

Bioproduct mill, the core of industrial ecosystem

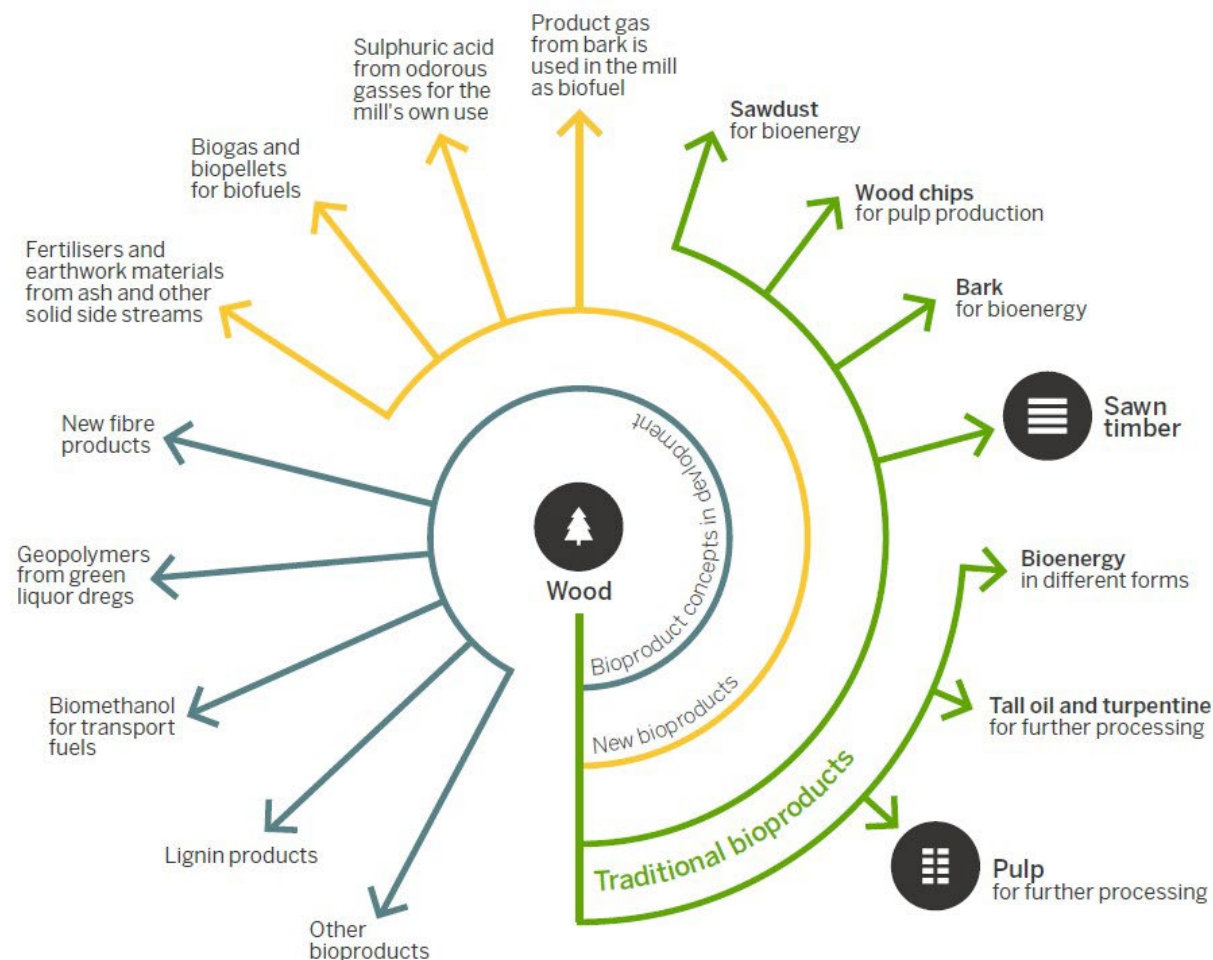


Our unique bioproduct mill concept

- Our concept for renewing our pulp mills
- Continuously converting **side streams** from pulp production into **bioproducts** that offer higher added value than before
- **Circularity** – when possible internal and external loops are applied, with the aim to maximise the utilisation of wood and minimise waste and emissions.
- Our industrial sawmills strengthen our bioproduct concept

Our resource efficiency target:
Utilising **100%** of wood raw material

UTILISATION OF MAIN AND SIDE STREAMS IN OUR BIOPRODUCT MILL CONCEPT



Äänekoski bioproduct mill **key figures**

WOOD
CONSUMPTION

6.5 M. m³

PRODUCTION
CAPACITY

**1.3 M
tonnes**

Export pulp **69%**,
of which to APAC **56%**

ELECTRICITY SELF-SUFFICIENCY

240%

USE OF FOSSIL FUELS

0%

PERSONNEL

240 employees

process employees **84%**

Average service time **16 years**

Average **42 years**

EMPLOYMENT EFFECT

**2,500 jobs
in value chain**

Biggest impact in forestry and transportation

Unique bioproduct concept



Softwood and hardwood pulp

- Metsä Pine AKI (softwood)
- Metsä Birch AKI (hardwood)

