

An aerial photograph of a dense evergreen forest, likely spruce or fir, with a white rectangular text box in the upper left quadrant. The trees are dark green with some lighter green highlights, suggesting sunlight filtering through the canopy.

Green and vibrant economy

The climate roadmap for the forest industry

2035

INTRODUCTION

FAREWELL TO FOSSILS – TAPPING THE CLIMATE POTENTIAL OF THE WOOD PROCESSING INDUSTRY

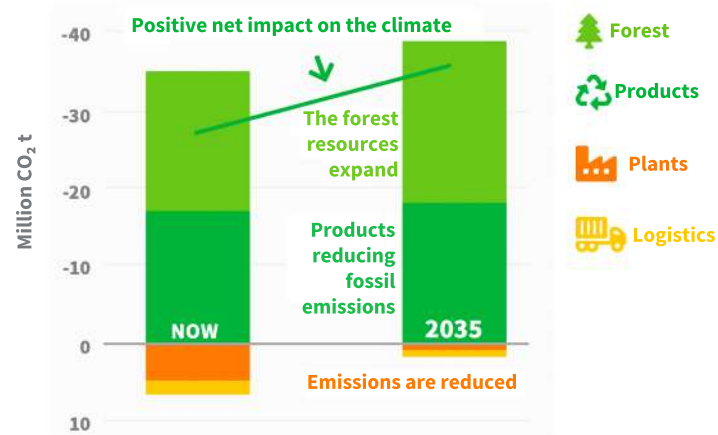
We have known for decades that we must stop producing fossil emissions because they cause climate change.

Forest industry companies have reduced their emissions, fully aware that even the remaining low levels of emissions must be cut. While the sector is a forerunner in terms of its climate impact, the forest industry wants to join forces with the government and other stakeholders to take this trend even further.

The forest industry operates in the global market. It offers products and services throughout the world.

The atmosphere recognises no national boundaries. If production is transferred elsewhere from Finland, this will lead to carbon leakage. Products should be made where this can be done at the lowest possible level of emissions. Finland has the necessary capacity and knowledge. Most Finnish-made forest industry products are exports destined for all continents. They help mitigate climate change by replacing products that are manufactured with high levels of fossil emissions. These products are the forest industry's gift to the climate.

The climate benefits created by the forest industry increase



Forest industry products help mitigate climate change now and in the future. All told, the forest industry accounts for tens of millions of tonnes of CO₂ abatement. This has been achieved by reducing emissions at the mills, by products reducing fossil emissions and by contributing to the growth of the forest resources. The diagram includes direct emissions and purchased energy emissions of mills.

Wood-based products, and forest management that enables their manufacturing, have the potential of offering more climate and economic benefits than today.

The portfolio of export products can be expanded, new climate solutions developed, and the growth of our forest resources improved. Finnish forest industry mills are likely to be fully fossil fuel free as early as 2035. The national economy could be injected with significant green cash flow for decades to come. This climate equation can be solved if there is a will.

Good outcomes come from bold choices.

Finland must look climate change in the eye and recognise the ways in which we could respond to the global phenomenon through national effort. Finland must dare to make the right choices that could make us a leading climate mitigator and help us achieve our national goals of carbon neutrality and a strong economy. The Finnish forest industry enables the achievement of these goals by creating global climate benefits while expanding the national economy and sustaining and creating employment for Finns.

Tapping the climate potential offered by the wood processing industry requires bold decisions from the policymakers. It requires the recognition of the available options and opportunities.

The climate roadmap for the forest industry directs towards sustainable climate choices and economic success

-  Forest industry products account for over 16 million tonnes of CO₂ emissions abated globally per year. This is more than one-third of all CO₂ emissions of Finland at the moment.
-  The emissions of forest industry mills are already extremely low and soon these mills could be completely fossil fuel free.
-  The forest industry could boost the Finnish national economy and improve the wellbeing of each Finn even more than it does today.
-  The growth of our forest resources could be improved while increasing the use of wood.
-  None of this requires miracles. All we need are the right decisions and the right vision.



CO₂ emissions are reduced.



12.1

billion/
year

**Substantial value added
to the national economy.**



3 MtCO₂/a
Direct
mill emissions



3200 MtCO₂
Forest resources



16.6 MtCO₂/a
Climate benefits²/a
from products



Products reducing fossil emissions.



