

The path to strong sustainability:  
**Research Agenda for the  
Wood Products Industry  
for 2025–2035**



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# Introduction

As far as climate actions go, wood construction in itself gives you a free benefit. It is proven to be competitive in terms of costs: Additionally wood binds carbon throughout its life cycle and is also a renewable material, which is unique. Wood construction is accounted directly as a carbon sink in the carbon balance analysis in EU countries.

Producing from wood is likely to support the domestic economy. The domestic origin of raw materials is high, and almost 70% of the added value of forest industry exports remains in Finland.

Wood construction is a major user of wood in the wood products industry. However, wood construction in Finland has lagged behind many other countries. For example, the share of wood in public construction in Finland is around 15%, compared to the statutory 50% obligation in France. In Finland, the share of wood in apartment buildings is around 5% compared to 20% in Sweden. This is a drawback, as there is enough raw wood material in Finland. Even if we were to build exclusively with wood, there would still be plenty of wood for export. A functioning domestic market is crucial for the development of the high added value wood component industry, as it lays the foundation for strengthening new concepts and leads to competitiveness also in export markets.

The Research Agenda for the Wood Products Industry, which targets for 2035, aims

to meet these challenges. What needs to be studied in cooperation between the academic world and the relevant industries to make wood products – and especially wood construction as a whole – competitive, to keep Finland at the forefront of materials development, and to create a business ecosystem around the wood products industry, where different parts of the value chain support one another?

The wood products industry may also involve new business models that can benefit from carbon sequestration, and as a forested country, Finland should be at the forefront of such actions. By working in cooperation, we create new know-how in areas we anticipate the regulations to develop and with this create new business opportunities. Without forests we cannot have wood - By creating better conditions for long-life wood products, we will further improve the sustainable use of our largest renewable resource, the forests.

Together with leading researchers in the field, we have been considering here the direction of research, and now I challenge the entire wood products industry sector as well as the local and national decision-makers to participate in this action and take benefit from the free lunch resulting from the climate effect.

**Antti Koulumies, Chariman**  
**Federation of the Finnish Woodworking Industries ry**





## Wood products industry sector paves the way for strong sustainability

The foreseen environmental challenges and the sustainability crisis require renewal of both the society and the wood product industry sector. Critical components of natural ecosystems such as biodiversity, climate and natural habitats cannot be replaced, so natural resources should be exploited responsibly respecting the renewal capacity of the environment.

These planetary limits define the strong sustainability framework, whereby economic growth must be built within these limits in a socially just and acceptable way.

The wood products industry as a sector, can lead the way to the path of strong sustainability. Wood products offer concrete and tangible solutions to cut emissions, sequester carbon and reduce the use of non-renewable resources.

In the long term, a shift from short- to long-life wood products and more efficient use of recycled and side stream materials will improve resource efficiency and reduce the need for virgin raw materials.

For the sustainability solutions offered by the wood products industries to be adopted by the wider society, these need to be technically and economically competitive. Wood products must provide measurable added value to customers, both in the production processes and in the end-use. At the same time, manufacturing productivity must be improved throughout the value chain, from sawmills and panel industries to construction sites, downstream processors and end-users. More value and income must be derived from wood products with less consumption of raw materials and resources.

Business models and value networks need also a change. Circular economy and industrialisation of construction are bringing a change to the operating logic of the sector, requiring a rethinking of the business ecosystems. The foreseen tightening of regulations poses new challenges, such as evolving requirements for recycling, responsible procurement procedures and energy efficiency, which are now central for a sustainable business in the wood value network. None of the above possibilities may be

realised by itself. Companies in the wood products industry, construction and other sectors need to invest more in research and development of wood materials, wood products and business to deliver on their promises to the customers and to the society. This is why a new research agenda for 2025–2035 has now been created for the sector, intended to be carried out as a collaboration between the research academia and the industries. The Agenda is a national declaration of intent on how the sector will address the coming challenges and opportunities of the sustainability transition. It also supports the objectives of the Strategic Research and Innovation Agenda of the Forest-based Sector Technology Platform.

