METSÄ GROUP

SUSTAINABILITY REPORT 2016

Metsä

SUSTAINABLE BIOPRODUCTS FROM THE NORTH

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.

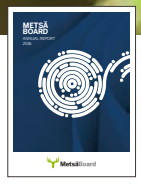
This is sustainable bioeconomy, where Metsä Group is a forerunner. Our strength continues to grow in the northern forests.

PUBLISHER: Metsä Group, Sustainability and Corporate Affairs
This publication and additional information is available online at **www.metsagroup.com/CSR.** Metsä Group's annual reporting consists of the following reports: Annual Brochure (AB), Financial Statements (FS), including the Corporate Governance statement, and Sustainability Report (SR). Metsä Board and Metsä Fibre publish their own reports.
Kindly send your feedback to sustainability@metsagroup.com or discuss with @MetsaGroup on social media.

Metsä Group Annual Brochure 2016

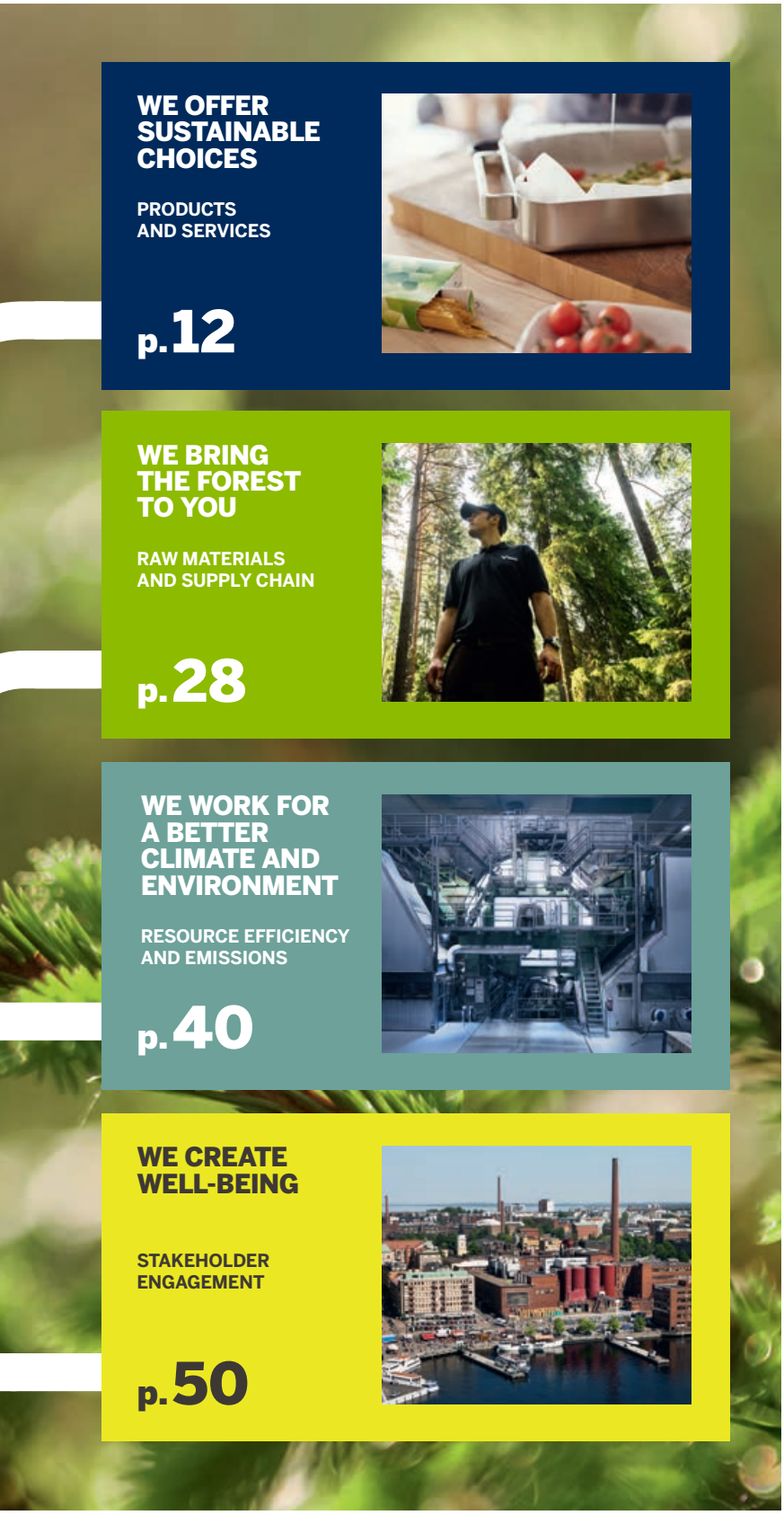
Metsä Group Financial Statements 2016

Metsä Group Sustainability Report 2016



Metsä Board Annual Report 2016

Metsä Fibre Annual Review 2016



WE OFFER SUSTAINABLE CHOICES

PRODUCTS AND SERVICES

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WE BRING THE FOREST TO YOU

RAW MATERIALS AND SUPPLY CHAIN

p.28

WE WORK FOR A BETTER CLIMATE AND ENVIRONMENT

RESOURCE EFFICIENCY AND EMISSIONS

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WE CREATE WELL-BEING

STAKEHOLDER ENGAGEMENT