End products

- Paperboard
- Tissue, greaseproof and printing paper
- Special products

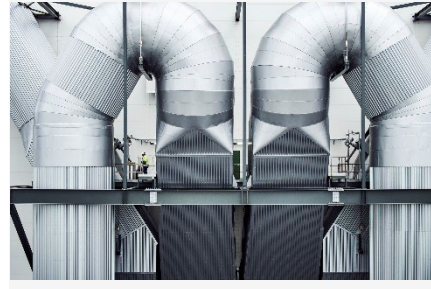


Biochemicals

- Tall oil
- Turpentine

End products

- Special products of chemical industry
- Biofuels
- Fragrances



Bioenergy

- Bioelectricity
- District heat
- Steam
- Bark-based solid fuel

End products

- Bioenergy to the national grid and for the own use



Other bioproducts

- Product gas and sulphuric acid for the mill's own use
- Biopellets and biogas
- Lime and ash for fertilizers
- Sandy bark and branch mass for landscaping



New concepts under development

- Wood-based textile fibres (MI Demo, demo plant)
- 3D fibre product (Metsä Spring and Valmet, demo plant)
- Biomethanol for transport fuel (Veolia, investment decision 3/2022)
- Utilization of green liquor sludge
- New bioproducts (eg. Lignin products)

Äänekoski industrial ecosystem

Metsä Wood

Metsä Wood Kerto® LVL

Kuura® MI Demo's textile fibre demo plant

Pro Nemus

Specialty Minerals Nordic

Metsä Fibre

Veolia

Metsä Board

Metsä Board Excellence Centre

3D fibre product pilot mill
(Metsä Spring and Valmet)

Nouryon

Metsä Forest

Metsä Wood

Metsä Board's sheeting facility

Metsä Fibre and Veolia conclude partnership for biomethanol production at the Äänekoski bioproduct mill

- Metsä Fibre and Veolia have signed a long-term partnership agreement on the refining of crude methanol generated in pulp production at the Äänekoski bioproduct mill into commercial biomethanol.
- As part of this cooperation, Veolia has decided to invest in the construction of a crude methanol refinery in connection with Metsä Fibre's Äänekoski bioproduct mill. The refinery, owned and operated by Veolia, will be closely integrated into the bioproduct mill processes.
- The annual production capacity of plant is 12,000 tonnes (65 GWh) of bio-methanol, which can be used, for example, as transport fuel. The plant is due to come on stream by 2024.





Metsä Fibre ja ANDRITZ plan to build a **lignin product demonstration plant** at Äänekoski

- The aim is to develop the process to separate lignin from black liquor in pulp production and to further process it for new end-uses.
- The demonstration plant would have a capacity of about two tonnes per day and would be located within Metsä Group's Äänekoski bioproduct mill. An investment decision on the plant is expected to be made during 2023.
- The high-performance bio-dispersant products produced in the demonstration plant could be used, for example, as bio-based concrete and gypsum water reducer used in construction markets.





Metsä Group and Fortum into cooperation **in using carbon dioxide**

- Metsä Group and Fortum have initiated a pre-feasibility study on the recovery of wood-based carbon dioxide generated as a side stream in the forest industry. The study will be completed by the end of 2023.
- In addition to the cooperation initiated with Fortum, Metsä Group is involved in various research and cooperation projects developing alternative products from the wood-based carbon dioxide recovered at the mills. Among other things, Metsä Group is exploring alternatives for liquefying carbon dioxide, which could be sold for further processing by market participants such as the P2X operators.
- Metsä Group's mills annually generate approximately 10 million tonnes of wood-based carbon dioxide as a side stream. With advancements made in the necessary technology, this could generate a new billion euro scale bioproduct business in the future.





Kemi bioproduct mill

The new Kemi bioproduct mill will produce pulp and several other bioproducts. Kemi's fossil-free bioproduct mill will be a global leader in environmental, energy and material efficiency.

Kemi bioproduct mill key figures:

- The total investment **EUR 2.02 billion**, making it **the largest investment ever made by the Finnish forest industry in Finland**
- Annual production capacity **1.5 million tonnes** of softwood and hardwood pulp
- The Kemi bioproduct mill will directly employ approximately **250 people** and in its entire direct value chain in Finland approximately **2,500 people** in total
- The Kemi bioproduct mill will be started-up on 20 September 2023