The preparation of the research agenda has been funded by the Metsämiesten Säätiö Foundation and the Puumiesten Ammattikasvatussäätiö Foundation.



# What is being researched

The research agenda highlights three key areas, all of which have a key role to play in supporting the move towards strong sustainability and the renewal of the wood products industries.

**Improving productivity:** The objective is to maximise the added value of wood raw material and develop products and processes that produce a measurable added value for customers. The main focus is on the use of wood to contribute to the coming carbon neutrality goals and to further innovations in production technologies.

**Evolving wood materials:** The objective is on improving the technical properties of wood materials, extending their life cycle and increasing their recyclability. Key themes include the longevity of materials in service, recycling as well as human health and well-being impacts.

**An evolving business:** The objective is on circular economy and industrial construction development, how traditional business models and value chains need to develop. The objective is to create new models that support the transition to industrialised construction and, more broadly, the renewal of the sector in the context of strong sustainability.

Resource scarcity  
Skilled workforce  
Digitalization/AI  
Climate change  
Stress/pressure  
Green loan

## Challenges

Energy  
Emissions  
Regulation  
Biodiversity  
Competition  
Urbanisation  
Industrialization



# What is being influenced

The research agenda supports a significant increase of research and development investments in the wood products industry. The objectives of effective RD activities are:

## 1 Increasing productivity and resource efficiency:

New technologies and processes will improve the productivity of the wood products industry sector and reduce the use of virgin raw materials, thus increasing competitiveness and supporting strong sustainability.

## 2 Innovative wood products which add value:

New wood-based products respond to market needs and sustainability requirements. This strengthens the competitive position of the sector.

## 3 Minimising climate impacts:

Increasing the share of durable and sustainable wood products in construction and reducing the carbon footprint of the whole value chain.

## 4 Boosting the circular economy:

New circular economy solutions and business models enable the efficient use of resources, extend the service life of wood products and increase the attractiveness of the circular economy bringing cooperation across industry boundaries.

## 5 Promotion of domestic markets and exports:

Domestic markets will be strengthened and a catalyst for competitive exports will be created. The position of wood products in construction and wood construction in general will be improved in Finland.

# How is the research agenda implemented

The central factor for implementing the research agenda is strong cooperation between the industry, the public sector and the research institutions, and securing the funding to support it. This strategic cooperation and the funding that supports it are crucial for the wood products industry sector to strengthen its competitiveness, innovate and deliver solutions to the sustainability transition.

The Federation of the Finnish Wood-working Industries Puutuoteteollisuus ry promotes cooperation:

By promoting the implementation of the **research programmes** presented in the research agenda.

By communications with research institutes, universities and polytechnics, wood products industry member companies, associations and ministries on the themes, projects and programmes on the agenda, **with the objective of prioritising focused topics that bring innovative and competitive advantages**, and identifying **knowledge and training needs** that drive the sector forward.

By holding annual **“Innovations and Co-operation” forums** to present interesting new research and innovation projects and facilitate the dialogue between researchers and the industry to

foster further cooperation and enable the emergence of new initiatives, as well as to improve the dissemination and exploitation of innovation between the different actors.

By conducting **visits to financiers** to discuss the themes of the agenda and the allocation of funding in accordance with the objectives of the research programmes.

By communicating to **decision-makers** about the objectives and opportunities of research and development in the wood product industry to promote national RD targets and to support the sustainability transition.

By cooperating with **Nordic and European organisations** to launch joint projects.

By presenting the agenda to **European organisations**, with the aim to include the research agenda themes in the next European Commission Framework Programme for Research and Innovation 2028–2034.

