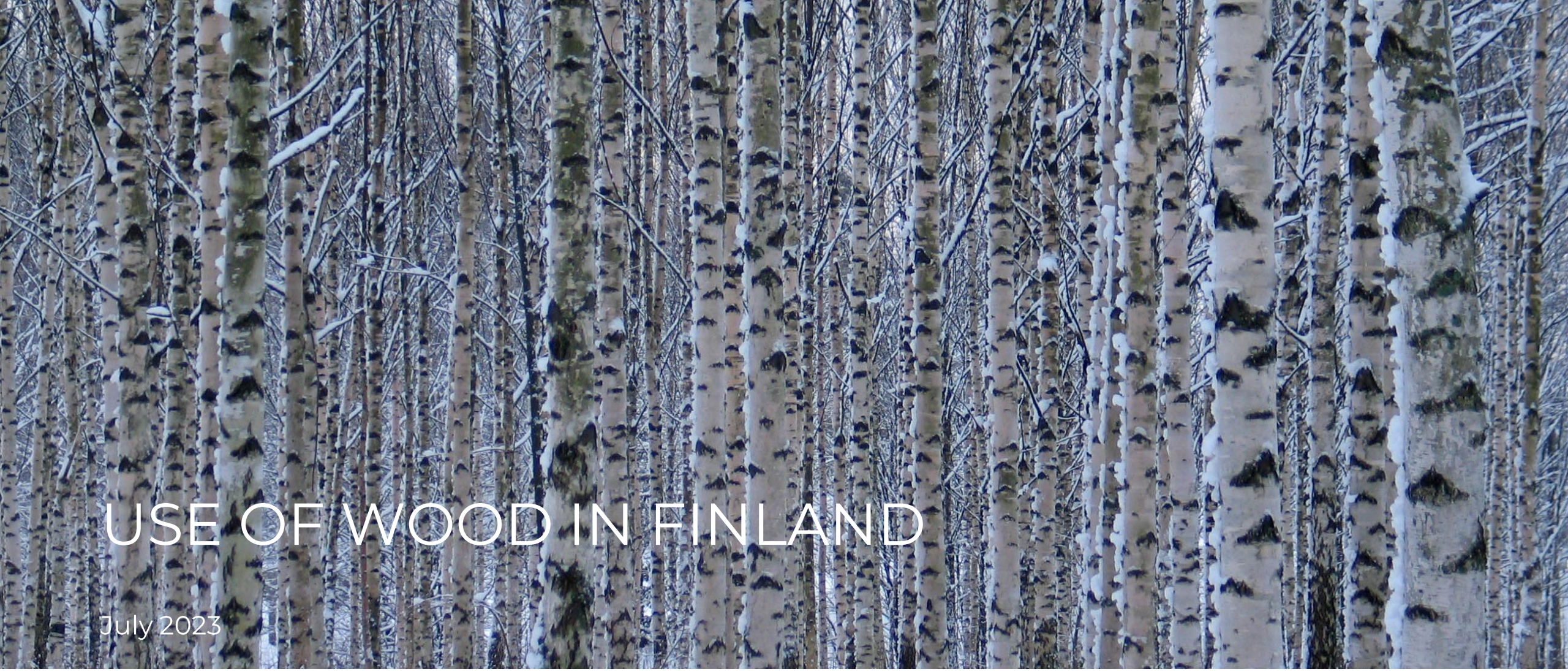
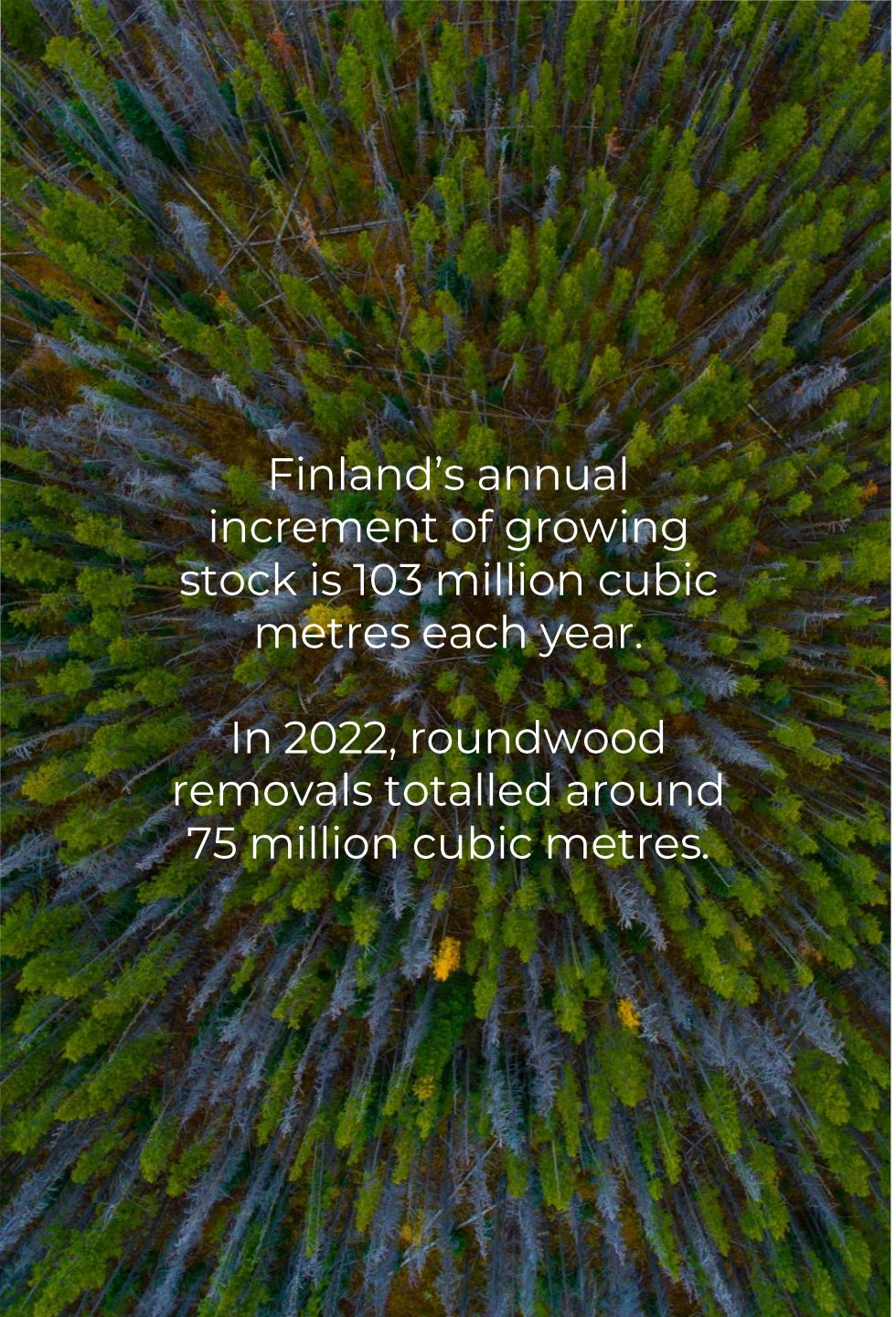


