

# METSÄ FIBRE

ANNUAL REVIEW  
2016



# A PIONEER IN SUSTAINABLE BIOECONOMY

Metsä Group produces renewable products from northern forests that replace the use of fossil raw materials. We manage our forests sustainably and secure their growth and nature values. We produce renewable energy and act resource-wisely.

This is sustainable bioeconomy, where Metsä Group is a forerunner. Our strength continues to grow in the northern forests.

p. 8

Metsä Group's sawmills were integrated into Metsä Fibre in 2016. The integration will bring about full-scale synergy benefits.



## PUBLISHER

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The annual review is published in English, Finnish and Chinese. It is available in PDF format at [www.metsafibre.com](http://www.metsafibre.com).



Metsä Group  
Annual Brochure  
2016



Metsä Group  
Financial  
Statements  
2016



Metsä Group  
Sustainability  
Report  
2016



Metsä Board  
Annual Report  
2016



Metsä Fibre  
Annual Review  
2016

Metsä Fibre is a leading producer of bioproducts including pulp, renewable energy, biochemicals and sawn timber. The company's Botnia brand softwood and birch pulp grades have been developed for the production of high-quality board, tissue and printing paper and speciality products.

Currently employing approximately 1,200 people, the company's sales totalled EUR 1.6 billion in 2016. Metsä Fibre is owned by Metsäliitto Cooperative (50.2%), Metsä Board Corporation (24.9%) and Itochu Corporation (24.9%). Metsä Fibre is part of Metsä Group.

## p. 12

Metsä Fibre is building the next-generation bioproduct mill in Äänekoski. The project has progressed according to plan. The mill will be the heart of an industrial ecosystem of companies.



## p. 18

We reviewed our internal operating methods for the management of environmental risks in 2016.



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The Carta Integra folding boxboard used for the cover of this Annual Brochure is manufactured at Metsä Board's Äänekoski mill. The surface layers of the three-layer folding boxboard are made from chemical pulp from Metsä Fibre's Äänekoski pulp mill, and the bleached mechanical pulp of the middle layer is manufactured at Metsä Board's Joutseno and Kaskinen mills. Carta Integra is made from pure fresh forest fibre. It is a fully coated paperboard, suitable for packaging and graphics end uses.

## METSÄLIITTO COOPERATIVE

GROUP'S PARENT COMPANY

OWNED BY 104,000 FINNISH FOREST OWNERS

### METSÄ FOREST

#### WOOD SUPPLY AND FOREST SERVICES

 SALES  
EUR 1.5 BILLION

 PERSONNEL  
**900**

 HOLDING  
METSÄLIITTO  
100%

### METSÄ WOOD

#### WOOD PRODUCTS

 SALES  
EUR 0.5 BILLION

 PERSONNEL  
**1,500**

 HOLDING  
METSÄLIITTO  
100%

### METSÄ FIBRE

#### PULP AND SAWN TIMBER

 SALES  
EUR 1.6 BILLION

 PERSONNEL  
**1,250**

 HOLDING  
METSÄLIITTO 50.2%,  
METSÄ BOARD 24.9%,  
ITOCHU 24.9%

### METSÄ BOARD

#### PAPERBOARD

 SALES  
EUR 1.7 BILLION

 PERSONNEL  
**2,500**

 HOLDING  
METSÄLIITTO 41.8%,  
61.5% OF VOTES

### METSÄ TISSUE

#### TISSUE AND COOKING PAPERS

 SALES  
EUR 1.0 BILLION

 PERSONNEL  
**2,750**

 HOLDING  
METSÄLIITTO 100%

PRODUCTION OF RENEWABLE ENERGY 22.3 TWh

PRODUCTION	2016 <sup>1)</sup>	2015	2014	2013	2012	Capacity	ISO 9001	ISO 14001	ISO 50001	OHSAS 18001	ISO 22000	PEFC™ COC	FSC® COC/CW
Pulp mills, 1,000 tonne													
Joutseno	619	658	594	604	606	690	x	x	x	x	x	x	x
Kemi	604	585	552	564	539	610	x	x	x	x	x	x	x
Rauma	585	602	607	612	573	650	x	x	x	x	x	x	x
Äänekoski	510	507	504	516	519	530	x	x	x	x	x	x	x
Total	2,317	2,353	2,257	2,297	2,237	2,480							
Capacity utilisation, %	93	96	92	95	93								
Sawmills, 1,000m <sup>3</sup>													
Eskola	49	53	60	58	56	60	x	x <sup>2)</sup>		x		x	x
Kyrö	219	200	219	215	197	230	x	x <sup>2)</sup>		x		x	x
Lappeenranta	234	216	226	228	205	240	x	x <sup>2)</sup>		x		x	x
Merikarvia	227	205	205	202	185	230	x	x <sup>2)</sup>		x		x	x
Renko	322	259	301	298	267	325	x	x <sup>2)</sup>		x		x	x
Vilppula	481	452	418	351	415	500	x	x <sup>2)</sup>		x		x	x
Metsä Svir (Russia)	263	251	233	244	221	270	x	x <sup>2)</sup>		x		x	x
Total	1,795					1,855							

<sup>1)</sup> Metsä Group's sawmills in Finland were integrated into Metsä Fibre on 1 November 2016.

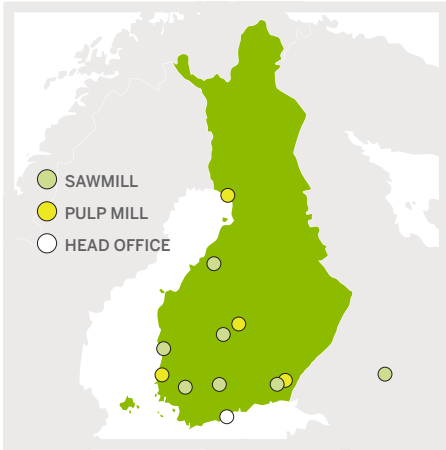
<sup>2)</sup> ISO 14001 standard includes the Energy Efficiency System (EES).

KEY FIGURES	2016 <sup>1)</sup>	2015	2014	2013	2012
Sales, EUR million	1,351	1,445	1,296	1,314	1,274
Operating result, EUR million	230	337	228	197	151
Comparable operating result, EUR million	219	337	208	197	148
Return on capital employed, %	20	42	30	29	23
Equity ratio, %	57	67	66	71	65
Net gearing ratio, %	23	-36	-40	12	16
Investments, EUR million	548	250	26	27	35
Pulp production, 1,000 tonne	2,317	2,353	2,257	2,297	2,237
Sawn timber, 1,000m <sup>3</sup>	1,795				
Wood consumption, million m <sup>3</sup>	13	13	12	13	12
Personnel, 31 December	1,231	857	842	884	876
Lost-time accident frequency rate, per million worked hours, incl. all accidents at work leading to absenteeism	7.2	7.9	4.9	8.4	7.9
Share of certified wood, %	90	87	87	85	85
Electricity self-sufficiency rate, pulp mills, %	142	151	149	144	151

<sup>1)</sup> In key figures Metsä Fibre reports the sawmills in Finland as a part of the company since 1 November 2016. Metsä Group reports the sawmills as a part of Metsä Fibre concerning the year 2016.