# Research Agenda for the Wood Products Industry 2025–2035

## Sustainability transition forces the wood products sector to renew

The rapidly changing environment in the wood products industry sector is driving a demand for low-emission and carbon-storing products and services, which in turn create new opportunities for the industry. However, the wood products sector cannot stay satisfied with its current competitive advantage, as other sectors are also developing more sustainable alternatives.

Regulation and climate objectives supporting a sustainable transition will become stricter at local, national and EU levels. EU regulation has focused on forests in recent years, but also other EU regulations have impact on wood products. National and local climate targets can benefit from the wood products industry, for example in life-cycle management of construction, where wood has an advantage over carbon-intensive concrete.

Forest-related regulation affects the availability of virgin raw material. The availability and quality of raw materials and the timing of timber harvesting can also change rapidly for other reasons, such as insect or storm damage. In accordance with the principles of the circular economy, the raw material base must be extended to include recycled material. The companies must also be able to meet increasing demands for traceability and certification of raw materials.

In Finland, more than half of all wood biomass and almost all recycled wood is currently used for energy production. The growth of low-emission technologies is undermining the competitiveness of wood biomass as a fuel. This will free up biomass previously burned for energy for other uses and have a significant impact on material flows, processes and markets in both the forest and wood products industries.

Economic uncertainty makes it difficult to predict the future and companies need to be able to adapt to rapidly changing export and import markets. The construction sector is often one of the first to be hit by recession, and currently bankruptcies have already been seen. This leads to a loss of valuable human skills, which can slow down the development of, for example, production automation.

The coronavirus pandemic and Russia's war of aggression in Ukraine have emphasised the importance of security of supply and self-sufficiency. ESG criteria (environment, social responsibility and good governance) and sustainable finance are shaping the financial markets and driving demand for sustainable solutions. The promotion of well-being and health is high on the agenda of both individuals and societies. Wood products can play an important role in all of these.

The wood products industry sector also has the opportunity to support a fair and viable sustainability transition by offering more jobs geographically than many other industrial sectors. The challenge is to ensure a sufficient supply of skilled labour as the population ages and skill requirements increase.

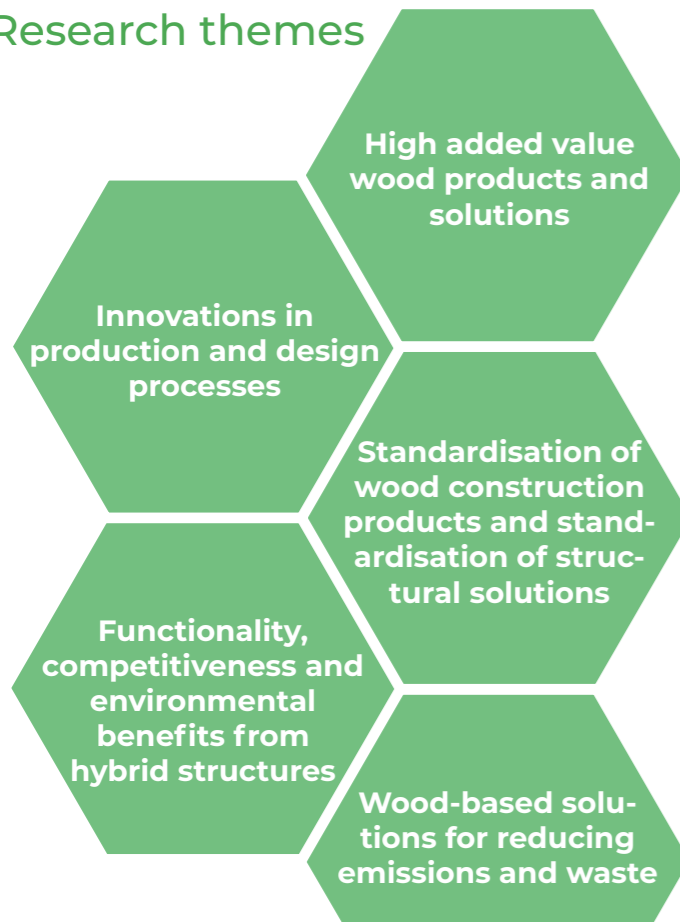
The wood products industry is able to respond to the challenges of a changing operating environment. To stay competitive the sector requires new technological, economic and social skills, the development of traditional business models and innovation in services, digitalisation and the adaptation to circular economy. These will be achieved through increased collaboration between research and business, in particular on productivity, wood material utilisation and business innovation.