USE OF WOOD IN FINLAND

July 2023

Ministry of Agriculture and Forestry of Finland

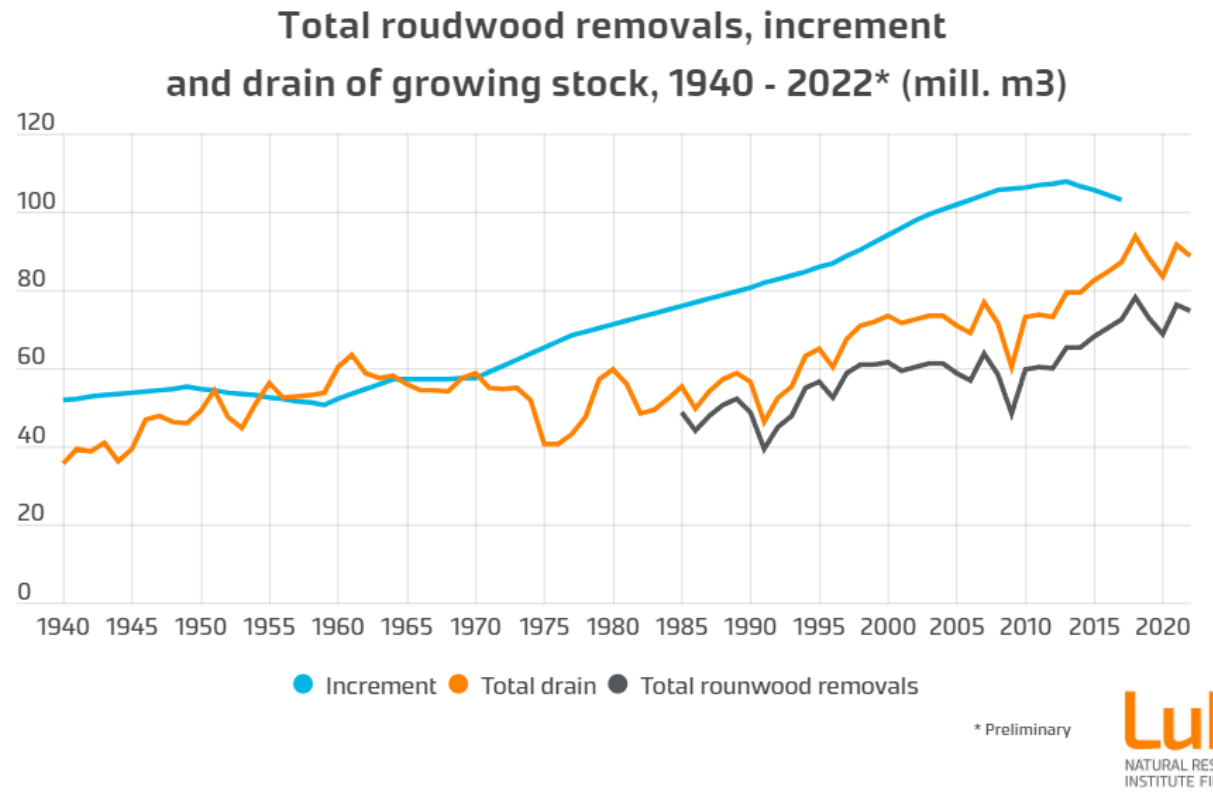


Finland's annual increment of growing stock is 103 million cubic metres each year.

In 2022, roundwood removals totalled around 75 million cubic metres.

FOREST GROWTH EXCEEDS HARVESTINGS

In 2022, about 73% of the annual increment of the growing stock was harvested.