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The cover of this report is made of Carta Integra lightweight paperboard, produced at Metsä Board's Äänekoski mill in Finland. The pulps, comprising 75% of the finished product, come from the Group's mills in Finland. The other raw materials come from reliable suppliers who comply with Metsä Group's Supplier Code of Conduct and Sustainability Principles.

YEAR 2016 HIGHLIGHTS

Metsä Group is a forerunner in sustainable bioeconomy utilising renewable wood from sustainably managed northern forests. Metsä Group focuses on wood supply and forest services, wood products, pulp, fresh fibre paperboards and tissue and cooking papers.

Metsä Group's sales totalled EUR 4.7 billion in 2016, and it employs approximately 9,300 people. The Group operates in some 30 countries. Metsäliitto Cooperative is the parent company of Metsä Group and owned by approximately 104,000 Finnish forest owners.

SUPPORTING GLOBAL GOALS

The member states of the United Nations have established the Sustainable Development Goals (SDGs). Metsä Group's operations and products support these goals in many ways.

Read more p. 8

WORKING TOGETHER

Networks are the key to creating value locally, nationally and internationally.

Read more p. 16, 52

86%

CERTIFIED WOOD

Read more p. 32

100%

TRACEABLE WOOD

Read more p. 32

2

BILLION EUROS IN INVESTMENTS IN 2015–2017

-35%

FOSSIL CO_2 EMISSIONS PER TONNE SINCE 2009

Read more p. 46

-22%

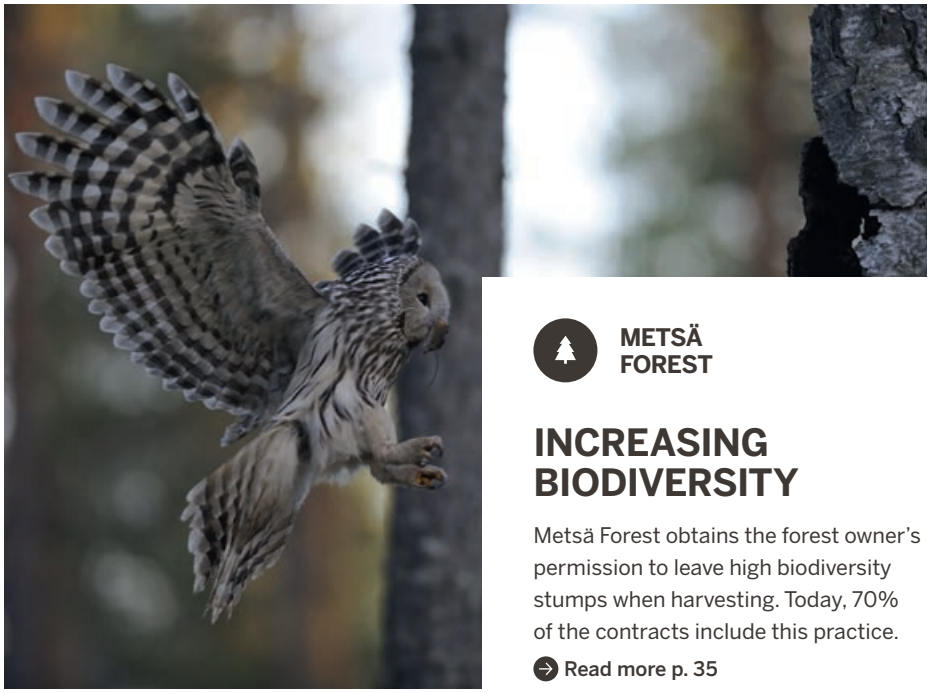
FREQUENCY OF ACCIDENTS AT WORK (LTA1)

