infestations – necessitating proactive forest management.

In conclusion, there is a need to build climate-resilient forest ecosystems and promote adaptive management in European forests. This includes key actions such as intentional shifts in species composition and strategic use of species better adapted to expected future conditions, financial support for post-disturbance recovery, and collaborative efforts between owners and industry.

## Forest management measures

**Shift to adaptive forest management practices**

- Promote mixed and structurally diverse forests, including natural regeneration and active assisted migration of species more adapted to future climates
- Reduce share of climate-sensitive Norway spruce, shorter rotation periods as intermediate strategy
- Seek support to restore forests after disturbances, and protect them
- Expand scientific research in genetics and silviculture to gain insights on suitable tree species
- Expand operational-scale trial plantings of more drought-resistant alternative tree species

**Connect forest owners/managers and industry partners**

- Intensify monitoring and planning of wood harvesting and forest management
- Develop resilient wood supply chains to adapt to climate-driven disturbances
- Address fragmented forest ownership through management partnerships and consolidation
- Strengthen collaboration between forest owners and industry partners in order to adapt to erratic wood harvest
- Expand capacity building efforts and awareness campaigns to bridge the rural-urban divide

**These measures enable:** More resilient forests adapted to future climates (climate-fit forest ecosystems); reduction in wood losses; stabilised wood production and stocks; outperformance of current management practices; minimisation of damaged wood; and enhanced transparency of wood supply

# POLITICAL LEADERSHIP FOR A SUSTAINABLE FUTURE

Global, European, national and sub-national policy frameworks affect forest management and create a multi-level challenge for wood supply, which needs to be addressed in a holistic manner by political decision-makers. This complexity results in trade-offs and fragmentation, with potential conflicts between environmental conservation, bioenergy and wood utilisation goals. Coherent and synergistic approaches to addressing these issues should involve harmonising policies, addressing national issues, and promoting multi-level collaboration and adaptive strategies.

The European policy landscape includes both legally binding and non-legally binding measures at various levels, emphasising sustainable forest management, nature protection, biodiversity conservation, and climate policies. These policies may result in restrictions on wood supply, changes in species preference, and potential conflicts between different EU regulations, creating legal uncertainty and influencing wood supply at both national and sub-national levels.

Responses to the highlighted issues spanning global, European, national and local domains must be better integrated. To foster cohesive and effective policymaking, efforts should be directed at both harmonising policies and promoting sustainable forest management practices. At the global level, collaboration through international forest governance and robust forest research is essential to address geopolitical challenges and climate change impacts. Within Europe, emphasis on sustainable forest management and promoting the circular bioeconomy can minimise uncertainties. Positive trade-offs such as harmonisation of market regulation, combined with strategies to enhance forest resilience, are vital components. Nationally, initiatives should engage forest owners, address demographic challenges, navigate energy sector transitions and bolster economic incentives for sustainable practices. Europe's geopolitical resilience will be strengthened through diversified wood sourcing and targeted financial incentives. Strategic investments in research and innovation are imperative to developing adaptable wood supply strategies and technologies, thus ensuring resilience in the face of evolving market dynamics and regional supply chain shifts.

## ▮▮▮ Policy measures

**Advocate wood supply challenges at all policy levels**

*Global level*

- Strengthen international and cross-sectoral cooperation through governmental organisations
- Promote research and knowledge-sharing on related forest issues
- Support the science-policy interface to provide policymakers with sound scientific knowledge

*EU level*

- Harmonise and align the various EU policies for greater coherence
- Support and encourage sustainable forest management practices
- Promote the circular bioeconomy through awareness campaigns and educational programmes
- Continue to regulate and support the wood market to promote sustainable wood use
- Develop strategies to enhance the resilience of European forests
- Promote robust, diversified sourcing strategies in the EU and access to growing regional markets

*National level*

- Implement initiatives to engage and incentivise private forest owners
- Address demographic challenges related to forest ownership by developing tailored policies
- Develop strategies to mitigate impact of the energy sector transition on wood supply
- Diversify sources of wood supply and reduce reliance on imports from regions with trading limitations
- Introduce targeted financial incentives encouraging industries to invest in sustainable circular practices
- Invest in inter- and multidisciplinary research and innovation

**These measures enable:** Meaningful policies to address global challenges; more informed policymaking and decision-making; minimised trade-offs and uncertainties in forest management; responsible consumption; an emphasis on the value of sustainable forest management; adaptation to regionalisation of supply chains; enhanced geopolitical resilience; and supported industry transformationof wood supply

## COLLABORATION AS THE CATALYST FOR DEVISING AND IMPLEMENTING EFFECTIVE MEASURES

Collaborative efforts are crucial for implementing successful strategies, and this study showcases the collective will of the European wood-based industry stakeholders to work together and demonstrate the industry's commitment to collaboration and joint actions. These joint endeavours serve as a beacon, guiding the wood-based industry towards innovation, adaptability and resilience amid evolving challenges.

In navigating the uncertainties and changes ahead, collaboration emerges as a cornerstone for shaping the future of wood supply in Europe. As various actors across the forest-based sector face disruptive times, strategic responses call for strengthened cooperation and partnerships. Interdisciplinary collaboration, exemplified by initiatives such as TEAMING UP 4 FORESTS, fosters knowledge exchange between science and business, driving informed decision-making and resilient business models. Transnational cooperation at pan-European and global levels facilitates mutual sharing of best practices, supporting adaptation strategies and technological advancements. Cross-sectoral collaboration is pivotal, aligning the wood-based industry with various sectors such as forestry, renewable energy, textiles and emerging industries to maximise the high-value use of woody biomass.