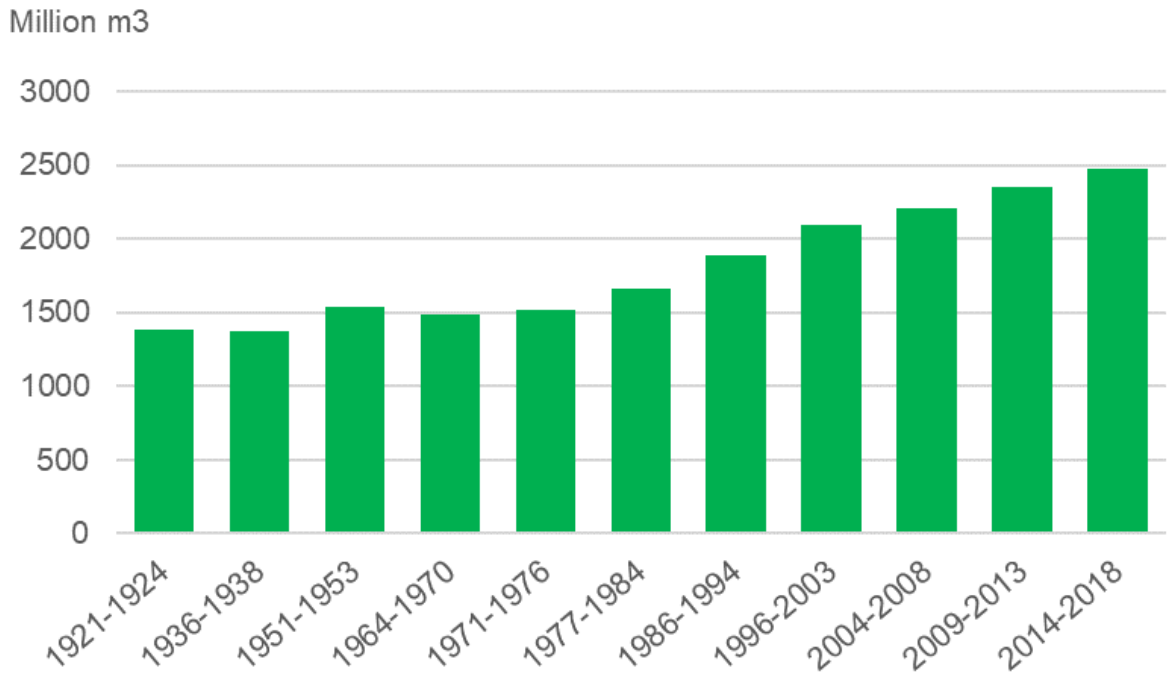
Annual increment of growing stock, roundwood removals, total drain of roundwood 1940-2022 (preliminary), million m^3.
Source: Natural Resource Institute Finland

The volume of growing stock and the state of forests have been monitored in Finland since the 1920s.

The growing stock volume in Finland's forests totals 2.5 billion cubic metres. This is 1.7 times the volume recorded in the 1920s.

GROWING STOCK IN FINLAND'S FORESTS HAS INCREASED OVER THE LAST 50 YEARS

Sustainable forest management ensures that the increasing trend will continue also in the future



Total volume of growing stock by inventory period, million m^3
Source: Natural Resources Institute Finland

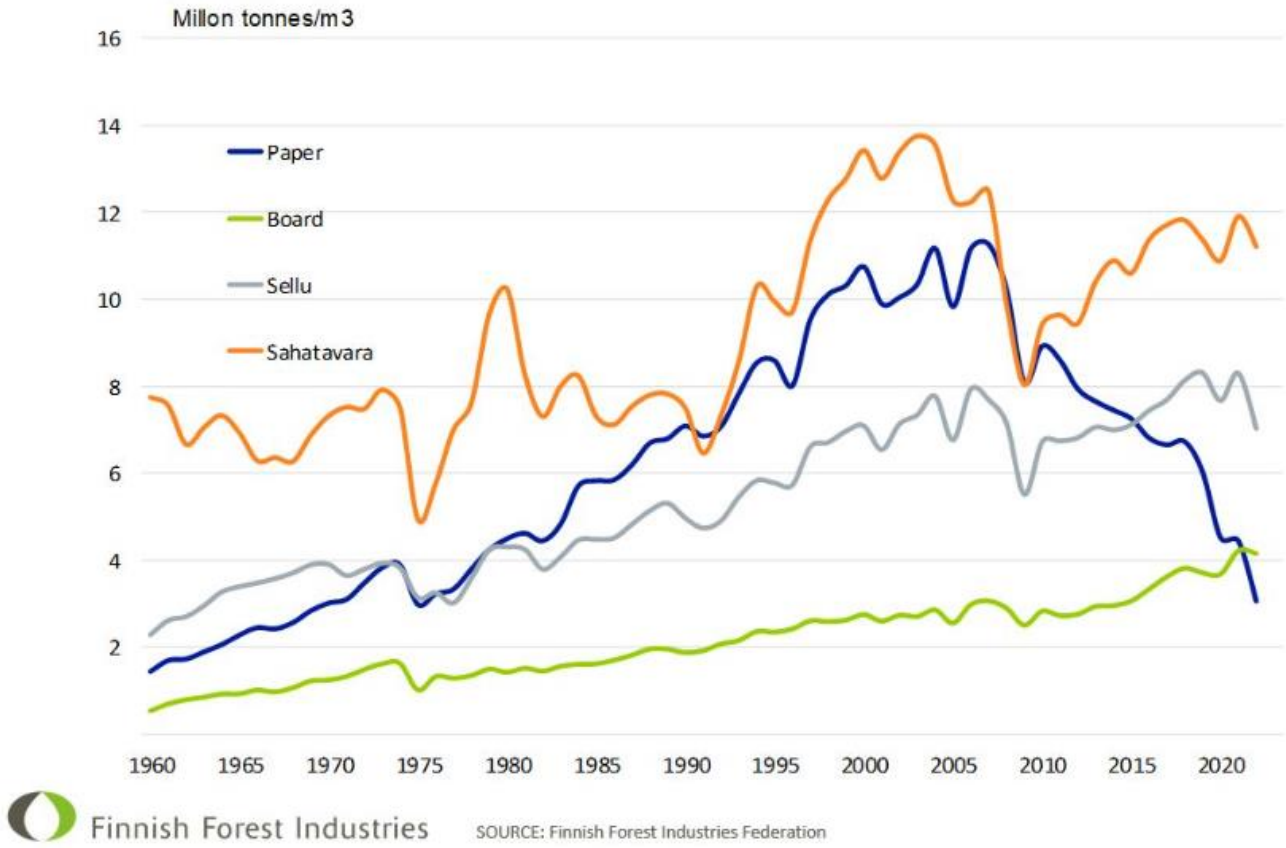
LONG HISTORY OF WOOD PROCESSING

Finland has long traditions in the use of wood for manufacturing printing and writing papers and packaging materials, and as construction and interior design material.