Read more p. 56

86%

OF PRODUCTION WITH BIOENERGY

Read more p. 48



METSÄ FOREST

INCREASING BIODIVERSITY

Metsä Forest obtains the forest owner's permission to leave high biodiversity stumps when harvesting. Today, 70% of the contracts include this practice.

Read more p. 35

METSÄ WOOD

GREEN WOOD PRODUCTS

The manufacture of Kerto LVL can generate more bioenergy than is used in its production. At Metsä Wood's Lohja mill, there's enough bioheat for the surrounding community as well.

Read more p. 43

ALMOST READY TO ROLL

The bioproduct mill, Europe's biggest forest industry investment ever, was 84% complete at the end of 2016. The work has continued with testing, resulting in a planned start-up of the mill during the third quarter of 2017.

Read more p. 18

RECOGNISED ENVIRONMENTAL PERFORMANCE

Metsä Board was recognised by CDP in their Climate, Water and Forest programmes. This level of recognition demonstrates that Metsä Board is leading the way in transparency of reporting and efficiency of operations.

Read more p. 44, 46

HUNDREDS OF DAYS WITHOUT ACCIDENT

Metsä Tissue's Düren mill in Germany achieved 1,424 days without any accidents – that's over three years! This is a great example of how working safely is a way of life at Metsä Group.

Read more p. 57

BUILDING A SUSTAINABLE BIOECONOMY

Climate change mitigation, resource scarcity and the paradigm shift towards circular economy have played a key role in global discussions this year. The Paris Agreement, settled in COP21 in 2015, was ratified earlier than expected.

Metsä Group continues to make headway into desired developments throughout its operations and investments. Energy, water and material efficiency are constantly in focus, and we contribute to the UN Sustainable Development Goals in various ways – also presented in this report.

Metsä Board made it onto the CDP's global Water A List as the only forest industry company, along with seven other companies from 607 applicants. The CDP also awarded Metsä Board leadership status in its Forest Programme and a position on the Climate A List. Related to that, science-based targets have been acknowledged as a tool for keeping the rise in temperatures to below 2°C compared to pre-industrial times. Since 2009, Metsä Group has reduced its fossil CO_2 emissions by 35% per produced tonne and improved its energy efficiency by 6% with 86% of our production made with bioenergy.

We are helping to build a path to a vital and sustainable circular and bioeconomy. We have therefore promoted a resource-wise bioeconomy and the sustainable use of wood, which is a renewable though limited resource. Metsä Fibre's bioproduct mill in Äänekoski, Finland, has been identified as an example of a resource efficient bioeconomy ecosystem that produces alternatives to fossil-based living. Representing the biggest forest industry investment ever in Europe, worth EUR 1.2 billion, it has received wide interest, both nationally and in the EU. Of particular interest is how it will utilise materials and side streams efficiently, provide