# PROFITABLE BUSINESS

2016



**JOUTSENO PULP MILL**

- 619,000 t bleached softwood pulp
- 135 employees

**KEMI PULP MILL**

- 604,000 t bleached softwood and hardwood pulp
- 160 employees

**ESKOLA SAWMILL**

- 49,000 m<sup>3</sup> sawn timber
- 11 employees

**KYRÖ SAWMILL**

- 219,000 m<sup>3</sup> sawn timber
- 69 employees

**RAUMA PULP MILL**

- 585,000 t bleached softwood pulp
- 119 employees

**ÄÄNEKOSKI PULP MILL**

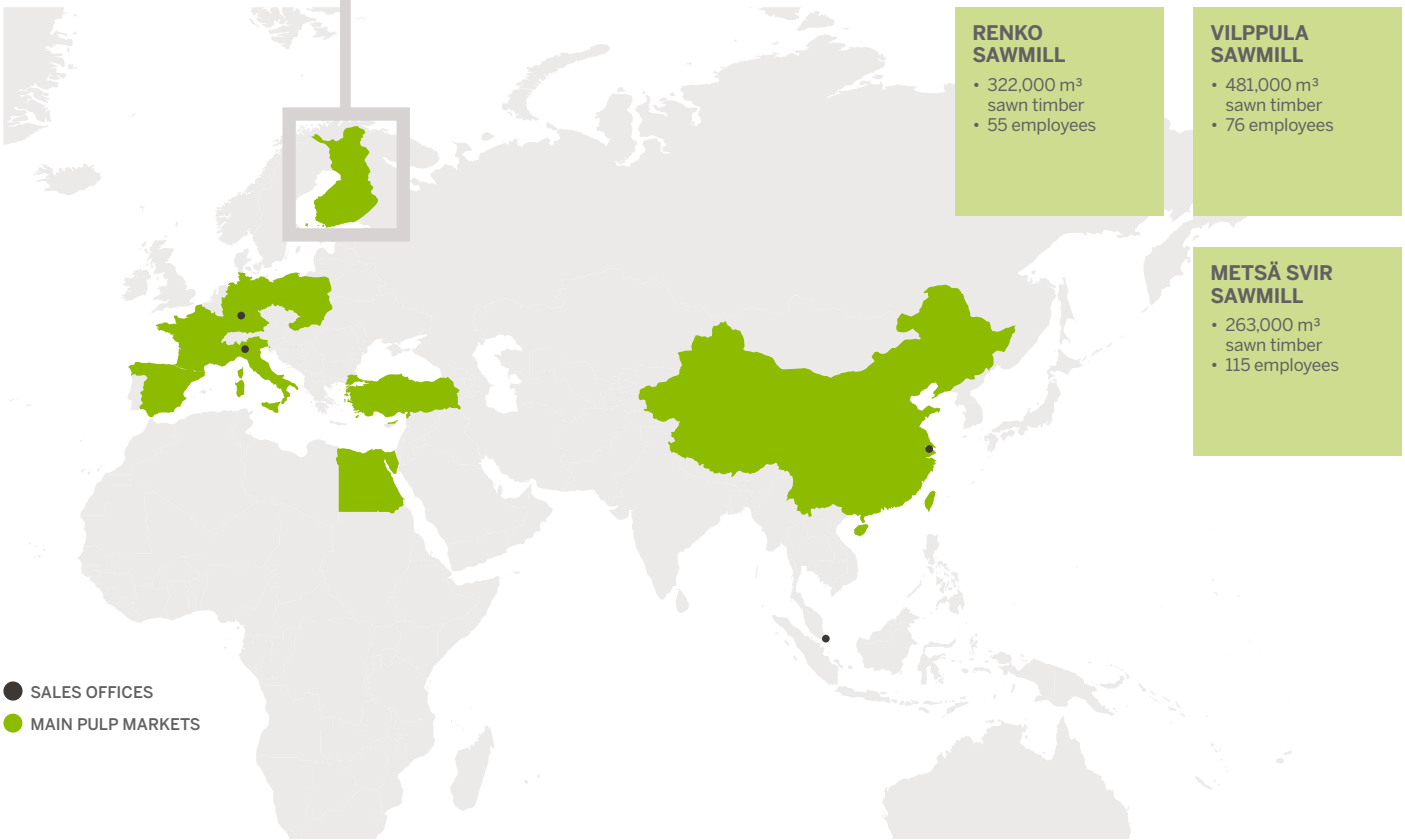
- 510,000 t bleached softwood and hardwood pulp
- 193 employees

**LAPPEENRANTA SAWMILL**

- 234,000 m<sup>3</sup> sawn timber
- 59 employees

**MERIKARVIA SAWMILL**

- 227,000 m<sup>3</sup> sawn timber
- 74 employees



**RENKO SAWMILL**

- 322,000 m<sup>3</sup> sawn timber
- 55 employees

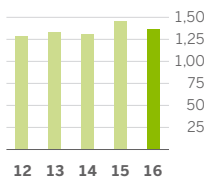
**VILPPULA SAWMILL**

- 481,000 m<sup>3</sup> sawn timber
- 76 employees

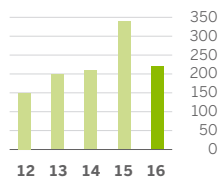
**METSÄ SVIR SAWMILL**

- 263,000 m<sup>3</sup> sawn timber
- 115 employees

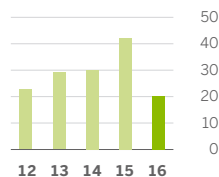
**SALES**  
EUR MILLION



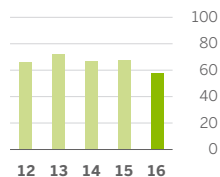
**COMPARABLE OPERATING RESULT**  
EUR MILLION



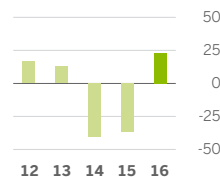
**RETURN ON CAPITAL EMPLOYED**  
%



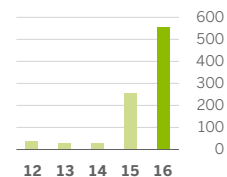
**EQUITY RATIO**  
%



**NET GEARING RATIO**  
%



**INVESTMENTS**  
EUR MILLION



# METSÄ FIBRE IS A DEVELOPER OF THE BIOECONOMY

2016 was a year of strong development work at Metsä Fibre. We advanced the company's operations in a number of different areas. We renewed the operating model of our mills, the bioproduct mill project at Äänekoski progressed according to plan and Metsä Group's sawmill operations were integrated into Metsä Fibre. In addition, we continued to work closely with our customers to improve mutually beneficial collaboration.