**ACTIVE FOREST
MANAGEMENT**

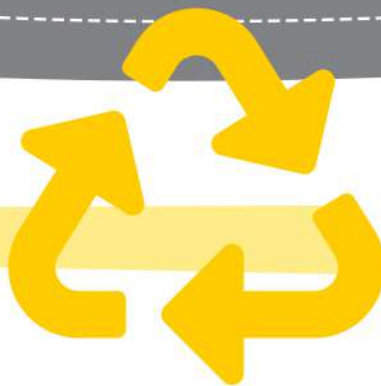
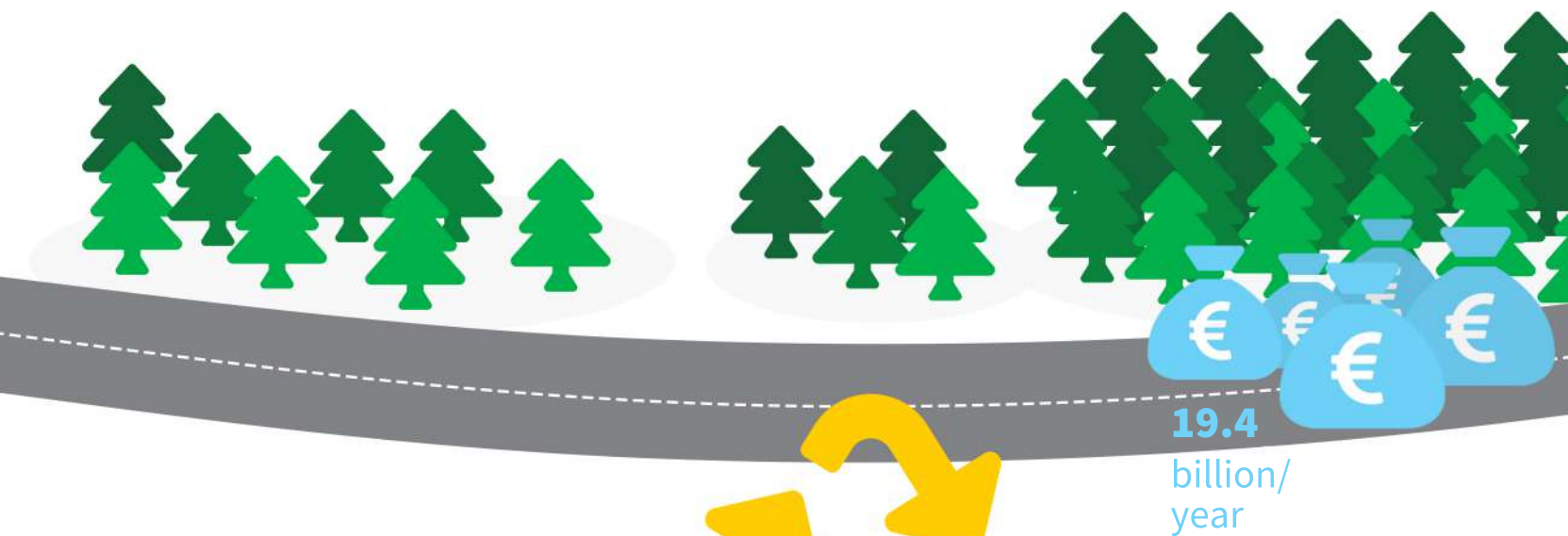


INVESTMENTS

2017

The forest industry roadmap scenarios reveal the enormous climate and economic potential in Finland. Products offer vast potential for the climate; mills could become fully fossil-free and the growth of forest resources could accelerate. This would create more value added and income for the national economy.

The forest resources increase.



**JOBS AND
INCOME**



INNOVATIONS

- **0.3 MtCO₂/a**
Direct mill emissions



3550 MtCO₂
Forest resources²



17.5 MtCO₂/a
Climate benefits² from products

2035

PRODUCTS REPLACING FOSSILS

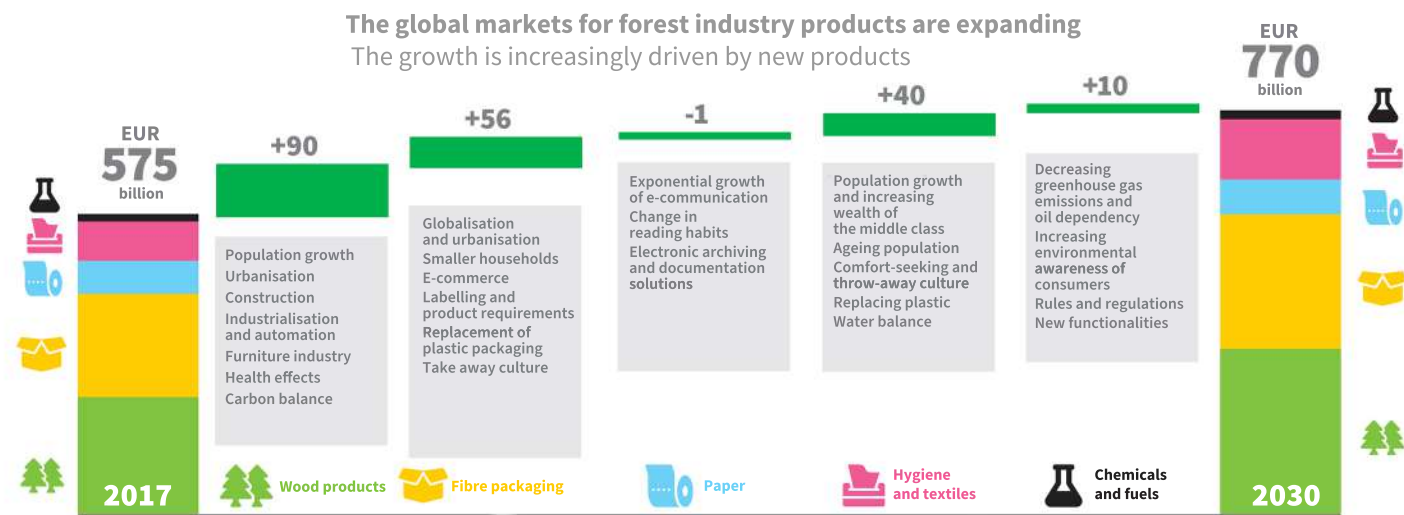
THE WORLD, OUR LIFESTYLES AND CONSUMPTION PATTERNS ARE CHANGING – WOOD-BASED PRODUCTS OFFER CLIMATE-FRIENDLY OPTIONS