Wood processing remains an important sector of industry in Finland. In 2019, the value of production of forest industry in Finland, including the furniture industry, was over 21.8 billion euros. This corresponds to over 17 percent of all industrial production.

Wood raw materials contain ingredients that have only recently been detected and developed for novel uses e.g. in chemical and medical industry.

Wood, wood fibers, biopolymers and molecules can replace synthetic, unsustainable or diminishing materials in many products.



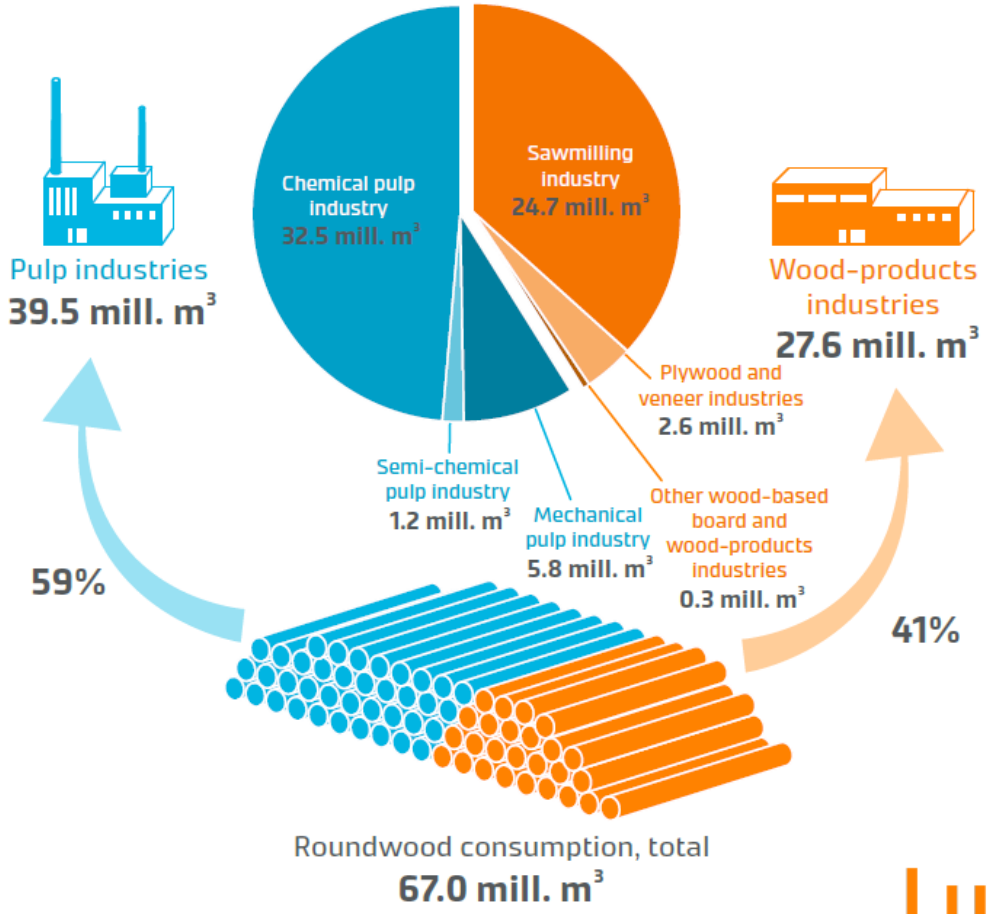
Forest industry production volumes since 1960.
Source: The Finnish Forest Industries Federation (March 2023)
Read more: Statistics

Most roundwood in Finland is consumed by chemical pulp and sawmilling industries.

Most important roundwood assortments are pine pulpwood and spruce logs.

EFFICIENT USE OF WOOD BY FOREST INDUSTRIES IN VARIOUS APPLICATIONS

The largest users of wood in Finland are pulp and sawmill industry



Total consumption of roundwood in Finland in 2020

Source: Natural Resources Institute Finland

Luke
NATURAL RESOURCES INSTITUTE FINLAND

THREE OF FINLAND'S TEN MOST IMPORTANT EXPORT PRODUCTS ARE BASED ON WOOD

Finland's most significant export product is paper and paperboard. In 2021, paper and paperboard accounted for EUR 6.4 million of exports. In the same year, sawn timber was the fifth in Finland's export statistics. Its value was 2.7 million EUR. Cellulose was the sixth and its value was 2.6 million EUR.

The majority of forest industry exports are directed to Germany, China and the United Kingdom.