Our strategic objective is to be the most efficient company in the pulp industry and the preferred supplier for high-quality bioproducts and services. This is based on continuous improvement, which means developing the production performance of our mills as well as environmental and energy efficiency. Continuous improvement also means constant work to develop not only the products, but also the services, offered to customers.

## **NEXT-GENERATION BIOPRODUCT MILL**

The mill construction project at Äänekoski provides Metsä Fibre with an opportunity to develop its operations in a number of ways. Following a year of focusing on equipment installations, some 84 per cent of the actual investment project was complete at the end of the year 2016. We moved on to equipment testing at the beginning of 2017. The test runs of the first production departments will begin in the second quarter, and the next-generation mill will be started up in the third quarter.



**ALONGSIDE THE  
PULP BUSINESS,  
WE HAVE PROMOTED  
THE DEVELOPMENT  
OF OTHER  
BIOPRODUCTS  
AS PLANNED.**

Alongside construction, we have been preparing to sell the new production capacity to the markets. This has required negotiations with our customers and test runs with pulps on new customer machines, as well as the building of logistics systems. The State has implemented planned investments in the road and rail networks.

We will be meeting the growing demand for pulp with an unprecedented mill concept. The investment allows Metsä Fibre to strengthen its position as the industry's leading operator.

### **THE BIOPRODUCT CONCEPT IS EXPANDING ACCORDING TO PLAN**

Alongside the pulp business, we have promoted the development of other bioproducts as planned. In connection with the bioproduct mill investment, we are implementing new processes in the production of renewable energy and biochemicals that will improve the mill's cost-effectiveness and reduce its environmental impact.

In 2016, we agreed to build a sulphuric acid plant at the mill.

A plant that makes a process chemical out of the sulphuric compounds in the mill's odorous gases is a significant step towards a closed chemical cycle, which will further improve the environmental performance of the bioproduct mill. An advanced closed cycle in which water and chemicals are recycled and returned to the process for reuse was one of the key criteria in the design of the bioproduct mill's processes.

The production of a pulp-based biocomposite related to the bioproduct mill investment is proceeding at Rauma mill, where our partner is investing in its own production line. The product development projects concerning new pulp- and lignin-based products are making progress.

In our latest operating model, the new bioproducts and partnerships will be integrated in phases into our developing and competitive business. The business model for the next-generation mill is based on an efficient partner network, in which the conversion of new products is the result of cooperation between the different expert operators in the value chain.

### **SAWMILLS NOW PART OF METSÄ FIBRE**

The decision to transfer Metsä Group's sawmill business to Metsä Fibre was made in June 2016. The new capacity brought about by the Äänekoski bioproduct mill investment will increase our use of pulpwood considerably. We decided to ensure the efficiency of our growing operations with a restructuring of the pulp and sawmill businesses, which will bring synergies particularly to the management of wood raw material and transport costs.

As a result, Metsä Fibre – which, together with the Metsä Svir sawmill that it owns, has a production capacity of 1.9 million cubic metres

and is a major producer of northern spruce and pine sawn timber. In sales cooperation with Metsä Wood, we can operate competitively in the growing markets for pulp and sawn timber in emerging economies, alongside our European home market.

### **A LEADER IN THE BIOECONOMY**

I want to thank our highly skilled personnel, who demonstrated their readiness to meet development challenges in 2016. The workloads relating to numerous projects have been well received, and the tasks have been carried out successfully. Our personnel have developed a new operating model for production, which was adopted at two mills in 2016. Metsä Fibre is a systematically developing company, considered by the markets as a professional player and a sought-after partner. We are meeting global growth and demand by being the best operator in our industry.

The culmination of 2017 will occur in the third quarter of the year, when the next-generation bioproduct mill enters its start-up phase. Metsä Fibre will continue to bear its responsibility as a developer of the bioeconomy in the future, too.

#### **Iikka Hämmälä**

CEO

Metsä Fibre Oy



# STRATEGY POINTS THE WAY FOR BUSINESS

Metsä Fibre's strategic vision is to be the preferred supplier for high-quality bioproducts and services. The change in the global operating environment – the bioeconomy, appreciation of renewable materials, the growth of emerging markets and the needs arising from population growth – create a healthy ground for Metsä Fibre's products and materials.

## VISION

The customers value Metsä Fibre as their preferred supplier for high-quality bioproducts and services that create value to their business