Fossil raw materials belong to the past, and renewable raw materials to the future.

Global megatrends, people's values and the predictions of policymakers all support this shift in outlook. If we continue to release the carbon contained in fossil raw materials into the atmosphere at the current rate, we stand to lose the fight against climate change. This is not an option.

We need to change our consumption behaviours for the climate in the foreseeable future – and we place our hope and expectations in renewable raw materials. The winners in the new reality will be wood-based products ranging from massive construction elements to microscopic nanocellulose. The reasons are many:

- While a tree grows, it captures carbon from the atmosphere. Products made from wood reduce fossil emissions when they replace products that cause emissions. Wood-based products act as carbon storage throughout their lifecycle. By recycling this carbon originating from the atmosphere, we can manufacture products, create jobs and maintain a sustainable economy.
- This is the highest level of the circular economy. The carbon circulates infinitely from the atmosphere, through trees to recyclable products. Exports generate wealth for domestic consumption.



Source: Pöyry/The global markets and growth potential for forest industry products in 2030 – a 2018 report

Finland has the potential to respond to demand on every market sector. Finland is competing for a share of EUR 200 billion.

The European climate visions and the market outlook for renewable products are giving clear signal that consumption accelerating climate change must change.

The European Commission climate vision from 2018, A Clean Planet for All, emphasises the role of wood-based products in the mitigation of climate change and the demand for wood as a raw material in many industrial applications (such as construction, fibre products, textiles, composites, bioplastics, renewable energy, chemicals).

The global market for wood-based products is estimated to grow by nearly EUR 200 billion between 2017 and 2030 (Pöyry, 2018). The growth is driven by many factors such as urbanisation, growing online trading, higher environmental awareness, population growth and increasing wealth, which in turn predict strong growth in wood-based construction, packaging, hygiene and textile products, chemicals and fuels.

The demand for wood-based products used in construction, fibre-based packaging materials, special paper products and product innovations is expected to increase and the demand for printing paper to decline. A portion of the wood material currently used in energy production, such as lignin (a by-product from pulp manufacturing), is envisaged to find new uses as a material in batteries, as replacement for oil-based materials and as an insulation material.

The climate benefit of products made from Finnish-grown wood stands at over 16 million CO₂ abated per year, which has been achieved by replacing products that cause more fossil emissions with wood-based products. In comparison, this is more than one-third of all CO₂ emissions of Finland at the moment and about five times the current emissions of forest industry mills at the moment (3 MtCO₂). In the future, the emissions caused by Finland on the whole and its forest industry will see a rapid decrease.

The positive annual climate impact of products

>16MtCO₂/a
(2020–2035)



The current output of forest industry mills operating in Finland accounts for more than 16 million tonnes of CO₂ abated per year globally (VTT 2020). However, the climate benefits obtained from the products will materialise only if the business environment supports the favourable development of products and processes, including sufficient availability of electricity and wood.

” These products have something in common: either they are manufactured by Finns or Finns are among the first to plan their production. Part of the 200 billion euro increase in added value is up for grabs for Finland.

New wood-based products could revolutionise the world in the next ten years.

Wood construction is increasingly mentioned in the EU climate initiatives and France, for example, has set itself the target to make 50% of public construction wood-based. Pulp manufacturing, on the other hand, is often the process behind new innovative products that enables the harnessing of the different qualities of wood for a variety of uses.

Pulp as such is also utilised more and more in textiles, 3D printing, composites and the pharmaceutical industry. In textiles, pulp could replace cotton and synthetic materials made from fossil fuels, which not only abates their climate impact but also other adverse environmental effects such as problems caused by irrigation and pesticides and microplastic pollution in the water systems. Pulp-based hygiene products improve our quality of life and reduce infections and the need for hospital care. In medical research, nanocellulose has been proven to speed up the healing of wounds and injuries and it is also used in cancer research for cell culture.