Beyond cooperation, a vital role is also played by education and extension services in general, especially in engaging the youth and future generations. Effective communication within and outside the forest-based sector serves as a powerful tool for promoting sustainable forest management, emphasising its societal value and shaping public opinion. When organised, these collaborative measures form a dynamic response framework to address the challenges and opportunities in the evolving landscape of wood supply in Europe.

## Collaborative measures

**Bolster cooperation, knowledge exchange, education and communication**

- Enhance interdisciplinary collaboration to promote shared goals in the forest-based sector
- Foster transnational cooperation at the pan-European and global level to exchange knowledge and best practices across countries
- Strengthen cross-sectoral cooperation in the wood-based industry to achieve alignment among different business sectors, as well as with other industries and society at large, thus enabling strong and effective response measures
- Expand education and extension services to prepare for future developments and engaging the youth
- Further communication strategies within and beyond the forest-based sector to promote effective response measures and adaptation strategies

**These measures enable:** A strong forest-based sector in Europe; well-thought-out adaptation strategies; technological advancements; and strong and effective response measures

# GLOSSARY

**Adaptation (in relation to climate change impacts)**
The process of adjusting to actual or expected climate change effects to reduce harm or utilise opportunities.

**Cascading use principle**
Efficient resource utilisation through reuse and recycling of materials to extend biomass availability.

**Circular bioeconomy**
The utilisation of biomass to create products and services (replacing fossil-based resources).

**Climate change**
A change of climate attributed to human activities that alter temperature and precipitation patterns, causing extreme weather events and disturbances.

**Forest-based**
Reliance on resources from forests and trees.

**Forest-based sector**
Industries relying on goods and services from forests.

**Forest ecosystem services**
The results of ecological processes or functions of value to society which are provided by forests and include provisioning, regulating, supporting, and cultural services.

**Forest management**
Planning and practices to achieve environmental, economic, social and cultural goals in forests.

**Forest ownership**
Legal rights to control or benefit from a forest.

**Sustainable forest management**
Aims to maintain and enhance economic, social and environmental values of forests.

**Value chain**
The range of activities to bring a product or service from conception to disposal.

**Wood-based**
Relying on wood as a resource from forests and trees.

**Wood supply**
Availability and procurement potential of wood and fibre for the forest-based industry.

**Wood-based industries**
Specific businesses relying on wood and fibre, such as pulp and paper industries.

# OVERVIEW OF RELEVANT STAKEHOLDERS IN THE EUROPEAN WOOD-BASED SECTOR

Europe's forest-based sector involves a wide range of stakeholders, each playing a crucial role in the industry's dynamics. The following list identifies some of the most relevant stakeholder groups in the European wood-based sector:

| | |
|---|---|
| **FOREST OWNERS AND MANAGERS** | ◗ Private forest owners<br>◗ Public forest owners<br>◗ Forest management companies and cooperatives |
| **WOOD-BASED INDUSTRIES** | ◗ Wood processing industries<br>◗ Pulp and paper manufacturers<br>◗ Timber and lumber producers<br>◗ Furniture manufacturers<br>◗ Building and construction companies |
| **ENVIRONMENTAL AND CONSERVATION ORGANISATIONS** | ◗ Non-governmental organisations (NGOs)<br>◗ Conservation groups<br>◗ Biodiversity advocates |
| **GOVERNMENT AND REGULATORY BODIES** | ◗ National forest agencies<br>◗ Environmental-protection agencies<br>◗ Regulatory authorities overseeing forestry practices |
| **RESEARCH AND ACADEMIC INSTITUTIONS** | ◗ Forest research institutes<br>◗ Universities and academic departments specialising in forest and environmental, social and economic sciences |
| **TRADE ASSOCIATIONS AND CHAMBERS OF COMMERCE** | ◗ Associations representing forest and wood-related industries<br>◗ Chambers of commerce focused on the forest-based sector |
| **WORKERS AND LABOUR UNIONS** | ◗ Forest workers<br>◗ Industry labour unions representing workers in wood processing, logging and related sectors |

| | |
|---|---|
| **CONSUMERS AND RETAILERS** | ◗ Retailers of wood and wood-based products<br>◗ Consumers and environmental groups advocating for sustainable and ethical wood consumption |
| **TECHNOLOGY AND INNOVATION PARTNERS** | ◗ Companies and organisations involved in developing and implementing technology for sustainable forestry and wood processing |
| **FINANCIAL INSTITUTIONS** | ◗ Banks and financial institutions providing funding for forest-related projects and sustainable initiatives |
| **COMMUNITY AND INDIGENOUS GROUPS** | ◗ Local communities dependent on forests for their livelihoods<br>◗ Indigenous groups with cultural ties to forested areas |
| **ENERGY SECTOR** | ◗ Biomass and bioenergy producers utilising wood resources<br>◗ Renewable-energy companies with a focus on sustainable wood-based sources |
| **TRANSPORTATION AND LOGISTICS** | ◗ Companies involved in the transportation of timber and wood products<br>◗ Logistics providers facilitating the supply chain for the forest-based sector |

Recognising and engaging with these diverse stakeholder groups is essential for promoting sustainable practices, addressing environmental concerns and ensuring the long-term viability of the European forest-based sector.

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We express our gratitude to Mondi for the financial support provided to conduct the study and produce this publication. In line with the principles of TEAMING UP 4 FORESTS, the highest standards of scientific quality, integrity and independence have been applied when carrying out this study.

This summary provides a short overview of the key messages of the expert group's full report and is focused on highlighting crucial aspects for the implementation of concrete response measures to challenges related to wood supply. We recommend the full report to the reader for deeper insights and a more detailed elaboration. We genuinely aspire for this summary to support business executives and other decision-makers and practitioners in addressing multiple intricate challenges related to wood supply in Europe.

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**Andreas Nikolaus Kleinschmit von Lengefeld**
**Nelson Grima**
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