WOOD-BASED PRODUCTS

WOOD IS USED IN MANY EVERYDAY ITEMS

Building and living

Material combinations

Packaging

Medicine and wellbeing

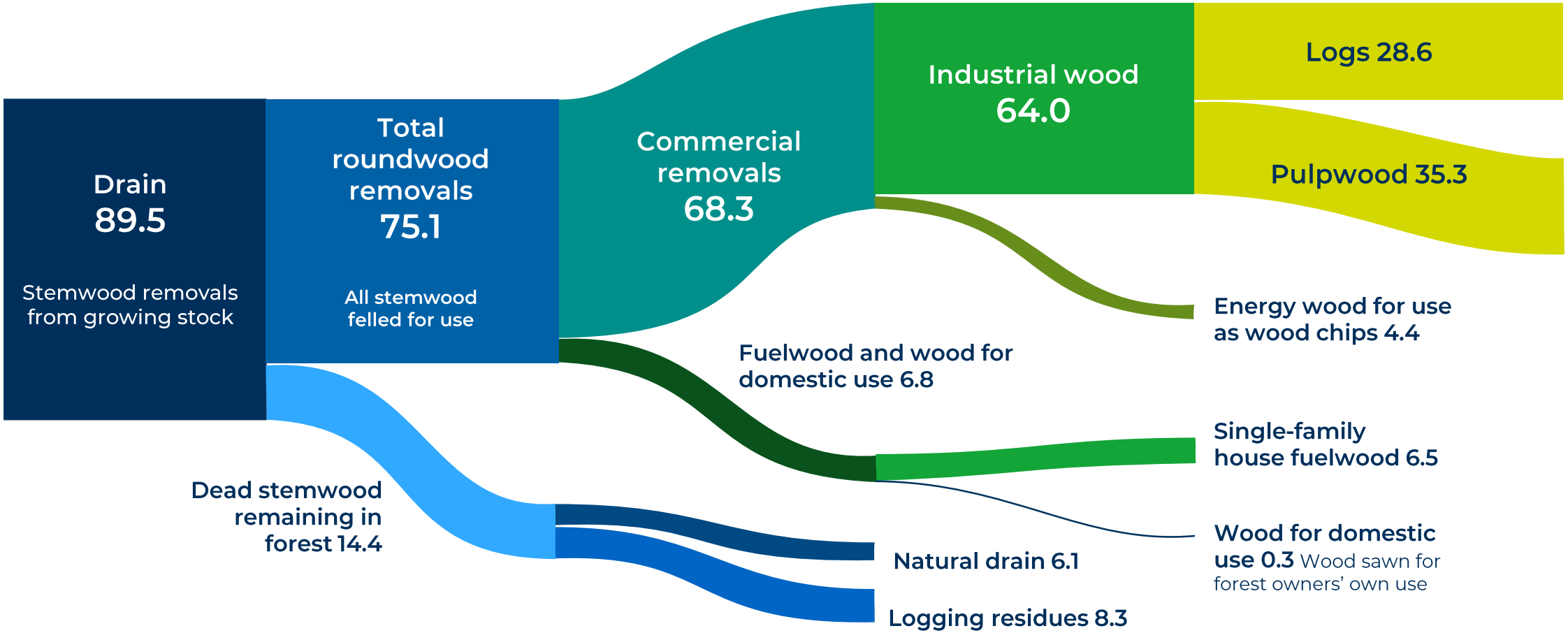
Energy, bio fuels and chemicals

Bio-polymers and bio-plastics

Pulp and paper

Source: Finnish Forest Industries

A DIAGRAM OF REMOVALS AND USE OF WOOD IN FINLAND IN 2022



In addition to stemwood, a total of 2.6 million cubic metres of logging residues and stumps were harvested from forests in 2022.
(Source: Natural Resources Institute Finland)

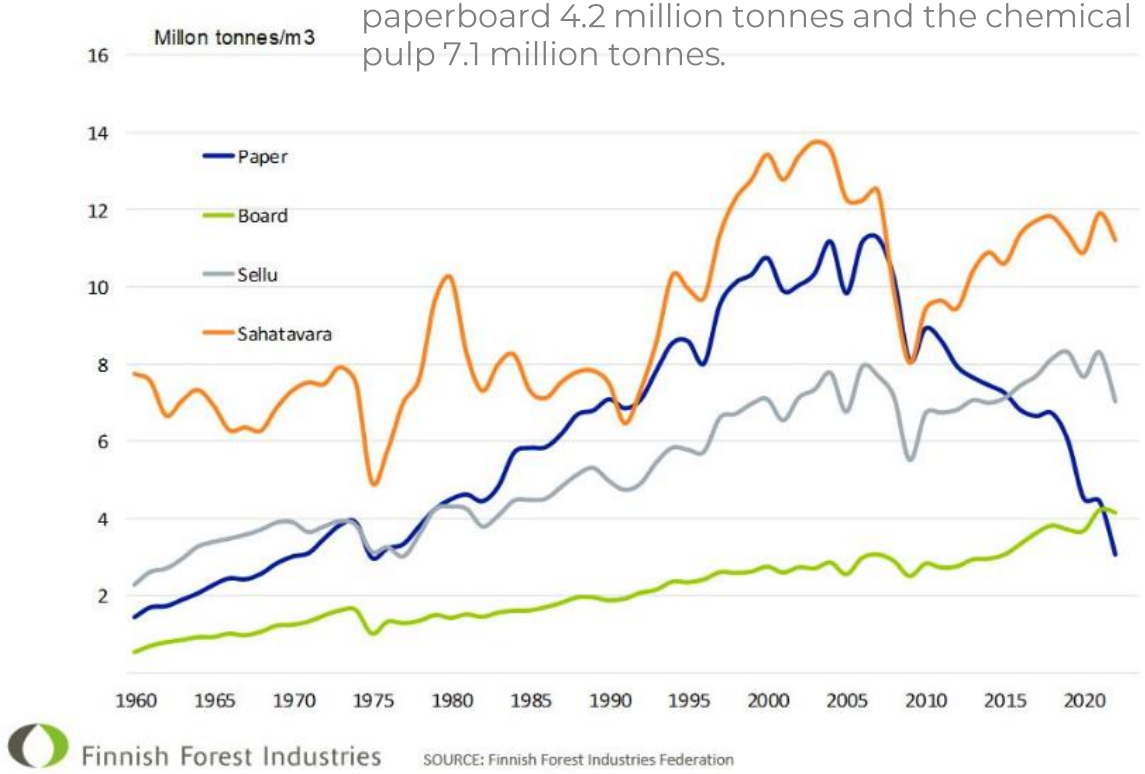
PULP, PAPER AND PAPERBOARD ARE IMPORTANT EXPORT PRODUCTS

Forest industry refers to industry that converts timber into products. It is often divided into the pulp and paper industry (chemical forest industry) and the wood products industry (mechanical forest industry).