Many wood-based innovations come from Finland. Their industrial production depends on profitable pulp mills. Tapping the climate potential of products and generating export earnings require sustained cost competitiveness, investing in mills, the electrification of the industry and the availability of wood for processing.

”Tapping the climate potential of products and generating export earnings require sustained cost competitiveness, investing in mills, electrification of the industry and the availability of wood for processing.

DECREASING CO₂ EMISSIONS

FOSSIL-FREE MILLS ARE REALISTIC

Forest industry mills in Finland could be nearly fossil-fuel free as early as 2035 and even carbon-negative from then onwards.

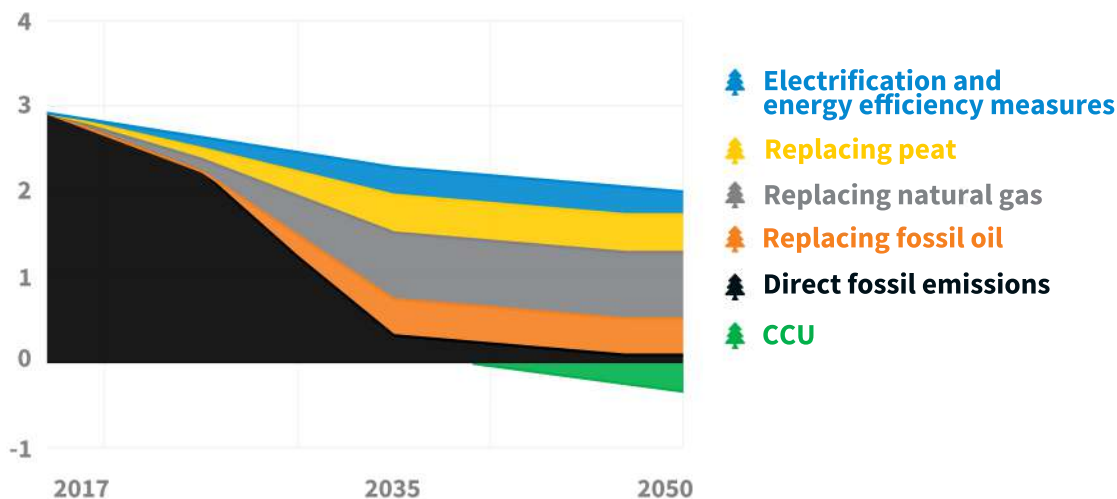
Achieving this requires that Finland create a favourable business environment for the wood processing industry. Up until now, the forest industry has been able to reduce its CO₂ emissions at a faster pace than Finland in general and the sector is committed to continuing on this path. The way to a completely fossil-fuel free industry is through investment, not restrictions.

The global competition for investments in the sector is tough, and only the very best will win. The key to success is to upgrade and modernise mills at pace and to secure new investments. They are the right response to the changing global demand and requirements. Without proactive measures, mills will fall behind and become outdated.

Winning investments in Finland requires critical rethinking and the right choices. The industrial policy of Finland should be reviewed and updated to support progressive and investment-driven decisions based on comprehensive situational analysis of the global environment in which our industries operate – in other words, the means of survival and success. Finland should ambitiously seek climate-friendly forest industry investments.

At the same time, favourable conditions for existing forest industry operators, which give jobs to a large number of Finns, should be safeguarded.

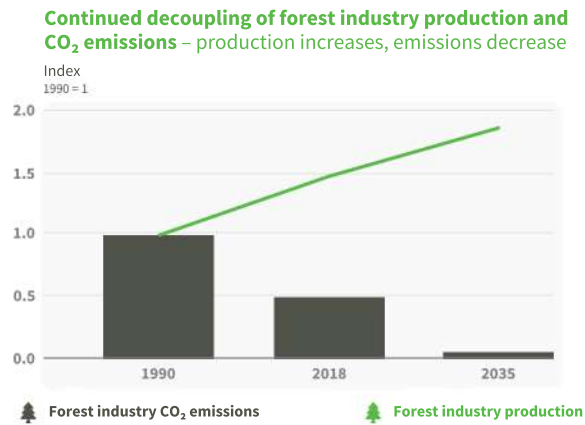
Nearly all of the fossil fuels used by the forest industry will be replaced by 2035



According to the scenario laid out by AFRY, the use of fossil fuels could, for the most part, be stopped, except for small quantities of emergency reserves, through investments in and the electrification of mills. The remaining fossil fuels could be replaced by modernising combustion plants and through investments in new mills. Another potential avenue expected to be available by 2040 is CCU, or carbon capture and utilisation. The demand for purchased energy is estimated to decline due to energy efficiency measures despite growing production and more widespread electrification (AFRY 2020). The proportion of fossil fuel consumed by forest industry mills is already as low as 14 per cent.

