NEXT-GENERATION BIOPRODUCT MILL IN ÄÄNEKOSKI
THE WORLD’S FIRST NEXT-GENERATION BIOPRODUCT MILL

Metsä Group’s next-generation bioproduct mill at Äänekoski is the largest wood-processing plant in the Northern Hemisphere and, with a value of EUR 1.2 billion, the biggest investment in the history of the Finnish forest industry.

The bioproduct mill produces 1.3 million tonnes of softwood and birch pulp a year under the Botnia brand to serve as raw material for paperboard, tissue and printing papers, as well as speciality products. Most of the pulp will be sold abroad, mainly in Europe and Asia. In addition to high-quality products Metsä Fibre, part of Metsä Group, offers a wide range of expert services to its customers, to support them in their process and business. Service offering extends from technical customer support to effective logistics and improved sustainability.

The demand for softwood pulp is increasing steadily around the world, most rapidly in China. The bioproduct mill will strengthen Metsä Group’s global position in the market for northern softwood pulp, improve profitability in the long run and meet the increasing demand for northern softwood pulp. The Äänekoski mill is called a bioproduct mill since it is increasing the product portfolio with new bioproducts, generating excess bioenergy, and using no fossil fuels. The mill is utilising 100 per cent of its wood raw material as well as production side streams.

DID YOU KNOW?
The bioproduct mill’s employment effect within its direct value chain in Finland is more than 2,500 jobs, of which approximately 1,500 are new.
THE ECOSYSTEM CREATED BY THE BIOPRODUCT MILL IS UNIQUE IN THE WORLD.
# Bioproduction Mill in Brief

<table>
<thead>
<tr>
<th>Investment</th>
<th>Use of Wood</th>
<th>Share of Certified Wood</th>
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<tbody>
<tr>
<td>1.2 EUR billion</td>
<td>6.5 million cubic metres per year</td>
<td>90 percent</td>
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<tr>
<th>Pulp Production</th>
<th>Traceability of Used Wood</th>
<th>Personnel</th>
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</thead>
<tbody>
<tr>
<td>1.3 million tonnes per year</td>
<td>100 percent</td>
<td>150 persons</td>
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<th>Use of Fossil Fuels</th>
<th>Electricity Production</th>
<th>Electricity Self-Sufficiency</th>
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<tr>
<td>0 percent</td>
<td>1.8 terawatt hours per year</td>
<td>240 percent</td>
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TOP-CLASS ENVIRONMENTAL EFFICIENCY

Sustainability and environmental responsibility are an integral part of Metsä Group’s daily operations. We use renewable northern wood as a raw material, utilise the best available technologies in production, and take care of our employees’ safety and well-being.

The bioproduct mill represents the highest levels of energy, material and environmental efficiency in the world. Although its production capacity is nearly triple that of the previous pulp mill at Äänekoski, it can operate within the emission limits of the previous mill’s environmental permit and wastewater permit conditions.

Its emissions will not affect the recreational or other use of the natural water system. The noise generated by the mill and the mill site will not exceed the guideline values. An advanced closed cycle in which water and chemicals are recycled and returned to the process for reuse is key in the bioproduct mill’s processes. Odorous gases are converted into sulphuric acid, needed by the bioproduct mill in the manufacture of tall oil, for example, which is an important bioproduct. Thanks to the sulphuric acid plant, sulphate emissions into waterways can be minimised. It also reduces the need to transport chemicals on rails or by road.
**MAXIMUM ENERGY EFFICIENCY**

Energy efficiency, low water consumption and low emissions are key criteria for the bioproduct mill’s equipment. The mill will produce 1.8 TWh of energy per year, which represents 2.5 per cent of all electricity production in Finland. The mill is annually producing 2.4 times as much energy as it needs.

The mill’s high degree of self-sufficiency in terms of electricity (240 per cent) is based on its size and advanced technology. The bioproduct mill will increase the share of renewable energy in Finland by more than two percentage points.
OUTSTANDING EFFICIENCY

At the heart of the bioproduct mill is the most efficient pulp mill in the world. The side streams generated in pulp production are utilised in the production of other bioproducts and bioenergy.

FOSSIL-FREE PRODUCTION PLANT

The bioproduct mill is not using any fossil fuels at all, since it generates all of the energy it needs from production side streams. The lime kiln’s fossil fuel has been replaced with product gas from gasified bark, and the mill’s shut-downs and start-ups can use as fuel the tall oil pitch generated in the processing of tall oil. Furthermore, the machines used in wood processing and pulp loading are driven by electricity.

RECOVERY LINE

Energy production and recycling of chemicals

- Debarking plant
- Chip piles
- Digester
- Washing
- Bleaching
- Drying
- Automated pulp distribution center
- Evaporation plant
- Recovery boiler and turbine
- Recausticising
- Lime kiln
- Bark gasification plant
- Sulphuric acid plant
- Water treatment plant
- Mill office
- Wastewater treatment plant

THE MOST EFFICIENT RECOVERY BOILER IN THE WORLD

A significant share of all renewable energy produced in Finland is generated when black liquor, consisting of wood and cooking chemicals, is combusted in the recovery boiler in pulp production. This process converts the cooking chemicals into a reusable form. The bioproduct mill is the world’s most energy-efficient pulp mill, given that its equipment solutions represent highly advanced energy technology. The mill will produce 2.4 times as much electricity as it uses.
MORE THAN JUST A PULP MILL

The bioproduct mill uses 6.5 million cubic metres of pulpwood a year and produces 1.3 million tonnes of softwood and birch pulp. The modern mill is among the best in the world with regard to its material and resource efficiency. All of the wood raw material and production side streams are used in the production of various bioproducts and bioenergy.
UTILISATION OF MAIN AND SIDE STREAMS