The pulp and paper industry manufactures chemical and mechanical pulp from wood. Chemical pulp is the result of boiling wood chips with chemicals, while mechanical pulp is manufactured by grinding wood chips. Both chemical and mechanical pulp are intermediate products. Traditionally, they have been converted into paper or cardboard.

Harvestings are carried out in forests at certain ages, which means that the remaining trees grow into the dimensions of sawlogs. The raw material of the pulp and paper industry consists of small-diameter timber, which is often called pulpwood or fibrewood.

In 2022, production of paper was 3.1 million tonnes, paperboard 4.2 million tonnes and the chemical pulp 7.1 million tonnes.



Forest industry production volumes since 1960, million tonnes/m3

Source: The Finnish Forest Industries Federation (March 2023)

THE SAWMILL INDUSTRY IS LARGEST PRODUCTION SECTOR IN THE WOOD PRODUCT INDUSTRY

Mechanical forest industry i.e. wood products industry includes sawmill, plywood, chipboard, fibreboard, wood construction products and construction industries.

In the mechanical forest industry wood is mechanically modified by sawing, turning and bending. The main products are sawn timber, plywood and other wood-based boards. Sawn wood is also processed further into windows, construction components or furniture.

In 2021, the production of sawn goods was 11.9 million cubic metres.

The most important use of sawn timber in Finland is construction. In recent years, the sawmill industry products have increased their popularity as renewable, carbon-binding and versatile construction material.

Source: Finnish Forest Industries Federation, Finnish Sawmills Association and Natural Resources Institute Finland.

In 2018, Finland had more than 80 industrial sawmills and hundreds of smaller locally operating mills. The annual output of Finnish sawmill industries is 12 million cubic metres and 75 % of the production is exported to more than 50 countries around the world.Source: Sahateollisuus, 2018

WOOD-BASED MATERIALS CAN REPLACE PLASTIC

In recent years, a great deal of new products based on wood raw materials have been developed in Finland.Wood-based materials can be utilised to substitute plastics made of fossil raw materials. Bio-based and biodegradable plastics are made from cellulose or side streams of forest industry.

Approximately 80 million tonnes of plastic packaging is produced worldwide each year. Up to 30 per cent of plastic packaging ends up in nature, untreated. Wood-based packaging material, like cardboard, can replace plastic packages.

Photos by: Kotkamills, VTT, DS Smith

TEXTILES ARE MANUFACTURED FROM WOOD AND RECYCLED MATERIALS

By-products of the forest industry and recovered paper can also be utilised in the manufacturing of textiles.

In the last few years, several innovations have been made in Finland on textiles produced from wood fibres. Textiles based on wood fibres can substitute, e.g., cotton.

Ioncell is a technology that turns used textiles, pulp or even old newspapers into new textile fibers


Poho: Stora Enso

WOODEN BUILDINGS ARE CARBON STORAGES

New solutions for using wood as building material

Wood as a material for construction and interior decoration has long traditions in Finland, but new innovations are gaining ground also in wood construction.

In Finland, wood accounts for about 40 per cent of all building materials. Nearly 80 per cent of detached houses have a wooden frame. Wood is also used in structures, windows, doors and finished surfaces.

There are new solutions for using wood as the main building material in e.g. multi-storey housing buildings and office buildings. The development of fire resistant structural elements of timber and prefabrification of wooden blocks of flats enable the breakthrough of multi-storey wooden buildings.

A wooden building acts as a carbon storage throughout its life – even hundreds of years.