METSÄ GROUP

SALES **4.7** BILLION | PERSONNEL **9,300**

METSÄLIITTO COOPERATIVE | GROUP'S PARENT COMPANY | OWNED BY 104,000 FINNISH FOREST OWNERS

METSÄ FOREST	METSÄ WOOD	METSÄ FIBRE	METSÄ BOARD	METSÄ TISSUE
WOOD SUPPLY AND FOREST SERVICES	**WOOD PRODUCTS**	**PULP AND SAWN TIMBER**	**PAPERBOARD**	**TISSUE AND COOKING PAPERS**
SALES **EUR 1.5 BILLION**	SALES **EUR 0.5 BILLION**	SALES **EUR 1.6 BILLION**	SALES **EUR 1.7 BILLION**	SALES **EUR 1.0 BILLION**
PERSONNEL **900**	PERSONNEL **1,500**	PERSONNEL **1,250**	PERSONNEL **2,500**	PERSONNEL **2,750**
HOLDING METSÄLIITTO 100%	HOLDING METSÄLIITTO 100%	HOLDING METSÄLIITTO 50.2%, METSÄ BOARD 24.9%, ITOCHU 24.9%	HOLDING METSÄLIITTO 41.8%, 61.5% OF VOTES	HOLDING METSÄLIITTO 100%

RENEWABLE ENERGY 22.3 TWh

Sawmills reported in Metsä Fibre.

renewable energy for its own needs and for society, as well as offering new business opportunities for smaller and industrial partners. The mill will start operating in the third quarter of 2017.

Other investment programmes have also continued as planned. In 2016, Metsä Board's EUR 170 million investment in Husum, Sweden was realised when the new folding boxboard machine began manufacturing food service boards. Metsä Wood launched a EUR 100 million investment programme in Finland and Estonia for Kerto LVL and plywood production. To better utilise the synergies between pulp production and sawmilling, Metsä Wood's sawmills were transferred to Metsä Fibre in an internal transaction.

The debate on the sustainable limits of circular and bioeconomy has increased. We have invited environmental organisations, authorities and decision makers to join Metsä Group's bioeconomy roundtables to discuss topics related to growth and sustainable use of natural resources, as well as biodiversity of forests. The meetings have been constructive and brought different parties together to share their views and learn from each other.

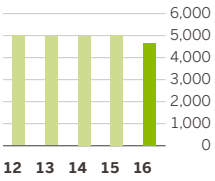
Metsä Group promotes biodiversity in the Northern forests through forest certification as well as voluntary action. The same methods are applied in all of our wood supply areas and we continually create new practices for better nature management. For example, starting from 2016, in cooperation with the forest owners, we will leave high biodiversity stumps as part of our harvesting processes to help promote greater biodiversity. When decaying, these tall stumps will offer favourable habitats for decades for many insects, fungi and birds that build nests in tree stumps. By producing tens of thousands of high stumps in Finnish forests annually, we actively add to the amount of decaying wood to enrich biodiversity.

After an active year we can confidently conclude that sustainability clearly continues to become more meaningful to us as well as to our customers, employees, partners and other stakeholders. Through cooperation, we continue the work of viewing sustainability from a value-creation perspective – as an example, Metsä Group today produces 14% of Finnish renewable energy in addition to bringing alternatives to the use of fossil materials around the world. We are proud to lead the way on that path.

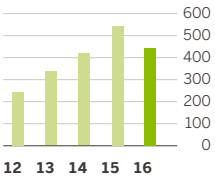
Riikka Joukio
Senior vice president, sustainability and corporate affairs, Metsä Group

WOOD AS A RENEWABLE BUT LIMITED RESOURCE SHOULD BE USED WISELY.

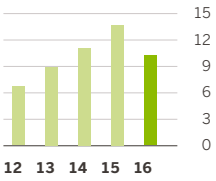
SALES
EUR MILLION



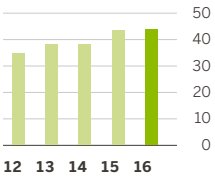
OPERATING RESULT, COMPARABLE
EUR MILLION