The forest industry wants a level playing field with global competitors

The forest industry is not asking for anything more. For policymakers to have a realistic idea of Finland as a business environment, they need better insight into the measures available to competing countries in the fight over investments. What measures have Germany and Sweden taken to affect, for example, the energy costs of mills competing with Finnish ones? Without a global perspective, no situational analysis or climate debate can be accurate or realistic. Comparing the energy taxation between Finnish companies that are inherently different can support only partial conclusions.



The relative CO₂ emissions of forest industry production have decreased by 64% since 1990. During this period, the pulp and paper industry has increased the manufacturing of environmentally and climate-friendly products by up to forty per cent. According to the scenario laid out by AFRY, a similar trend could continue until 2035.

It is no coincidence that Finland is a hub of high-level wood processing industry

The foundations are already in place: Finland is a stable democracy with a secure energy supply, generous water resources and advanced grey water treatment systems, the skills level in the sector is among the best in the world and mills are regularly invested in and modernised. To keep up and improve the excellent performance, the industry needs new investments backed by a strong political commitment to take responsibility for the environment and the economy.

If Finland ceased to produce forest industry products, the increasing global demand will only be met by fossil-based materials and fuels or wood-based products made in other countries.

Finnish forest industry products are manufactured from wood sourced from well-managed forests using extremely low levels of fossil fuel energy. This generates enormous added value to benefit Finnish society. The global climate and Finnish economy will both be winners, if we have the courage to take responsibility for the sustainability of both.

Finnish forests are healthy. Over decades, the forest resources have steadily increased. It is what our mills, products and exports continue to rely on in the future – and it does not come without hard work.

INCREASING FOREST RESOURCES

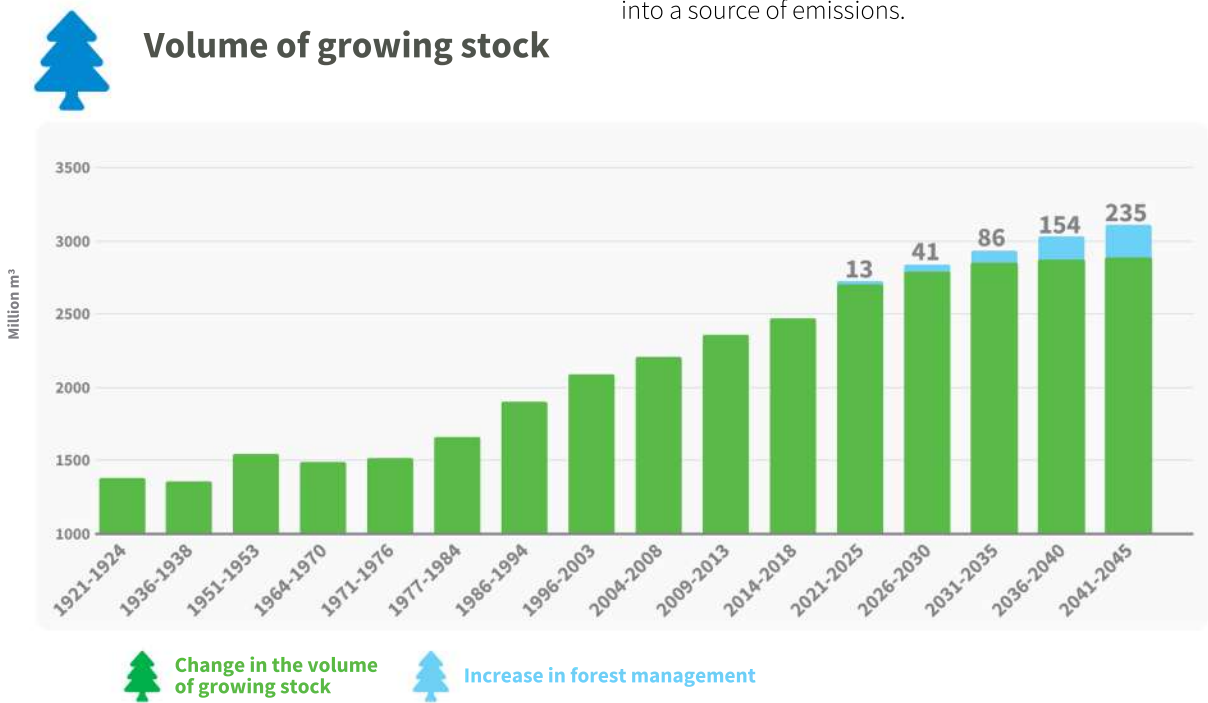
STRONGER GROWTH IN THE FOREST CARBON STORAGE

Where wood processing gives forests their economic value, the climate also stands to benefit.