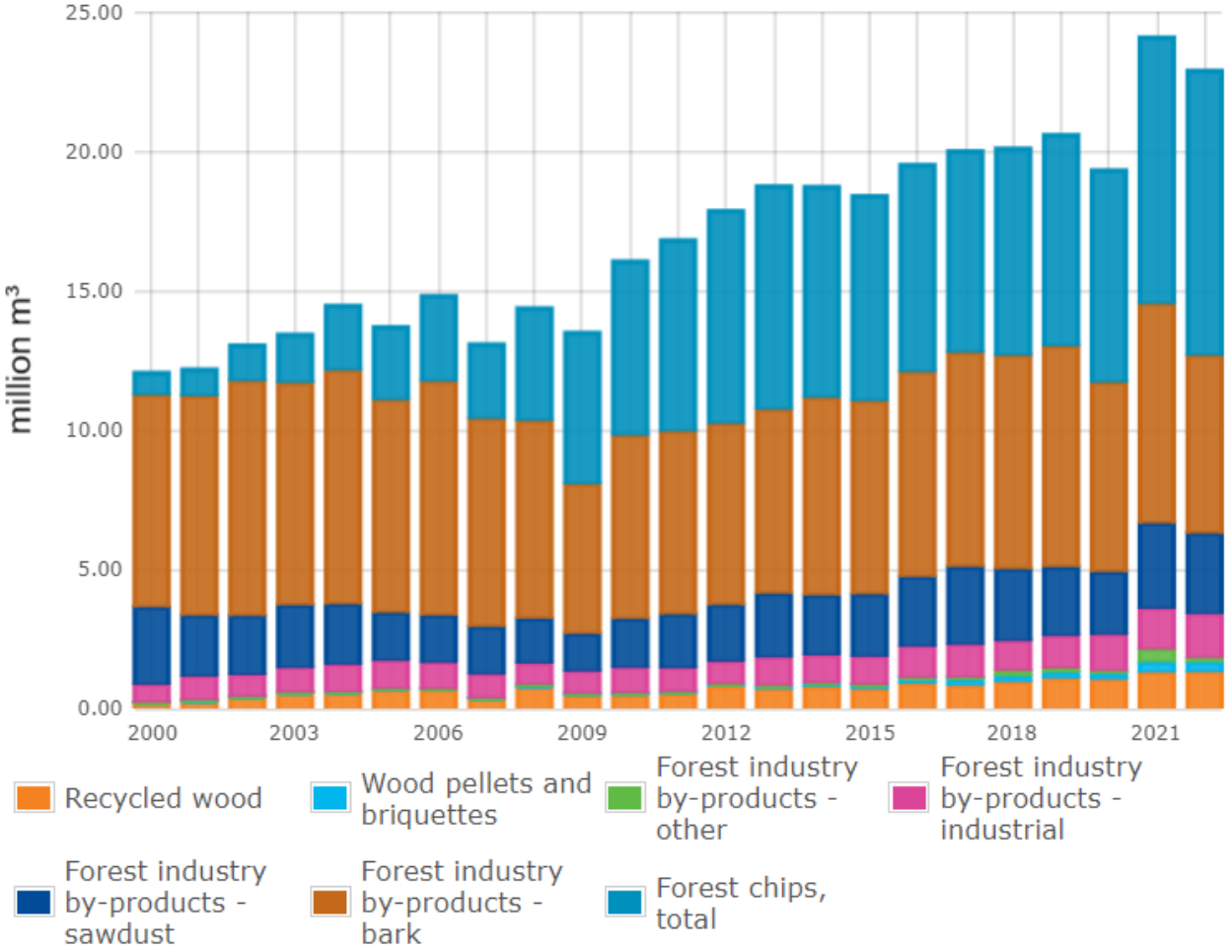

Photo: Erkki Oksanen

ELECTRICITY AND HEAT FROM WOODY BIOMASS

In Finland wood fuels are derived from sidestreams and residues of the forest industry and forest management

In Finland bioenergy has a key role in the production of renewable energy. Bioenergy production is largely integrated into forestry and forest industry. Various wood processing residues are utilised as energy, including bark, sawdust, industrial wood residue chips and black liquor from pulp manufacturing. Moreover, treetops, branches and small-sized stems and stumps collected in connection with forest management work and felling can be chipped and used as energy sources.

In 2022, heating and power plants consumed a total of 22.9 million solid cubic metres of solid wood fuels. Solid wood fuels are obtained from several different sources.



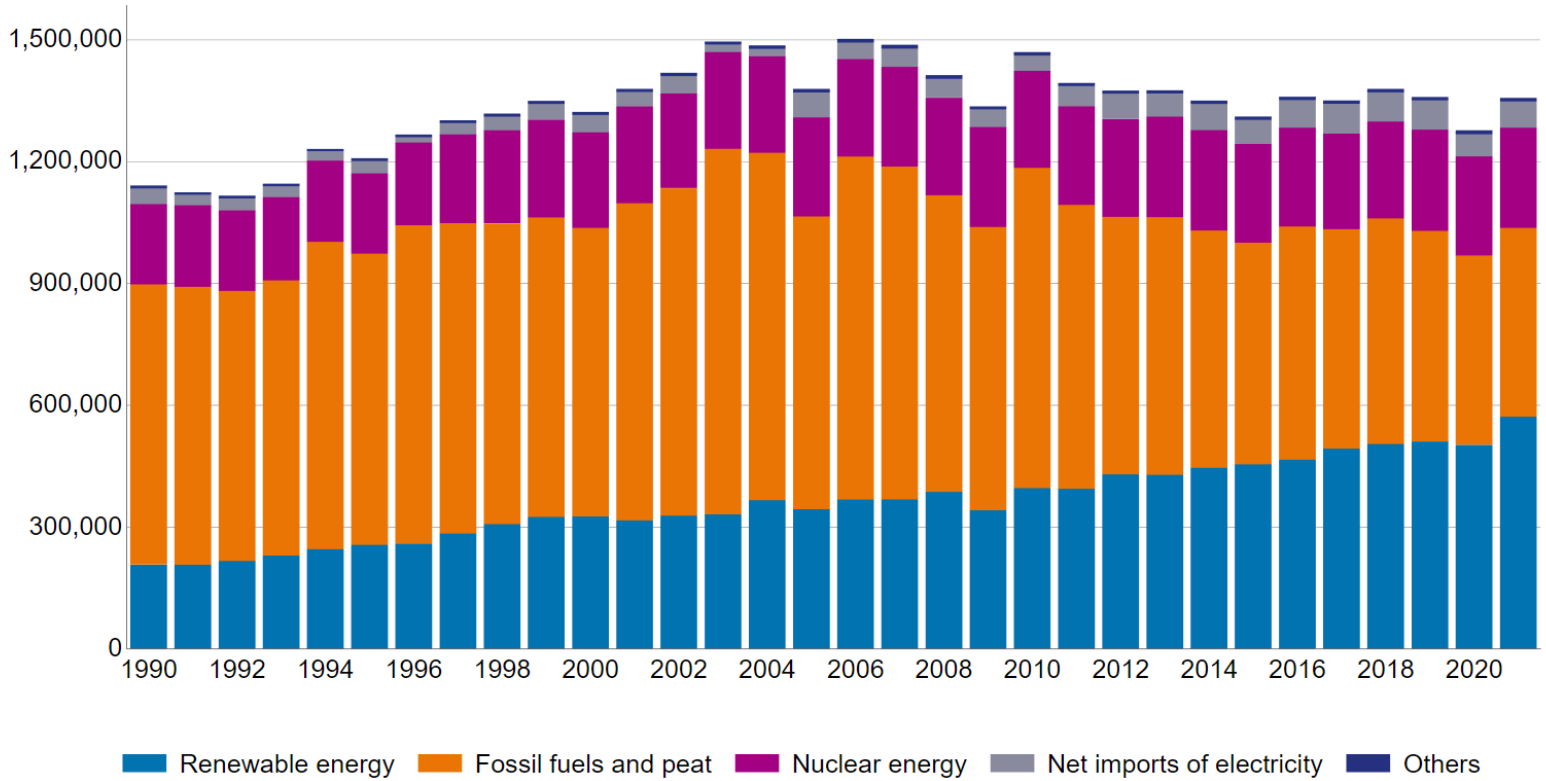
Wood in energy generation 2000 -2022*
Source: Natural Resource Institute Finland
*preliminary

Wood fuels are the main source of renewable energy in Finland. In recent years, the growth in the consumption of wood fuels has been based especially on increased use of forest industry by-products and wood residues.