Key areas of research:

# 1 Improving productivity

Wood raw material must provide maximum added value competitively and with a respect for the ecological boundary conditions. To achieve this, we need better products and solutions, as well as production processes and technologies that increase both resource efficiency and productivity.

## Research themes



## Research questions

- What is the development potential of the processing of wood products from the perspective of the Finnish economy and sustainable development?
- How can production and design processes be made more efficient to meet the goals of strong sustainability, using digitalisation and artificial intelligence?
- How can standardisation of wood products and construction solutions contribute to the productivity, competitiveness and sustainability of construction?
- What is the role of wood products in mitigating the environmental impact of the building sector and how can the use of wood products be increased most effectively?

## Added value and productivity do not increase only through gradual development

Although there is plenty of wood in Finland, there is not enough to waste. Modernisation of the wood products industry and construction sector has been gradual. However, significant increases to added value and productivity require radical innovations that transform entire processes and create entirely new opportunities, not just small incremental improvements.

Sufficient measures have not been taken in the sectors to seize the potential associated with wood products, such as a stronger transition to wood construction that utilises industrial pre-fabrication. Neither has the innovative and higher added value solutions of the wood product industry yet been fully utilised. At the same time, carbon dioxide emissions per square metre from new housing production, for example, have increased, and the productivity of construction work is stagnating, even though wood offers an immediate improvement.



# 1 Improving productivity

## Research themes

Modernising the wood products industry and increasing its added value requires a comprehensive overhaul, combining production, design, process and value chain development.

**The objective of high added value wood products and solutions** is to increase the use of wood raw material in products that result in the greatest possible added value both economically and ecologically. This requires a better understanding of the origin, quality and the impact of the degree of processing on productivity, end products and their economic value. Research is needed on how the wood products industry can make better use of the current low value added products to products of higher added value and longer service life.

**The objectives of innovations in production and design processes** include increasing resource efficiency and introducing new production technologies as well as utilising digitalisation, artificial intelligence and data modelling, which make production processes more efficient, reduces costs and improves product quality. Two directions should be considered in production: 1) the gradual promotion of resource efficiency in current production, and 2) the breakthrough of entirely new innovations. These require an interdisciplinary approach, with an emphasis on business, architecture and structural design.

**The standardisation of wood construction products and construction solutions** is a critical step to improve the competitiveness and sustainability of the construction sector. Standardisation enables the wider use of wood products, for example in prefabricated building elements, which both reduces emissions from construction and increases productivity and resource efficiency. In the development of building elements, the functionality of hybrid construction and its competitiveness in the market will also be studied. It is also important to determine on which basis standardisation will be built. It makes sense to select already established products as the basis for standardisation. In this way, standardisation supports the compatibility and marketability of products at different stages of processing.

**Wood-based solutions for reducing emissions and waste** are based on the use of wood products and hybrid solutions in long-life applications. The objective is to find out how the use of wood products can be maximised within ecological boundary conditions, what impact it will have on the carbon balance of Finland and how the side stream materials of the wood industry can be utilised more efficiently in wood products.