The positive outlook for the Finnish wood processing industry has motivated forest owners to look after the wellbeing of their stands and to increase Finland’s forest resources. Sustaining the positive outlook requires that forest owners continue to assume an active role and have faith in the future of Finnish forest management and the forest industry.

If Finland chooses to maintain and develop its wood processing industry, this will also serve as an incentive for forest owners to pass on their assets to future generations in their prime.

Expanding the forest resources and increasing the production of wood-based products will strengthen and sustain the entire Finnish economy and encourage people to participate in climate actions. Choosing a passive approach at this point would undermine all the climate and economic benefits to be gained, because the mere existence of forest resources does not create jobs or produce climate-friendly products or encourage owners to look after the wellbeing of their stands. Passive forest management would reduce the carbon sink in Finnish forests and, in the long term, could even turn them into a source of emissions.



The volume of growing stock in Finnish forests has grown rapidly since the 1970s. A clear stimulus for roundwood production has played a significant role in this development. According to the scenario laid out by the Natural Resources Institute of Finland for the Finnish Forest Industries Federation, this growth can be sustained even with increased harvesting. This, however, requires that Finland take decisive actions to encourage timely and growth-inducing forest management. In the scenario, the harvesting volume is set to increase from the current level towards the highest sustainable level of roundwood removal (LUKE 2020).

Forestry that supports the viability and growth of forests is part of cost-effective and rational climate policy that also involves sustainable products.

Forest owners should be encouraged to actively look after their assets. Enhancing forest growth and a wider utilisation of wood as a material ensure the best possible climate and economic benefits. From the perspective of the climate, the question is much larger than the development of forest resources.

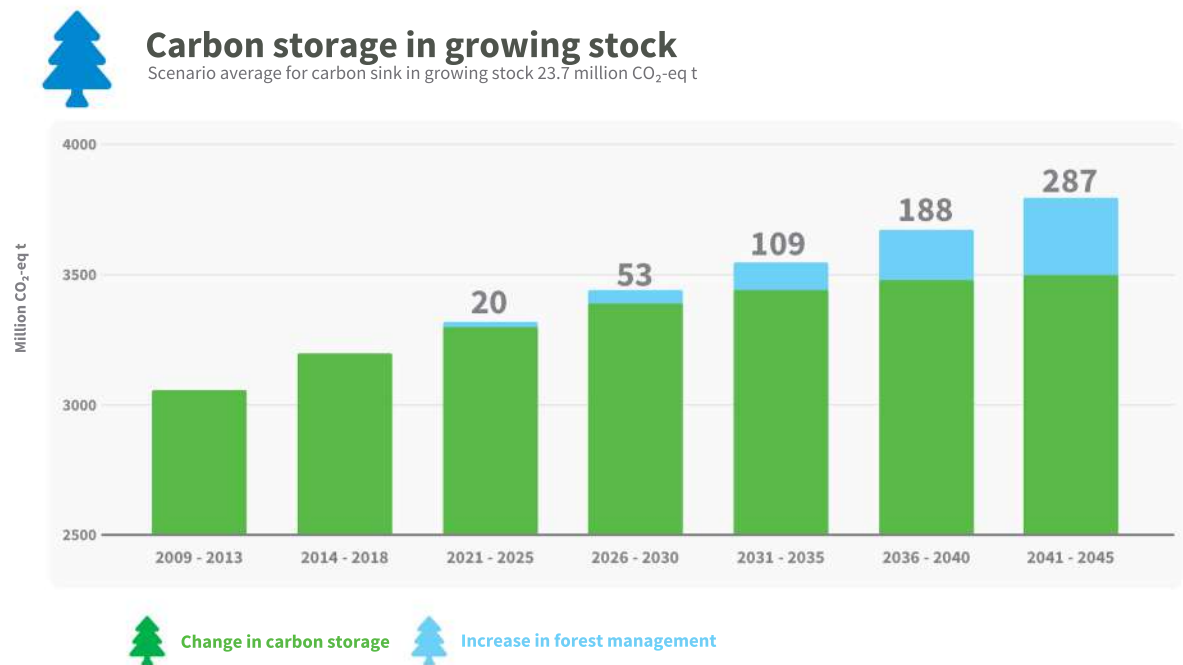
The carbon storage of Finnish forests could be increased while upscaling the utilisation of wood.

The carbon sink of Finnish forests, or the rate at which the forest resources are expanding, could be stronger even if harvesting were to be increased from 72 million cubic metres to the highest sustainable level, 89.5 million cubic metres. However, achieving this would require proactive measures.

For the available benefits to materialise, decisions would be required from the government to guide the industry towards more active and timely forest management.

Better management of seedling and young stands should be increased and the nutrient management should be improved for both mineral soils and peatlands. Ditch network maintenance could be substantially reduced in peatland forests. At the same time, the proportion of continuous cover forestry could be doubled. Even-aged stands should be quickly regenerated using bred seeds and seedlings.