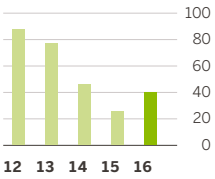
ROCE, COMPARABLE
%



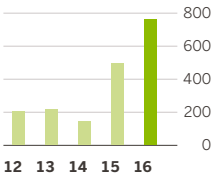
EQUITY RATIO
%



NET GEARING RATIO
%



INVESTMENTS
EUR MILLION



KEY FIGURES	2016	2015	2014	2013	2012
Sales, EUR million	**4,658**	5,016	4,970	4,938	5,001
Operating result, comparable, EUR million	**439**	537	418	343	256
Return on capital employed (ROCE), comparable, %	**10.2**	13.6	11.4	9.1	7.1
Equity ratio, %	**43.9**	43.2	37.9	37.9	34.7
Net gearing ratio, %	**40**	25	46	77	87
Investments, EUR million	**758**	492	143	214	204
Research and development, EUR million	**18**	18	18	18	20

STRATEGY FOR SUSTAINABLE SOLUTIONS

Today, the world talks about sustainable solutions, globalisation and population. These global megatrends create opportunities to which Metsä Group's strategy responds.

The world's population is growing, competition for energy and natural resources is becoming tighter, and resources must be used more efficiently. For Metsä Group, these changes create versatile opportunities as a forerunner in sustainable bioeconomy. Through bioeconomy the world is seeking ways to reduce dependence on fossil resources, prevent the weakening of ecosystems, and facilitate economic development and the creation of new jobs.

Actors in the bioeconomy play an important role in the circular economy, where the manufacture and use of products are designed in a manner that eliminates waste and allows materials to be recycled and retain their value. In both circular economy and bioeconomy, the forest industry's role has been widely recognised. The industry is based on circulations.

VALUE FOR NETWORKS

In Finland, a national bioeconomy strategy has been prepared and is one of the key priorities of the current Government Programme. Metsä Group's strategy supports the programme, as our business is based on renewable wood raw material that is grown, sourced and upgraded responsibly for high value-added products.

The owner-members of the parent company Metsäliitto Cooperative bring continuity and long-term focus to our operations. We source the majority of the wood we use from our Finnish owner-members, and the origin of wood is always known.

We are familiar with the properties of the wood and Metsä Group's business areas make up a strong value network where we utilise wood to its maximum as wood products, pulp, paperboard, tissue, cooking papers or bioenergy and other bioproducts. All of our products are ecological and safe, and they can be recycled or, for example, used to produce energy at the end of their lifecycles.

OPERATIONS WITH COMPETITIVE ADVANTAGE

Metsä Group acts responsibly and our operations, investments and resources are focused on areas where we have a clear competitive advantage. We manufacture products that millions of people throughout the world need and in which renewable raw material, customer focus, innovation and sustainability are combined in a unique way. Our premium products are designed to meet the needs of corporate customers and consumers and to promote the well-being of people and the environment. Our main market is Europe, and we are pursuing growth in Europe, North America and Asia.

As a result of systematic investments, all of the Group's production units are at the forefront of the industry, whether measured by profitability, energy efficiency or environmental performance.

METSÄ GROUP'S MATERIALITY TOPICS

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3	Product safety	p. 24
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6	Bioenergy	p. 48
7	Sustainable supply chain	p. 36, 38
8	Emissions to water and air	p. 44, 46
9	Circular economy	p. 7, 18
10	New bioproducts	p. 16, 18
11	Supporting local livelihoods and society	p. 52
12	Water use	p. 44

These priorities have been defined on a materiality analysis with our business areas and stakeholders.