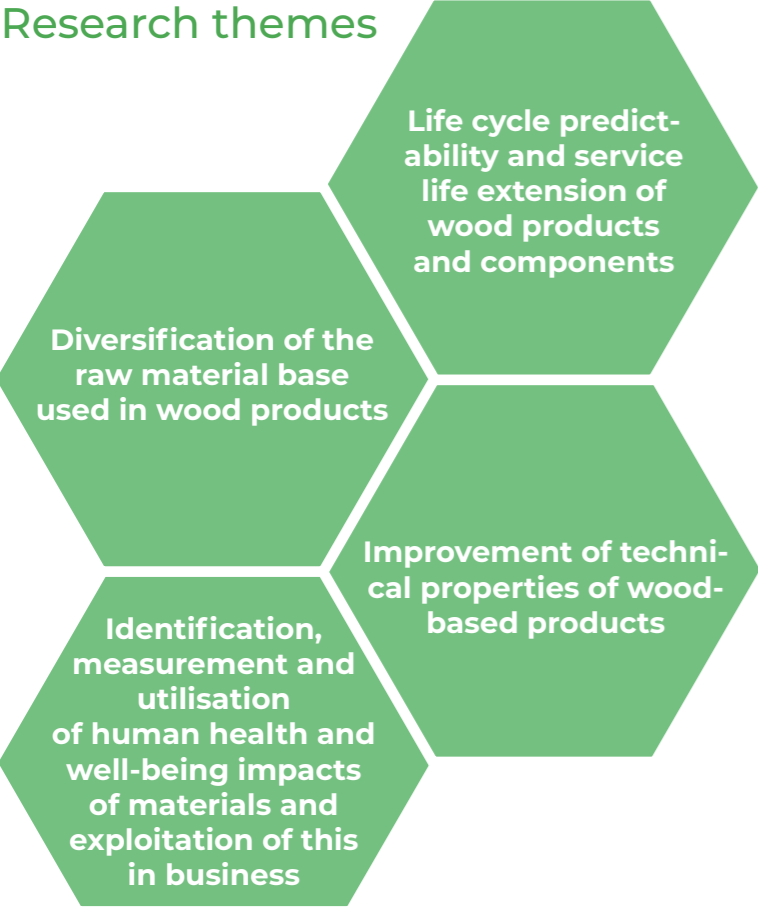


Key areas of research:

# 2 Evolving wood materials

Wood raw materials must be used more efficiently, and the range of raw materials will grow to cover recycled wood and industrial side streams previously ended up in energy production. The utilisation of new materials requires research and new technologies. There is also a need for predictability and manageability in the properties of materials and the lifetime of products.

## Research themes



## Research questions

- What materials and products can withstand the changing conditions related to climate change?
- How to increasingly utilise industrial side streams, recycled wood and small wood fractions in the manufacture of long-life products?
- What solutions can improve the long-term durability of wood in different end-uses?
- How to improve the fire and moisture resistance of wood and the repairability of structures?
- How can the strength potential of Finnish wood be fully utilised?



## Strong sustainability requires more a versatile utilisation of raw materials

- How to produce bio-based adhesives, develop adhesive technology and bonding technology for wood structures?
- What methods are used to assess and verify the welfare and health impacts of buildings?
- How do materials affect human well-being in the built environment?
- How will the verification of welfare impacts change the demand and competitiveness of products?

**C**ombustion-based energy production is expected to decline. The decline in the competitiveness of wood-based energy is causing fundamental changes in material flows, production processes and markets in the forest industry. For the wood products industry, the fate of millions of cubic metres of by-product streams is a key, but the change also applies to recycled wood.

Material technology can be used to optimise the use of raw materials by extending the life cycle of products while reducing dependence on virgin raw materials and fossil fuels. The aim is to direct raw materials to the most profitable value chains based on their properties.

## 2 Evolving wood materials

Research themes

The objective of material technology research is to maximise the added value of wood raw materials. At the same time, the competitiveness of existing products and processes will be maintained by increasing expertise in raw materials, production technology, product and environmental impact. In addition, the objective is to identify, develop and commercialise new products and industrial production processes based on forest industry side streams and recycled wood.