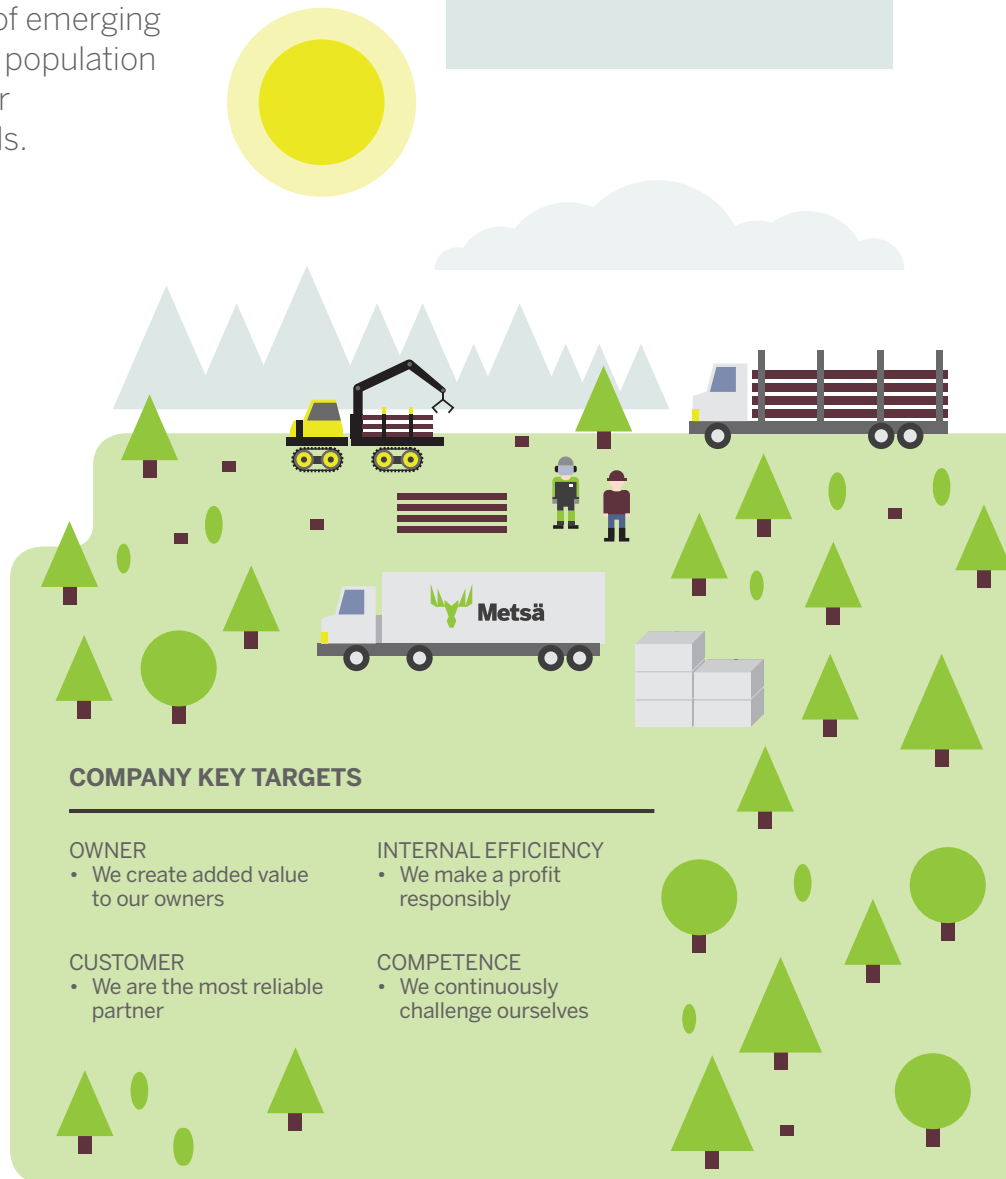
## MISSION

The most professional and efficient company in the pulp industry

We are the most professional and efficient company in the pulp industry. We continuously develop our competitiveness in efficient basic industrial production, and we are the leading company in the global market for our main product, softwood fibre. We create added value for our owners and achieve results through continuous improvement. Our operations are based on openness and the principles of sustainability.

We operate with a long-term perspective in cooperation with our customers, developing their business and profitability. Research shows that we are the most reliable partner in the industry. We are a permanent operator in the market, and we have the technical competence to provide customers with quality products that meet their needs and services that generate added value. Our consistency and predictability allows us to keep our promise of reliability.

We invest in know-how, the development of our personnel and organisation, and in partnerships. We are shaping constantly renewing long-term operations.



### COMPANY KEY TARGETS

#### OWNER

- We create added value to our owners

#### INTERNAL EFFICIENCY

- We make a profit responsibly

#### CUSTOMER

- We are the most reliable partner

#### COMPETENCE

- We continuously challenge ourselves



# VALUES



## COOPERATION

We develop our operations in cooperation with our customers and share information and best practices with each other. We operate as one group of companies, utilising mutual synergies and relying on common benefits.



## RELIABILITY

Our success is based on long-term cooperation with our stakeholders. We appreciate the work and competence of each other and strengthen the confidence of our various stakeholders by acting in a consistent and predictable way.



## RENEWAL

We are aware of future challenges and have the courage to question old practices in order to provide better products and services to our customers in support of their business operations.



## RESPONSIBLE PROFITABILITY

We bear responsibility for the environment, our partners and each other to ensure successful business activities and forestry. Profitability is an absolute prerequisite for the continuous development of operations.



## CUSTOMER PROMISE

- High-quality bioproducts
- Technical customer service
- Efficient logistics
- Sustainability
- Partners in business

# CONTINUOUS IMPROVEMENT CREATES A FOUNDATION FOR THE FUTURE

In 2016, we worked systematically to build for the future in accordance with the principles of continuous development. The upcoming start-up of the bioproduct mill and the integration of the sawmill business into Metsä Fibre will further improve our competitiveness. This allows us to ensure success in the future, too.

The construction and equipment installations of the bioproduct mill have progressed according to plan. The mill will start up in the third quarter of 2017. We are making careful preparations to ensure the mill's efficient start-up and the high quality of the products. We have also considered the effects of the start-up on business processes as a whole. The staff of the bioproduct mill will complete extensive training and induction into all aspects of the new mill.

## STRONGER SYNERGIES

Metsä Group's sawmills were integrated into Metsä Fibre in November 2016. The integration of the pulp and sawmill industries will bring about full-scale synergy benefits. The compact structure allows for the best optimisation of the use of wood raw material and transport costs. The business synergies will be further strengthened in production, purchasing and logistics.

## FOCUSING ON IMPROVING OPERATING RELIABILITY

In terms of production development, we continued the work to further improve the operat-

ing reliability of mills. In the second half of the year, we achieved an extremely high operating reliability of 99 per cent. This good operating reliability allows us to ensure premium product quality, cost-effectiveness, high environmental performance, well-being at work and occupational safety.

## CONTINUOUS IMPROVEMENT OF OPERATIONS

The Joutseno mill area worked throughout the entire year without a single lost-time accident. This result is an indication that our goal of zero accidents is achievable at all mills.

At Metsä Fibre, safety is a professional skill. The accident frequency in the pulp and sawn timber industries together was 7.2.

Our environmental performance capacity was excellent, and we reduced the volume of wastewater from the mills. We ensure good environmental performance by continuous preventive work involving environmental observations, environmental briefings, risk assessments and environmental investigations. Emissions into the air exceeded permit levels three times during the year.

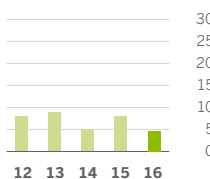
Production at the Rauma and Äänekoski mills adopted a new operating model, called Mills of the Future. This model won Finland's quality innovation award in the category for large companies in 2016. The new operating model was developed by Metsä Fibre's personnel and is based on self-directed work. It represents a truly pioneering approach for the whole forest industry.

We will continue to improve our work on a constant basis also in 2017, which will culminate in the start-up of the bioproduct mill.

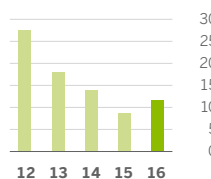
## THE STAFF CREATED OUR FUTURE OPERATING MODEL

Our production personnel were asked the smartest way to carry out tasks. The result was the new Mills of the Future operating model, based on self-directed teams and flat organisation. The project started at the Rauma mill in January 2016. In the new operating model, shift personnel make independent decisions without a shift supervisor and jointly agree on the division of work in accordance with the shared objectives. The personnel's diverse expertise is valued and applied in a completely new way, since everyone has the opportunity to perform increasingly demanding and varied tasks. This operating model was outlined in interviews and workshops taken part in by approximately 200 Metsä Fibre employees.

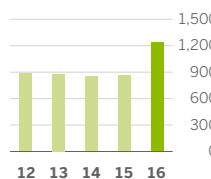
LTA1 RATE,  
PULP INDUSTRY  
/MILLION WORKED HOURS



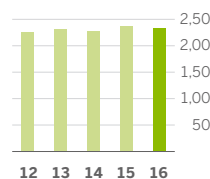
LTA1 RATE, SAWN  
TIMBER INDUSTRY  
/MILLION WORKED HOURS



PERSONNEL  
31 DECEMBER



PULP PRODUCTION  
1,000 TONNE





# UNDERSTANDING CUSTOMERS ADDS VALUE

Metsä Fibre's products comprise of bleached softwood and birch pulps, biochemicals and bioenergy, as well as sawn timber. Services developed over the long-term in cooperation with our customers add significant value to their products.