The reduction in forest area caused by change in land use should be reversed to substantial reforestation. Timely forest management measures are a crucial factor in the prevention of forest damages.



According to the scenario developed by the Natural Resources Institute of Finland for the Finnish Forest Industries Federation, the growing stock in forests will continue its strong growth thanks to timely forest management measures. Measures supporting forest growth enable the sustaining of the carbon sink at its current level despite an increase in harvesting. In the scenario, the harvesting volume is set to increase from the current level towards the highest sustainable level of roundwood removal (LUKE 2020).

GREATER VALUE ADDED

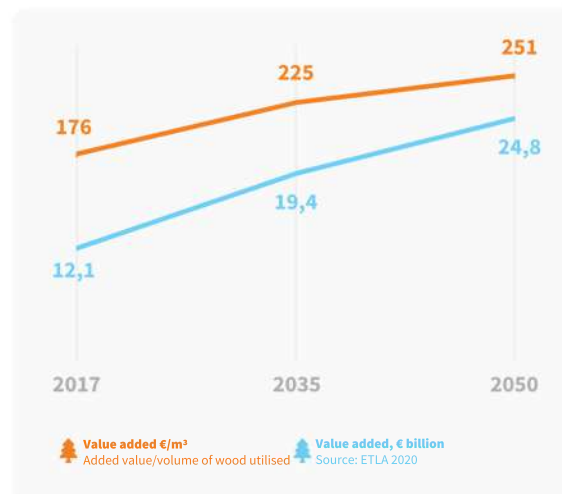
STRONG FINNISH ECONOMY FOR DECADES TO COME – DRIVING WORLD-CLASS INNOVATION

The future of the global market for wood-based products looks bright. Forest industry companies are showing keen interest in investing in Finland and mills are well positioned to compete for market shares. Constructive cooperation with policymakers will help create hubs of innovation in Finland that could generate increasing value added and develop new products and opportunities for exports. The climate, the economy and the employment benefit.

The Finnish bioeconomy is already producing a great deal of value added today – over EUR 200 per cubic metre of wood. The forest industry generates the largest part of this, EUR 176. In the future, each cubic metre of wood converted by the forest industry could produce well over EUR 200 of value added.

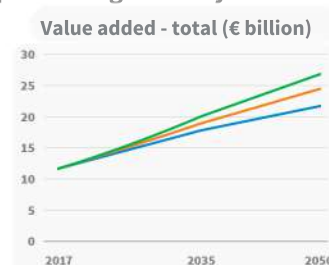
In the past few years, the Finnish forest industry has converted more than 70 million cubic metres of wood, which explains, for example, the EUR 4 billion in tax revenues. The forest industry roadmap provides clear directions on how the positive climate impact of the forest industry could be amplified while increases in value added are produced in a manner that benefits the climate.

The economic and climate benefits to be drawn from wood processing and forest management are enormous.



The value added produced by the forest industry could grow by more than seven billion euros by 2035 and double by 2050 (ETLA 2020). In other words, the processing of one cubic metre of wood could produce more than EUR 200 value added as soon as in 2035 and even more in 2050.

The Finnish forest industry could produce even more value added and tax revenues, as well as create new jobs for the Finnish economy and, at the same time, help mitigate climate change. The policies adopted by Finland can contribute to the achievement of the economic and climate potential of the wood processing industry.



As a result, the total value added accumulated during 2017–2035 is



ETLA's projections on the direct and indirect value added produced by the forest industry in the wake of growing production. Most of the indirect value added comes from forest management and harvesting. The diagram illustrates the base estimate (orange) as well as the best-case (green) and worst-case (blue) estimates based on a sensitivity analysis (ETLA 2020).

THE METHODS ALREADY EXIST

NO MAGIC IS NEEDED TO ACHIEVE MAJOR CLIMATE AND ECONOMIC BENEFITS

National policy decisions have a significant impact on our capability to achieve climate goals rapidly while succeeding in tough global competition and creating export revenues.

The forest industry is in a position to increase the production and export of climate-friendly products, to strengthen the Finnish economy, dramatically reduce emissions from fossil energy sources and to expand Finland's forest resources. This requires investments in mills, forest management and expertise to face global competition.

The sooner Finland makes the right choices, the sooner we can see the benefits for the climate and the national economy.

On the next page, you are presented with a coherent concept of the forest industry's value proposition - focusing on a single element may be tempting but will not bring the desired results.

Creating export revenues, expanding the product portfolio and attracting investments into Finland require not only competitively priced electricity but also sufficient availability of wood to meet the demands of increasing production. With a comprehensive approach, as described on these pages, Finland could become an economically powerful climate action pioneer in the coming decades. If we remove competitively priced electricity, the supply of wood or any other investment condition from the equation, we will also lose the climate and economic benefits they would help secure.



The forest industry produces sustainable solutions and wellbeing.