Key research themes include extending **the life cycle and resource efficiency of wood products**, i.e. the properties of raw materials, long-term durability, user safety and **health and well-being impacts**. It is in the common interest of forest bioeconomy operators to find **ways of using different material flows** so that the **potential properties of the raw material** are fully utilised.

As the range of materials grows, new solutions must be found to **make raw wood, forest industry by-products and recycled wood into products that are as long lasting as possible**. The solutions depend on the properties of each material. For this reason, the long-term performance and fire resistance of materials in different conditions is an important area of research.

From the perspective of structural engineering, information on the functional and environmental benefits of different structural types and solutions for optimising the use of materials are needed.

In addition, the use of wood needs to be supported by information of the impact of the materials on the psycho-physical well-being of the occupants and on the productivity of teaching and office work which is carried out in buildings made from wood.

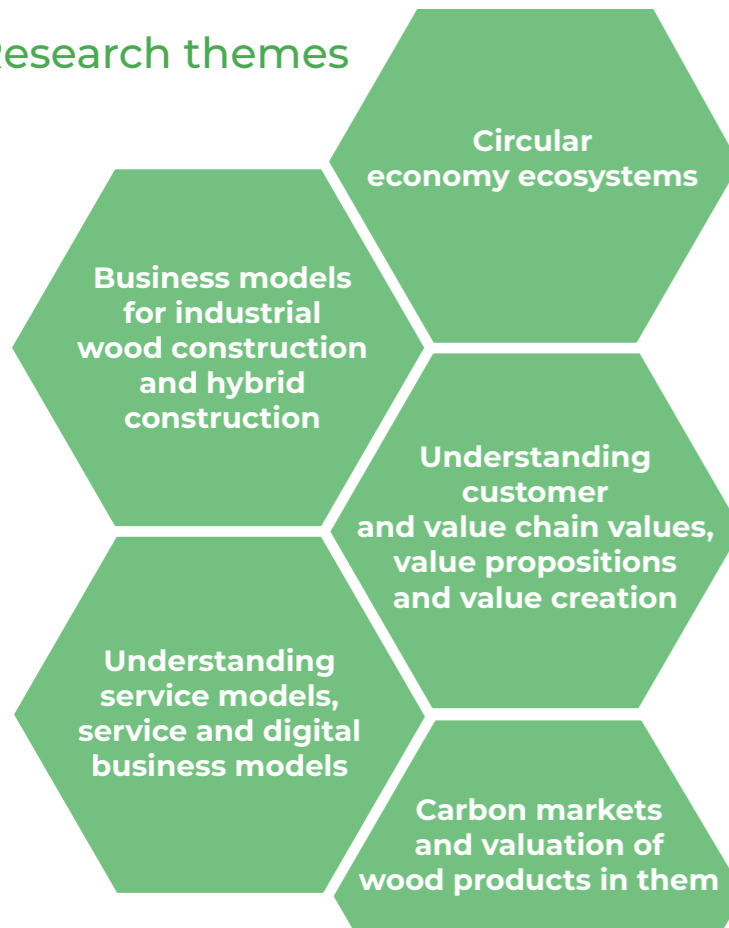


Key areas of research:

# 3 An evolving business

The transition to a circular economy and industrial construction requires a systemic change in the business models, value networks and forms of collaboration in the wood products and construction industries. The aim is to understand and innovate new ways of creating value, service models and digital solutions that support the transition towards more sustainable and circular business.

## Research themes



## Research questions

- What are the business models, value networks and processing chains of the circular economy and industrial construction in the wood products industry? What are they like in the pioneering sectors of the circular economy and industrial construction and what can be learned from them?
  - What values do the actors have and what kind of value propositions do they have for the sustainability and circular economy transition?
  - How is added value generated and how is it shared? What factors increase value and acceptability in the eyes of current and potential new customers? How are they implemented and branded?
  - Do prejudices affect the utilisation of recycled materials and how is approval promoted?
- How do different services and digital business models support the transition to a circular economy?
  - How can carbon sequestration be measured and reported reliably throughout the product life cycle?
  - What is the value of carbon stored in wood products and fossil emissions avoided by the use of wood products and what kind of business do they enable?