Demand for softwood and birch pulp has been strong throughout the year. The growth in demand for pulp has been strongest in Asia and in other growing economies, while demand in Europe has remained stable. Volumes in China have developed positively, and we have also entered entirely new market areas. Other noteworthy actions taken last year included the development of customer accounts through added value services and the systematic progress of the bioproduct mill. A large part of the output of the new mill will be targeted at emerging markets, such as China. We are one of the world's biggest

producers of tall oil bioproducts, and the significance of new bioproducts generated in pulp production will grow in the future.

## FOCUS ON CUSTOMERS

We serve our customers in diverse ways and are continuously developing our digital services to provide extra support. We have launched Pulp Exchange, a digital trading channel for customers; and our digital customer magazine Echo Online, which provides an easy to use and wide-ranging way to access topical industry affairs.

By developing our customers' end-products and services in cooperation with them, we aim to be the preferred supplier of high-quality bioproducts and services. Our understanding of the value chain for the end product brings direct benefits to customers. Our products meet even the strictest quality requirements.

## LISTENING TO OUR CUSTOMERS

The principle of continuous improvement includes ongoing measurement. In 2016, we received the best results in our customer surveys. We are grateful for all types of feedback, and we will continue to develop our services accordingly, aiming to remain the most reliable operator.

SALES VOLUMES BY PULP MARKET AREAS %



Finland	39
Asia	30
Europe, excl. Finland	22
Middle East and North Africa, Turkey	9

END USE OF BOTNIA NORDIC PULPS %



Printing paper	26
Tissue paper	33
Board	32
Speciality papers	7
Others	2



## METSÄ DAY BRINGS THE FORESTS TO CUSTOMERS

Metsä Day is Metsä Fibre's way of familiarising customers with the origins of its products and with responsible forestry. Sustainable development is part of our customer promise and integral to our everyday operations.

"Metsä Day is an excellent way of explaining the unique relationship that Finnish people have with the forest by providing a memorable experience in an authentic setting. We seek to show what modern sustainable forest management is like in practice. Besides explaining the growth of wood reserves, we also draw attention to the diversity of the forested environment and to the public everyman's right that is uniquely recognised in Finland," states

**Mikael Lagerblom**, VP, General Manager of Metsä Fibre GmbH.

Last year several Metsä Day events were arranged for Metsä Fibre's key customers. Typical topics included technical services, innovation work and logistics.

"We tell customers about our own good practices and values, and share expertise in matters of responsibility for the benefit of customer organisations. We also provide benchmarking of best practices for promoting sustainability," Lagerblom explains.

All of the wood used in Metsä Fibre products comes from responsibly managed forests, and its origin is always traceable. This natural, renewable raw material already satisfies the increasingly exacting requirements of a growing bioeconomy and circular economy.



## METSÄ FIBRE PRODUCT PORTFOLIO

### PULP

Our portfolio of Botnia pulps is the broadest in the world, comprising all main pulp grades including Softwood, Hardwood and High Yield (BCTMP) Pulps.

### RENEWABLE ENERGY

Our pulp mills produce enough renewable energy to meet their own process needs still leaving enough surplus to allow us to sell it into the general grid.

### BIO-CHEMICALS

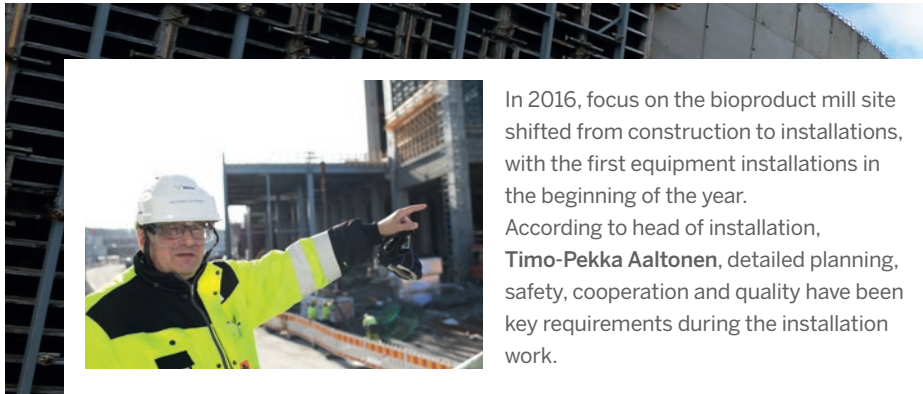
We provide Botnia Crude Tall Oil (CTO) and Crude Turpentine (CST) for a wide range of end use applications and industries.

### SAWN TIMBER

Tight grains and light weight together with excellent strength make the timber an ideal material to meet high quality requirements.

# TOWARDS THE START-UP OF THE BIOPRODUCT MILL

Metsä Fibre is building the world's first next-generation bioproduct mill in the area of the present Äänekoski pulp mill. During 2016, much of the installations of equipment was completed. Preparations were also made for the mill's test runs, commissioning and start-up, which will be the primary focus for 2017. The bioproduct mill project has progressed according to plan, and the mill is set to start up in the third quarter of 2017.



In 2016, focus on the bioproduct mill site shifted from construction to installations, with the first equipment installations in the beginning of the year. According to head of installation, **Timo-Pekka Aaltonen**, detailed planning, safety, cooperation and quality have been key requirements during the installation work.

## TRAINING PREPARES PERSONNEL FOR THE START-UP OF THE NEW MILL

The staff at Metsä Fibre's operational mill at Äänekoski have prepared for the start-up of the new bioproduct mill with in-depth training programmes. The training began in 2015 and continued in the form of six training days in 2016. The training focused on areas such as maintenance, the SAP system, process competence and rail safety.

At the beginning of 2017, everyone was set to complete a two-week theoretical training phase, after which inductions will continue at the bioproduct mill as part of the testing and commissioning phase. The skills of the operating mill's personnel are also being put to use in the design of the bioproduct mill's equipment and in risk assessments. The current mill employs a total of 170 leading professionals in pulp production, ensuring an excellent platform for the start-up of the next-generation bioproduct mill.



In February 2016, Vuosaari Harbour in Helsinki was confirmed as the export harbour for the bioproduct mill. The area will now become home to a new 30,000 cubic metre terminal building.



Also in February, the bioproduct concept reached a key stage in its development when implementation agreements were made with biogas manufacturer EcoEnergy SF Oy and biocomposite producer Aqvacomp Oy.



According to a study published by the Research Institute of the Finnish Economy (Etlä) in May 2016, the bioproduct mill will have a significant positive effect on the Finnish economy during both its construction phase and its operation.



In May 2016, an agreement on a sulphuric acid plant to be constructed at the mill was also made, representing a step towards a closed chemical cycle. The sulphuric acid plant will be the first large-scale plant of its kind in the world to be integrated into a pulp production process.