TRADITIONAL BIOPRODUCTS

Pulp
Tall oil and turpentine
Various forms of bioenergy

NEW BIOPRODUCTS ALREADY AGREED UPON

Product gas from bark to biofuel for the mill
Sulphuric acid from odorous gases to be used by the mill
Biogas and biopellets from sludge to be used as fuel in transport and industry
Biocomposites from pulp

NEW CONCEPTS UNDER DEVELOPMENT

New biofuels from surplus bark
Fertilisers and earthwork materials from dregs and ash
New bioproducts from lignin
New textile fibres from pulp
NEW BIOPRODUCTS EXPAND THE PRODUCT RANGE

One of the central ideas behind the bioproduct mill is to expand the product range to entirely new bioproducts. Bioproduct concept is progressing according the plan and new products of the mill include product gas, sulphuric acid, biogas and biopellets. The mill also produces bioenergy as well as traditional biochemicals, such as tall oil and turpentine.

Bioproducts manufactured from side streams account for 20 per cent of the mill’s sales, and this proportion continues to grow gradually. We are studying several processes and product paths, which are progressing in phases. Potential future bioproducts include products derived from pulp-based textile fibres and lignin.

DID YOU KNOW?
Metsä Group and Itochu establish a joint venture that builds an industrial demo plant in Äänekoski to produce wood-based textile fibres with an annual capacity of about 500 tonnes. The manufacture of wood-based textile fibres using environmentally friendly method based on ionic liquid technology is a long-term research process.

PRODUCT GAS
Bark-derived product gas is produced for the mill’s own use, whereby the mill is fully free of fossil fuels. The renewable product gas is replacing some 45,000 m³ of heavy fuel oil a year.

SULPHURIC ACID
Metsä Group has developed a concept in which the odorous gases of the bioproduct mill are converted into sulphuric acid, to be used as a raw material by the mill. This represents a significant step towards more closed chemical cycles.

BIOCOMPOSITES
Aqvacomp Oy is producing biocomposite as a substitute for plastic, which combines pulp fibre and plastic. It can be used in the electronics and automobile industries. The first plant is integrated to Metsä Group’s Rauma pulp mill.

BIOGAS
The biogas plant is converting wood-based wastewater sludge from the bioproduct mill into added-value products and producing biogas and biopellets. The biogas plant in Äänekoski is the first in the world.
The importance of wood is increasing around the world. The bioeconomy symbiosis formed by forest management, wood supply and the forest industry represents a unique success factor for Finland. Metsä Group’s business areas make up a strong value chain. In its various phases, we fully utilise wood as pulp, wood products, paperboard, tissue paper and bioenergy, for example. This strong foundation now also serves the bioproduct mill, which is the largest wood-processing plant in the Northern Hemisphere.

An efficient pulp mill lies at the core of the bioproduct mill, and the network of companies around the mill manufacturing a variety of bioproducts continues to expand. These companies convert side streams from pulp production into bioproducts that offer higher added value than before. This will support the competitiveness of the mill complex and increase supply in the growing market for wood-based bioproducts. The ecosystem created by the bioproduct mill is globally unique.
DID YOU KNOW?
The bioproduct mill and the network of companies are using 100 percent of the raw materials and side streams.
With a value of approximately EUR 1.2 billion, the bioproduct mill is the largest investment in the history of Finland’s forest industry. It will have a significant effect on the Finnish national economy by generating new jobs and economic growth.

The bioproduct mill’s employment effect within its direct value chain in Finland is roughly 2,500 jobs, of which 1,500 are new. The employment effect is most significant in the forest industry and transportation. The mill will increase the value of exports by around EUR 0.5 billion per year. In addition, it will have an annual income effect of more than EUR 0.5 billion in Finland.

The bioproduct mill will diversify the structure of the Finnish forest economy and bioeconomy, and expand their product range by introducing new bioproducts that offer high added value.

**NORTHERN WOOD – A SUSTAINABLE CHOICE**

The bioproduct mill significantly increases the use of Finnish wood.

**INCREASES THE VALUE OF FINNISH EXPORTS ANNUALLY**

| 0.5 | EUR billion |

The use of pulpwood is increasing across the country by about four million cubic metres a year. The majority of the wood used at the bioproduct mill derives from sustainably managed Finnish forests. The wood used as raw material at the mill is fully traceable, and more than 90 per cent of it has PEFC or FSC certification.

**WHY THE BIOPRODUCT MILL?**

- The demand for softwood pulp is increasing steadily. Demand is growing most rapidly in Asia, particularly in China.
- Metsä Group has strong roots at Äänekoski – pulp production here began in 1937.
- The bioproduct mill replaced the previous pulp mill, which had been operating since 1985 and was nearing the end of its life cycle. The new bioproduct mill was built on the present site next to existing forest industry facilities.
- The bioproduct mill’s business model is based on having an efficient partner network in which new products are upgraded in cooperation with various companies. Metsä Board’s board mill, for example, is located in the same integrated mill complex.
- Äänekoski has a good geographical location in terms of the availability of raw material.

**HISTORY OF THE ÄÄNEKOSKI INTEGRATED MILLS**

- **1899**
  - Sawmill
- **1899–1986**
  - Board production
- **1906**
  - Paper production
- **1906–2011**
  - 
- **1937**
  - Sulphite pulp mill
- **1937–1984**
  -
1961 – 1985
Sulphate pulp mill

1966
New board mill

1985 – 2017
Previous sulphate pulp mill

2017
Bioproduct mill
Make the most of Metsä