## Transition to a circular economy challenges familiar ways of doing things

**T**he sustainability transition is a social necessity that requires significant changes in the economy, business and production methods.

A linear economic model, in which resources are used for single use, does not fit into the definition of strong sustainability. The change must be promoted in a way that not only reduces environmental impacts but also creates new opportunities for livelihoods and supports sustainable economic growth within ecological boundary conditions.

Wood and the wood products industry play an important role in the change, as wood is a renewable raw material and can offer solutions in a circular economy based on closed supply chains.

# 3 An evolving business

## Research themes

In business, a value proposition is defined as a promise of what kind of added value the company offers to its customers and other stakeholders.

In the wood products industry, we need to better understand **value networks and value creation** and redefine value propositions for both customers and wider stakeholders, such as suppliers, employees and society. Research will determine what values and value propositions different actors have and how value is added. A broader understanding is important in the transition to a circular economy.

**The circular economy ecosystem** requires broad-based information on how actors in the wood product industry can build and maintain sustainable business. Research is needed on the structures and dynamics of value networks in the wood products industry, both domestically and internationally.

Market analyses, innovation models and best practices, as well as studies on circular economy knowledge and actors' capacities, provide a key knowledge base. Good practices will be sought in particular from sectors at the forefront of the circular economy. In addition, it is important to research regulation and its effects, as regulation acts as a steering mechanism in the sustainability transition.

**The promotion of industrial wood construction and hybrid construction** as well as new business models play a key role in the modernisation of the construction sector. Industrial construction offers an opportunity for a productivity leap in construction, providing a competitive advantage for the entire value network.

Studies show that productivity improvements of up to 20% can be achieved without significant additional investment in production technology. More information is needed on how the industrial construction process differs from the traditional one and what kind of new business models enable its extensive utilisation.

Key research areas include separating the productivity potential of industrial construction throughout the construction value chain, on what schedule the productivity potential can be realised and integration of design, industrial prefabrication and site work into a single entity instead of partial optimisation.

**Intangible value creation** strengthens the competitiveness of the wood product industry, renews business and helps to respond to changing markets. **The development of service models and digital business models**, such as circular economy service models like product rental, leasing or maintenance services, can reduce material consumption, extend product life cycles, add value for customers and open up new revenue streams for businesses.

The use of digitalisation and new technologies, such as Building Information Modelling (BIM), product knowledge and smart building solutions and new business models based on them can improve design efficiency and customer experience. The utilisation of data, for example through artificial intelligence and big data to optimise production processes, manage the supply chain or predict customer needs, is also an important part of intangible value creation. Demand can also be supported by examining factors affecting

brand building, innovations and customer experience, such as the impacts on the well-being of wood products or the acceptability of the circular economy in the sector.

As wood products store carbon throughout their life cycle and reduce fossil greenhouse gas emissions, **determining the value of wood products as a part of the carbon market** can open up new business opportunities.

Research is needed to determine the market value of the carbon sequestered in wood products or avoided by wood products and how this can be used to develop business.



# Research programmes

The key areas of the research agenda can be promoted, for example, through the following research programmes.

## 1 Smart and Productive Wood – productivity programme for industry and construction.

### **Objective: Productivity leap in the construction sector**

The productivity of construction has remained unchanged for decades. The Smart and Productive Wood programme develops and scales up industrial wood construction, moving work from the work-sites to the factories. This will change the value chain of a construction project and allow the sector to become more productive. The target is a 20% improvement in productivity compared to 2024 by 2035.

The productivity programme covers the entire value chain, from product manufacturing to the end of the life cycle of buildings. Digital solutions, such as artificial intelligence, parametric planning and knowledge-based management, are key tools for development. In addition to improving the efficiency of factory manufacturing, new product combinations and hybrid construction opportunities will be studied.