The on-site workforce peaked in size in November, when approximately 2,600–2,700 top professionals in their respective fields were working on the site. On the busiest days, this figure rose to nearly 3,200. Safety is the first priority on the bioproduct mill site and, in November, a three-hour Safety Stop event was organised, resulting in 6,000 working hours being dedicated to occupational safety. Everyone on site spent the three hours revising safety issues, preparing a personal risk assessment and tidying up their work area.

# A LEADER IN THE GLOBAL BIOECONOMY

Metsä Group's EUR 1.2 billion bioproduct mill is the biggest bioeconomy investment in Finland – and all of Europe. In addition to high-quality pulp and other bioproducts produced in an environmentally and resource-efficient manner, it will generate economic growth and well-being.

The core of the bioproduct mill is the energy and environmentally efficient mill, which will produce pulp and other bioproducts. This cutting-edge mill is the heart of a unique industrial ecosystem of companies that will produce a variety of bioproducts.

## THE BIOPRODUCT MILL CREATES GROWTH

The investment is based on the steady growth in global demand for northern long-fibre pulp. The mill will produce 1.3 million tonnes of softwood and hardwood pulp a year, most of which will be sold in Europe and Asia. The mill will use 6.5 million cubic metres of wood a year.

The bioproduct mill will increase the value of Finland's exports by approximately EUR 0.5 billion a year, and its income effect on Finland will also be EUR 0.5 billion. During its construction, the mill's personnel impact will be more than 6,000 person-years. After production commences, its employment impact throughout its value chain in Finland will be around 2,500 jobs.

## TOP-CLASS ENVIRONMENTAL EFFICIENCY

In terms of its material, environmental and energy efficiency, the bioproduct mill will be second to none, even on a global scale. It will not use fossil-based energy, instead generating all the renewable energy it needs from its side streams. Despite the nearly threefold production capacity in comparison to the existing pulp mill at Äänekoski, the bioproduct mill will operate within the same emission limits and wastewater conditions as the existing mill.

## THE BIOPRODUCT CONCEPT IS PROGRESSING

Agreements on the production of biogas and biocomposites were made in 2016. A decision was also made on the world's first large-scale sulphuric acid plant integrated into a pulp production process.

The bioproduct mill aims to function as a growth platform for business partnerships and to expand and diversify the existing forest industry network at Äänekoski. Our concept will bring about a unique industrial ecosystem that will make use of the side streams generated by the main pulp production and create extensive value chains.

We will continue to actively and systematically conduct research and development work into the bioproduct concept.

## UNIQUE INDUSTRIAL ECOSYSTEM

### BIOPRODUCTS

The bioproduct mill will produce pulp, biochemicals and bioenergy. The product portfolio will be complemented with new bioproducts: product gas, sulphuric acid, biogas and biocomposites. The new bioproducts will improve the competitiveness of the entire ecosystem.

### CURRENT BIOPRODUCTS



PULP



RENEWABLE  
ENERGY



TALL OIL AND  
TURPENTINE



The network of companies around the mill will produce numerous bioproducts.



## CORE THE WORLD'S MOST MODERN PULP MILL

**0%**  
OF FOSSIL FUELS

**1.3**  
MILLION  
TONNES OF  
PULP  
PER YEAR

SELF-SUFFICIENCY  
IN ELECTRICITY  
**240%**

## NEW BIOPRODUCTS

### BIOGAS

Eco Energy SF Oy will use the sludge generated in pulp production to produce biogas, which can be refined into biomethane for traffic use.

### SULPHURIC ACID

The odorous gases will be used to make sulphuric acid, which is needed in the production of tall oil, for example. The production of sulphuric acid will take the mill closer to a closed chemical cycle.

### PRODUCT GAS

Tree bark will serve as a raw material for product gas used as fuel by the mill. The mill will therefore not use any fossil fuels at all.

### BIOCOMPOSITE

The production of biocomposites will first begin at the Rauma mill. Aqvacomp will use pulp fibre and plastic to produce a biomaterial that can replace plastic in the electronics and car industries.

## BIOPRODUCTS IN THE RESEARCH PHASE

### TEXTILE FIBRES AND PROCESSED LIGNIN PRODUCTS

We are studying several different processes and product paths, which will be implemented in systematic phases. Possible new bioproducts include lignin and wood-based textile fibres. We are studying the production of textiles with an ecological method that uses ionic liquids. Mill-scale tests are conducted in 2017.

## VALUE FOR THE SOCIETY

TOTAL INVESTMENT

**1.2**

EUR BILLION

EMPLOYS

**2,500**

PEOPLE IN THE  
DIRECT VALUE CHAIN  
IN FINLAND

INCREASES THE  
VALUE OF FINNISH  
EXPORTS BY

**0.5**

EUR BILLION PER  
YEAR

INCREASES THE  
SHARE OF  
RENEWABLE ENERGY  
IN FINLAND  
BY MORE THAN

**2**

PERCENTAGE POINTS

# OUR SUSTAINABILITY THEMES

## WE OFFER SUSTAINABLE CHOICES



### PRODUCTS AND SERVICES

- Sustainable, safe and recyclable products from renewable wood
- Customer-focused services and solutions
- Innovations and renewal

## WE BRING THE FOREST TO YOU



### RAW MATERIALS AND SUPPLY CHAIN

- Sustainable forest management, certification and diversity of forest nature
- Sustainability in the value chain
- Traceability

### WOOD

Maintain the share of certified wood:

Target

≥75%

Performance 2016

90%

### LOGISTICS

Ensure sustainability of main logistics flows 2016–2017:

Target

100%

Status 2016

Evaluation of service providers will be finalised in 2017



The United Nations' Sustainable Development Goals (SDGs) represent a large-scale global commitment. The SDG's transformed the wide sustainability agenda into concrete targets. Metsä Group's activities support reaching the SDG's. Metsä Group is also committed to the UN Global Compact.



# WE WORK FOR A BETTER CLIMATE AND ENVIRONMENT

## RESOURCE EFFICIENCY AND EMISSIONS

- Efficient use of raw materials, energy and water
- Value of side streams
- Share of bioenergy
- Emissions to water and air

6 CLEAN WATER AND SANITATION



13 CLIMATE ACTION



# WE CREATE WELL-BEING

## STAKEHOLDER ENGAGEMENT

- Ethical business practices
- Safety at work
- Responsible management
- Local livelihoods and society

2 ZERO HUNGER



6 CLEAN WATER AND SANITATION



13 CLIMATE ACTION



15 LIFE ON LAND



## CLIMATE

Fossil CO<sub>2</sub> emissions per product tonne 2009–2020:

Target

-30%

Performance 2016

**-32%**

## ETHICAL BUSINESS

Coverage of code of conduct training:

Target

100%

Performance 2016

**99%**

## ENERGY

Energy efficiency improvement 2009–2020:

Target

12%

Performance 2016

**2.7%**

## SAFETY AT WORK

Lost-time accidents frequency annually (LTA1):

Target

0

Performance 2016

**7,2**

## RESOURCE EFFICIENCY

Process water use per product tonne 2010–2020:

Target

-17%

Performance 2016

**-16%**

## WELL-BEING

Sickness absenteeism:

Target

<3%

Performance 2016

**4.0%**



# PREVENTIVE WORK REDUCES ENVIRONMENTAL IMPACT

We minimise the environmental impact of our operations with professional and precise management of environmental risks. This is why we reviewed and updated our internal operating methods for the management of environmental risks in 2016.