In Finland, the goal of wood production is not the production of bioenergy, but the utilisation of wood material for higher value products.

IN 2021 WOOD FUELS ACCOUNTED FOR 30 % OF FINLAND'S TOTAL ENERGY CONSUMPTION

Wood fuels are main source of renewable energy in Finland.



Total energy consumption 1990 – 2021 (preliminary)
(Source: Natural Institute Finland)

Kuva: Tiina Somerpuro

WOOD-BASED BIOFUELS FOR TRANSPORT

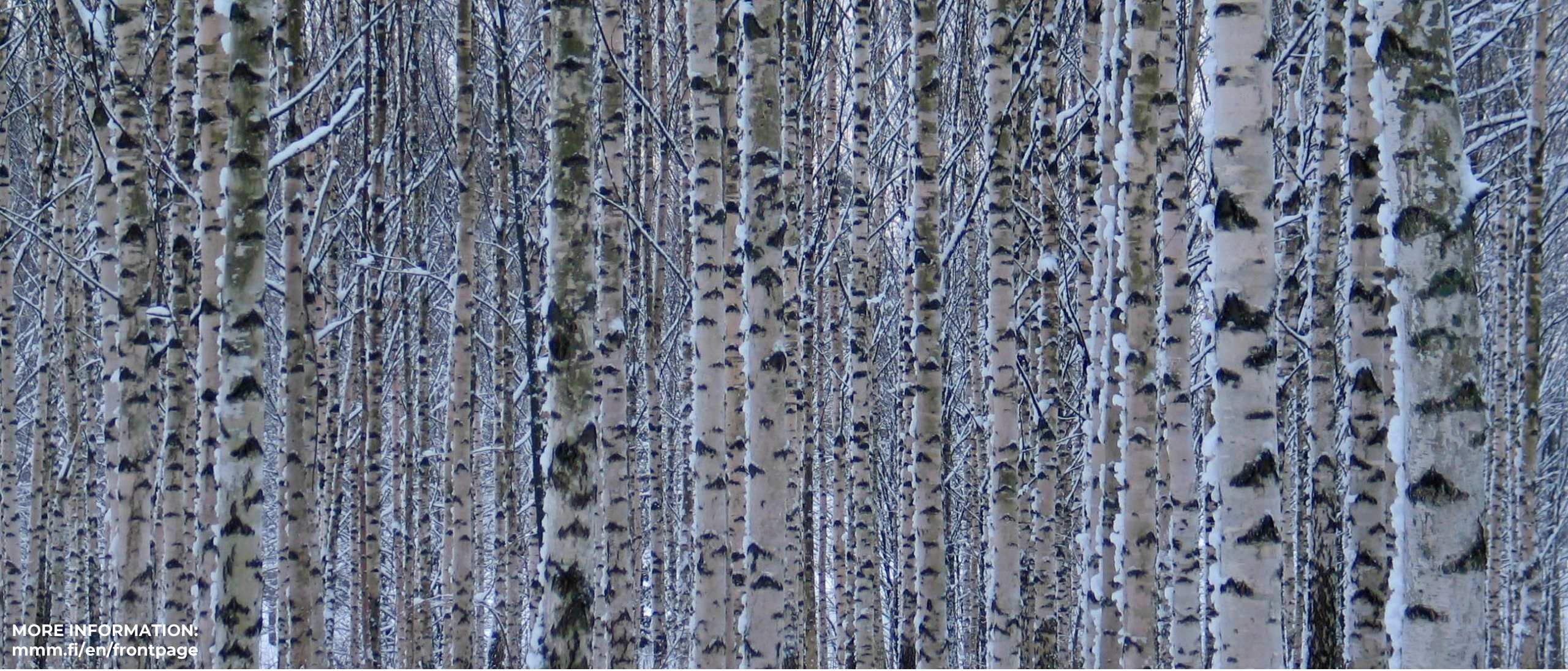
Forest industry residues and by-products can be used to manufacture biofuels for transport.

In Finland transport sector plays an important role in achieving the carbon emission reduction targets.

All transport fuels distributed in Finland contain bio-components. The share of biocomponents is based on the limit values of the National Fuel Quality Regulation (distribution obligation). The aim is to raise the share of biofuels in transport fuels to 30% by 2030.

Biofuels can be used in vehicles either directly or in combination with fossil fuels. The blending limit means that the maximum concentration of the biocomponent must be limited for technical reasons. At European level, the use of biofuels has been estimated to reduce carbon dioxide emissions from transport by 15% by 2030.

Biofuels are classified by generation according to the raw material, product characteristics or manufacturing process. The manufacture of second and third generation, or so-called advanced biofuels, is not in competition with food or feed production, as it does not use raw materials suitable for food. The raw materials for second generation biofuels are vegetable and wood-based cellulose, as well as waste and residues from industrial production or forest residues, for example. Third generation biofuels are produced entirely from new raw materials, such as algae. They are not yet in commercial production.



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