All parties are taken into account in improving overall productivity, and the construction sites are moving towards factory-like installation work. The role of the customer is crucial in the implementation of the reforms, and data management supports the overall optimisation. Research into customer needs and business models will drive process change, and risk and reward sharing must be incentivised for all parties in changing value chains.

The research programme contains the study of the stages of the construction value chain and focus on reconciling the benefits at different stages. The distribution of development costs and risks are key research topics for moving towards more efficient approaches.

The objective of the programme is to improve the productivity of resource use, which is also linked to material efficiency and the circular economy. A holistic approach ensures that all parts of the value chain are taken into account in improving productivity.

## 2 Health and Well-Being from Wood – a human well-being programme for the built environment.

### **Objective: Built environment for well-being**

The old wisdom tells us that we influence our buildings, which then affect us. The use of wood in buildings has been shown to have beneficial effects on well-being. Wooden interiors both reduce stress and blood pressure and improve concentration. The wooden surface is also antibacterial. Wood construction makes it possible to create diverse, aesthetically and sensorially pleasing and comfortable environments, where labour productivity is also higher. These themes are also central to the New European Bauhaus initiative.

The Health and Well-Being from Wood programme for housing and the built environment is linked to the New European Bauhaus initiative and examines the well-being impacts of wood construction on different scales from the district level to the interior of the premises and creates solutions that can be commercialised on the basis of the results.

The programme focuses on both housing construction and public construction, such as schools, hospitals and nursing homes.



## 3 Sustainable and Competitive Circular Economy

**Objective: Development of circular economy ecosystems in the wood products industry**

Increasing regulation, such as stricter recycling requirements for new and renovation construction, will require the wood products industry to focus on new categories of recycled products and various wood recycling innovations. The transition to a circular economy requires rethinking the basics of business and the entire business ecosystem, including the utilisation of branding and new technologies.

The Sustainable and Competitive Circular Economy programme builds ecosystems between the wood product industry and the concrete, steel and chemical industries and other industries around leading companies. The aim of the programme is to develop and establish new business models based on closed material cycles, innovative utilisation of recycled materials and side streams.

These models aim to create economically viable and competitive products with a focus on both internal and external value chains, service models, digitalisation and supply chains.

## 4 Centre of Excellence for Wood Construction

**Objective: Bringing Finnish wood construction expertise and research to the forefront of the world**

The Centre of Excellence for Wood Construction is responsible for the national coordination of teaching, training and research related to wood products and wood construction.

The Centre of Excellence will bring together the entire multidisciplinary construction value chain and different levels of government to share up-to-date knowledge and expertise on wood construction and apply it to the field.

Coordination and the whole sector moving in the same direction is essential to make systematic progress on the sustainability path. Key research and educational institutions, companies in the wood products and construction sectors, and municipalities and cities participate in the Centre of Excellence.

### How the research agenda was prepared

The Research Agenda for the Wood Products Industry was created between autumn 2023 and autumn 2024 in an extensive stakeholder cooperation between researchers, industrial companies and other organisations. The process included a survey (142 providers) and two workshops in spring 2024. Professor Anu Bask, Professor Henrik Heräjärvi, Professor Matti Kuittinen, Research Professor Katja Lähtinen, Professor Sami Pajunen, Professor Anne Toppinen and Professor Erkki Verkasalo participated in the more detailed design of the research themes of the project. The project was led by a core group consisting of Professor Anne Toppinen, Professor Henrik Heräjärvi, Professor Matti Kuittinen and Professor Sami Pajunen, as well as CEO Mika Rytty and SVP Antti Koulumies. The project is coordinated by the Federation of the Finnish Woodworking Industries Puutuoteteollisuus ry with the support of the think tank Demos Helsinki. The research agenda has been funded by the Metsämiesten Säätiö Foundation and the Puumiesten Ammattikasvatussäätiö Foundation.



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