The forest industry has the potential to offer a great deal more for the climate and the economy.

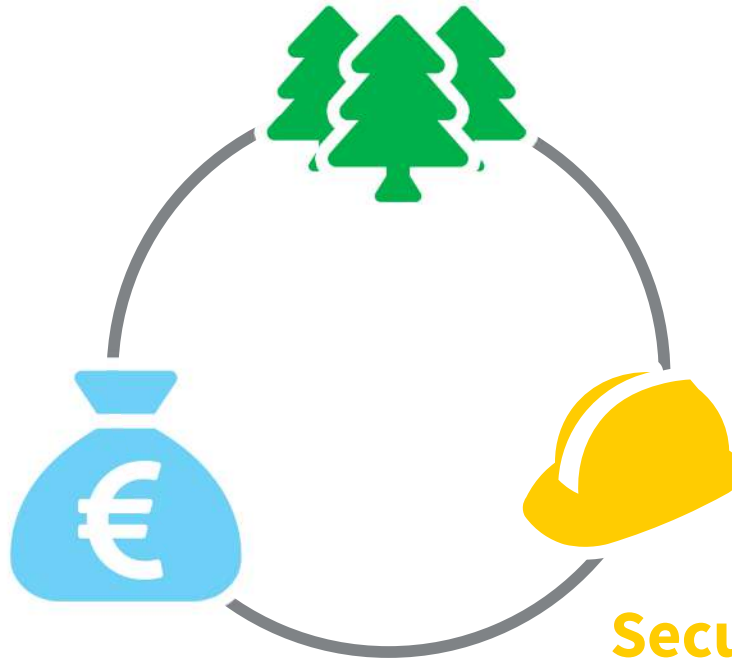


Good outcomes come from bold choices. The time to make those choices is now.

**The best outcome is achieved
by giving full focus to each area.**

Greater climate benefits

- The Finnish forest industry is a substantial climate change mitigator on a global scale and a major contributor to Finland's success in achieving its goal of becoming carbon neutral.



Balanced economy

- The forest industry provides funding for the different functions of a welfare state.

Securing employment

- The forest industry creates steady employment throughout Finland.
- New and diversified competencies.

Polymaker: cut out and frame!



By making the right choices, the climate and economic potential of the wood processing industry can be fully utilised. No miracles are needed:



The fossil emissions of mills are already extremely low and could soon be close to zero. National policy measures are vital to secure competitively priced electricity and swift environmental permit processes, which encourage the electrification as well as investments and modernisation within the sector.

Methods: The electricity tax rate should be lowered to the EU minimum and the period for the emissions trading compensation should be extended and an energy tax reform should be implemented in a way that would protect international competitiveness.



The range of climate-friendly products can be further expanded. Sustaining the competitiveness of current operations is the basis for regeneration, as only viable companies are able to invest and hire new talent. Long term innovation policy and availability of a competent workforce feed into the development and rollout of new products.

Methods: Following the French model, 50 per cent of all new public building should be wood-based, educational policies should be based on labour market relevance, higher education institutions should be further specialised, and the Finnish innovation system should be strengthened by adopting a business-centric, long-term PPP model.



The wood processing industry has plenty of potential to boost Finland's national economy even further. Competitiveness continues to be a key success factor in the future. The flexibility of labour markets, cost competitiveness in logistics and reliable infrastructure, among other things, trigger further investments that result in climate benefits.

Methods: The level of transport infrastructure investments should be increased, and the use of larger transport units should be enabled.



The expansion of the forest resources could continue and even be accelerated. Active forest management and investments in the management of seedling and young stands, reforestation, peatland forest management and the forest road network are essential. Furthermore, preventing deforestation brings rapid climate benefits.

Methods: The incentive system for the forest management sector should be developed and the reduction in forested areas should be stopped.

Rather than actual predictions or commitments, the scenarios introduced in the forest industry roadmap describe the opportunities presented to forestry and the forest management industry. The scenarios are based on the following studies:

The climate effects of forest industry products manufactured in Finland

VTT 2020

Authors:

Matias Alarotu

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Contributors:

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In addition, VTT's experts of different fields were consulted.

A forest industry roadmap in low carbon society (mill emissions)

AFRY/Pöyry 2020

Authors:

Petri Vasara

Jenni Patronen

Hannele Lehtinen

Olli Laukkanen

The Low-carbon Roadmap of the Finnish Forest Industries:

An Economic Impact Assessment

ETLA Economic Research 2020

Authors:

Jussi Lintunen

Jyrki Ali-Yrkkö

Martti Kulvik

Forest treatment scenarios

Finnish Forest Industries Federation climate roadmap

Increasing carbon storage

Natural Resources Institute Finland 2020

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Our Roadmap website that offers background information
for the surveys we have commissioned.

www.metsateollisuus.fi/ilmastotiekartta



Finnish Forest Industries



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