Operating methods, particularly with regard to the prevention of oil risks, were enhanced at our four sawmills. The practices determined to be the best during the risk assessments have been implemented at all of Metsä Fibre's pulp mills.

In addition to separate risk assessments, active responses to deviations and encouraging people to make observations in daily operations form an integral part of the management of environmental impact. By recording environmental observations, we respond to possible disruptions as fast as possible in advance.

The number of entries pertaining to preventive environmental work has increased year after year.

## MANAGING THE ENVIRONMENTAL BURDEN

In 2016, our burden on waterways remained below the permit limit. Thanks to preventive environmental work, the operations of treatment plants and the management of nutrient loads, the burden on waterways has also been lower than required in the permit limits in previous years. In line with 2015, the volume and chemical oxygen demand of wastewater remained at good levels.

We did not, however, meet all of the permit limits with regard to emissions into the air. Electric filters and the scrubber at the Kemi mill were overhauled to reduce the emissions of particulate matter from the recovery boiler, and the relief gas scrubber in the chlorine dioxide plant at the Rauma mill was repaired to reduce the overall chlorine emissions. At the Joutseno mill, the permit limit for total reduced sulphur (TRS) was temporarily exceeded when the wire in the lime sludge filter broke down.

However, the number of times that permit limits were exceeded in terms of emissions into the air halved from 2015, to three. All of the aforementioned cases of permit levels being exceeded have been subject to environmental investigations, and we have defined remedial measures to avoid similar events in the future.

## INVESTMENTS AND PROFESSIONAL SKILLS

Over the years, Metsä Fibre has made a number of investments aiming to make the treatment of malodorous gases more efficient.

The vapour treatment system of the wood-chip silo at the Joutseno mill was improved in 2014, a new malodorous gas boiler was taken into use at the Rauma mill in early 2016, and

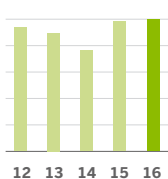
the Kemi mill enhanced the burning of malodorous gases in the recovery boiler in 2016.

These investments will have a positive effect on air quality in the immediate vicinity of the mills. Individual investments in the treatment of malodorous gases have significantly improved the quality of air in the immediate vicinity of mills. The bioproduct mill will considerably improve our environmental performance. The mill's water cycles are largely closed, meaning that it will produce less wastewater than traditional pulp mills. The multi-phase wastewater treatment plant will also minimise our burden on waterways. Sulphuric acid will be produced from the mill's malodorous gases – a process which will further close the chemical cycle.

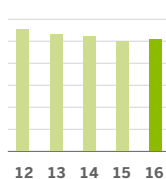
In addition to investments, the management of environmental impact relies heavily on day-to-day work: the personnel's professional skills and know-how are the basis for uninterrupted operations. The operating reliability of mills is visible in everything we do, including the environmental impact of our operations.

➔ **Read more: Metsä Group's Sustainability Report p. 47**

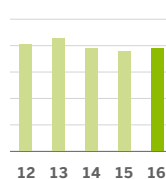
**FOSSIL CO<sub>2</sub> EMISSIONS**  
1,000 TONNES



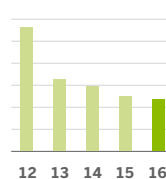
**EFFLUENT FLOW**  
M<sup>3</sup>/PULP TONNE



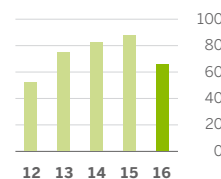
**CHEMICAL OXYGEN DEMAND IN EFFLUENT (COD)**  
KG/PULP TONNE



**LANDFILL WASTE**  
KG/PULP TONNE, WET



**WASTE REUSE RATE**  
%





SELF SUFFICIENCY RATE  
IN ELECTRICITY

**142%**



# ENVIRONMENTAL BALANCE

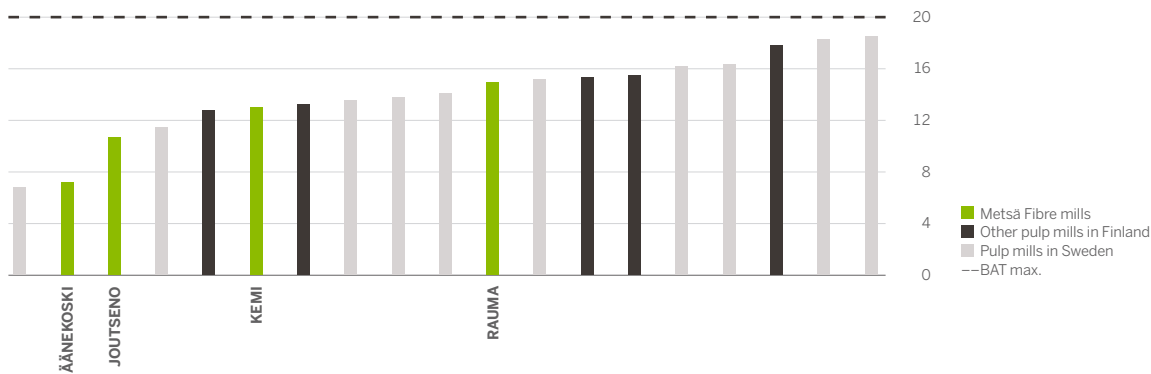
		JOUTSENO	KEMI	RAUMA	ÄÄNEKOSKI	METSÄ SVIR (RUSSIA)	TOTAL 2016	TOTAL 2015	ESKOLA	KYRÖ	LAPPEEN- RANTA	MERIKARVIA	RENKO	VILPPULA	TOTAL 2016 <sup>1)</sup>
<b>PRODUCTION</b>															
Pulp	t	618,700	603,524	585,187	509,962		<b>2,317,374</b>	2,352,642							
Sawn timber	m <sup>3</sup>					262,923	<b>262,923</b>	251,451	49,187	219,455	234,002	226,704	321,625	481,050	<b>1,532,023</b>
<b>WOOD CONSUMPTION</b>															
Total wood consumption	1,000 m <sup>3</sup>	3,406	3,061	3,211	2,336	560	<b>12,574</b>	12,625	112	453	484	469	651	979	<b>3,149</b>
Certified wood	%	88	98	84	93	49	<b>90</b>	87	98	96	92	95	96	94	<b>95</b>
<b>EFFLUENTS</b>															
<b>WASTE WATER</b>															
Process water volume	1,000 m <sup>3</sup>	17,113	14,171	14,720	12,614	276	<b>58,894</b>	59,011	-	7.3	2.1	8.5	5.3	54	<b>77</b>
Total suspended solids	t	294	404	292	419	9	<b>1,418</b>	1,410	-	-	-	-	-	-	-
Chemical oxygen demand (COD)	t	6,616	7,842	8,714	3,652	17	<b>26,840</b>	26,635	-	-	-	-	-	-	-
Biological oxygen demand (BOD)	t	144	166	122	107	7.0	<b>546</b>	480	-	-	-	-	-	-	-
Phosphorus P	t	5.3	6.6	4.3	6.1	0.028	<b>22</b>	19	-	-	-	-	-	-	-
Nitrogen N	t	115	109	53	82	0.31	<b>359</b>	315	-	-	-	-	-	-	-
AOX	t	112	64	71	63	-	<b>310</b>	281	-	-	-	-	-	-	-
<b>AIR EMISSIONS</b>															
Sulphur dioxide (as SO <sub>2</sub> )	t	102	137	73	281	0.10	<b>593</b>	1,252	-	2.9	0.0010	0.041	0.040	19	<b>22</b>
TRS (as S)	t	9	34	4	6	-	<b>53</b>	58	-	-	-	-	-	-	-
NO <sub>x</sub> (as NO <sub>2</sub> )	t	851	1,133	871	942	19	<b>3,815</b>	4,026	-	25	29	23	28	59	<b>164</b>
CO <sub>2</sub> from fossil sources	1,000 t	43	58	75	64	0.14	<b>240</b>	244	-	0.42	0.013	0.56	0.55	6.0	<b>7.52</b>
CO <sub>2</sub> from biomass	1,000 t	1,289	1,366	1,167	931	19	<b>4,771</b>	4,883	-	23	25	23	32	60	<b>163</b>
Particles	t	127	144	120	383	10	<b>784</b>	895	-	20	31	23	10	59	<b>143</b>
<b>WASTE</b>															
Landfill waste	t	9,332	10,453	13,930	11,982	59	<b>45,757</b>	29,006	3.0	-	7.8	83	15	35	<b>144</b>
Hazardous waste	t	45	64	157	38	0.30	<b>305</b>	221	0.010	6.9	0.7	4.7	8.2	24	<b>45</b>
<b>ENERGY</b>															
Wood based fuel use	GWh	3,545	3,757	3,209	2,561	51	<b>13,123</b>	13,430	-	64	70	62	89	164	<b>449</b>
Fossil fuel use	GWh	243	215	264	226	0.53	<b>950</b>	921	-	1.6	0.05	2.1	2.1	22	<b>28</b>
Purchased electricity	GWh	-235	-165	-104	-80	14	<b>-570</b>	-698	0.90	15	17	16	8.6	15	<b>73</b>
Purchased heat	GWh	-56	-517	-191	-84	-	<b>-847</b>	-808	-	-	-0.089	-10	-	-53	<b>-63</b>

<sup>1)</sup> Metsä Group's sawmills in Finland were integrated into Metsä Fibre on 1 November 2016, in Environmental Balance sawmills in Finland are reported concerning the year 2016.

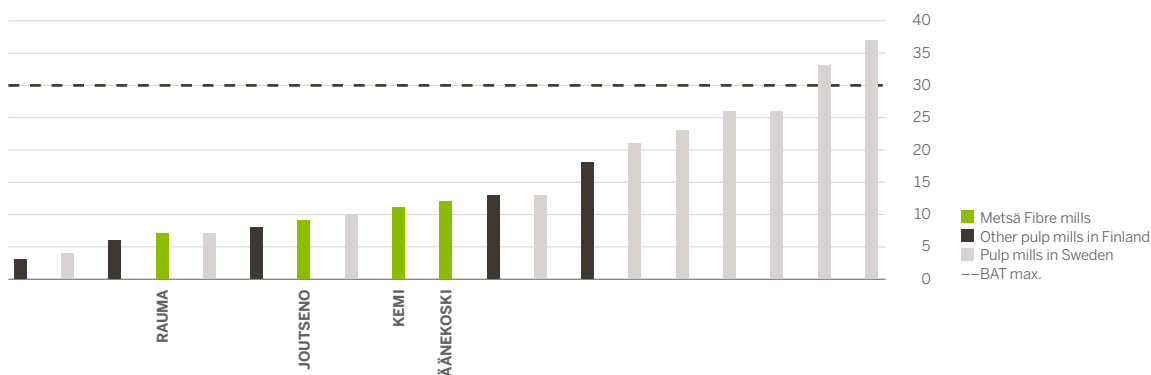
# SPECIFIC EMISSIONS FROM PULP MILLS IN THE NORDIC COUNTRIES

Specific emissions from Metsä Fibre's and other Finnish and Swedish mills producing bleached sulphate pulp are compared below. Metsä Fibre's figures are from 2016. The other figures are from 2015 and based on the statistics of the Finnish Forest Industries Federation and the Swedish Forest Industries Federation.

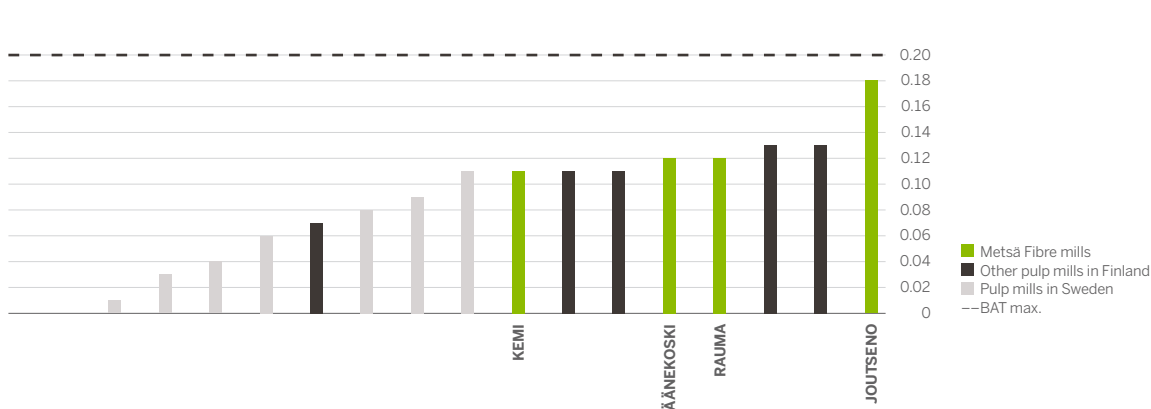
## CHEMICAL OXYGEN DEMAND (COD<sub>CR</sub>) KG/PULP TONNE



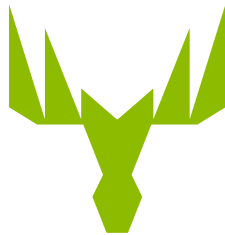
## PHOSPHORUS (P) G/PULP TONNE



## CHLORINE AND OTHER HALOGENS BOUND TO ORGANIC MATERIAL IN EFFLUENT (AOX) KG/PULP TONNE



# Make the most of Metsä



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