www.metsagroup.com/CSR

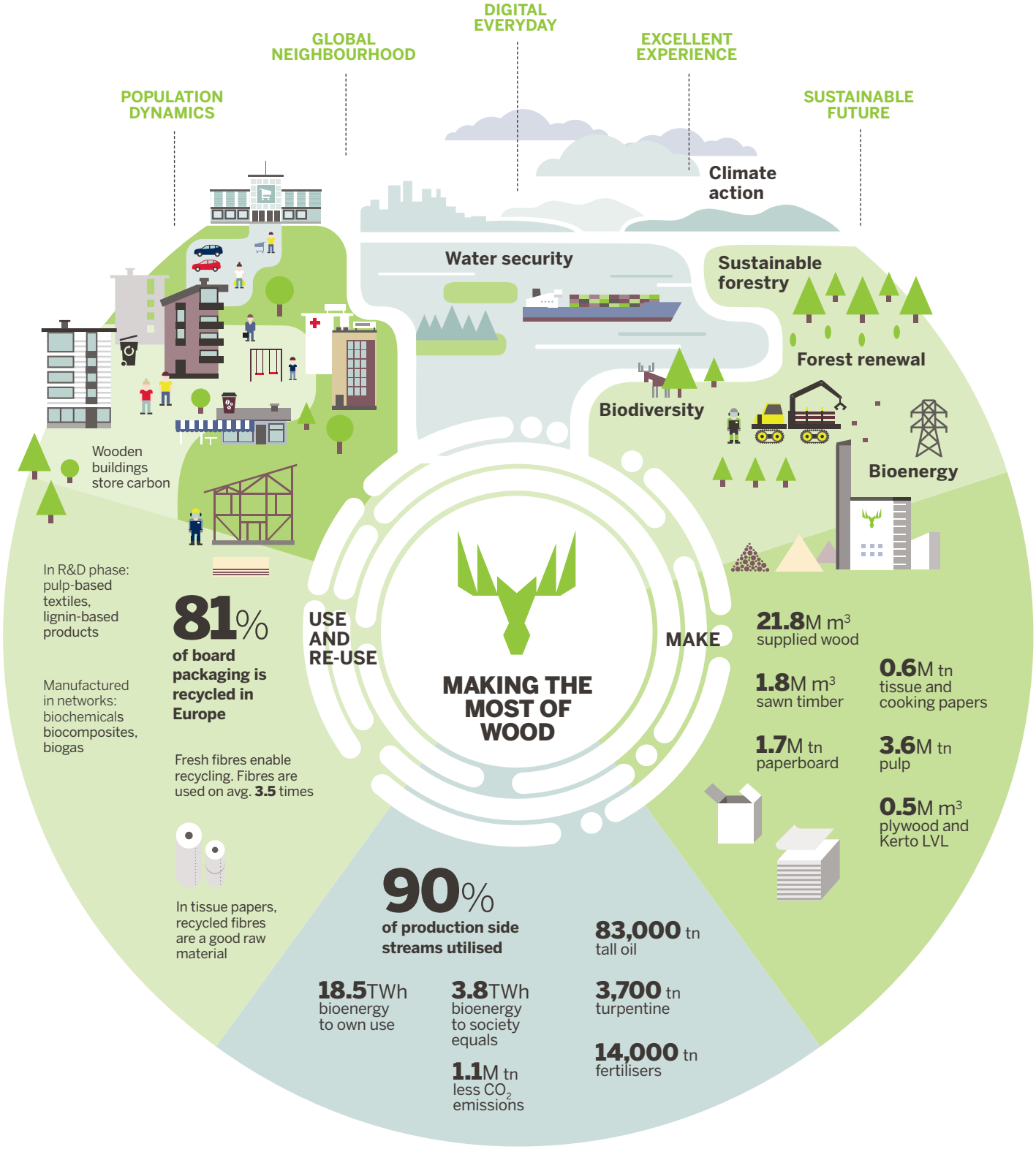
RISKS

The global factors and risks affecting our business are reported in the parallel Financial Statements.

FS p. 8, 54 and www.metsagroup.com/CSR

INDUSTRY BASED ON CIRCULATION

Wood-based products replace the use of fossil resources and are needed in circular economy.



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

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

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

8 DECENT WORK AND ECONOMIC GROWTH

13 CLIMATE ACTION

15 LIFE ON LAND

WOOD

Maintain the share of certified wood:

Target
>80%

Performance 2016
86%

LOGISTICS

Ensure sustainability of main logistics flows 2016–2017:

Target
100%

Status 2016
Evaluation of service providers will be finalised in 2017

THE GLOBAL GOALS For Sustainable Development

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

1 NO POVERTY | 2 ZERO HUNGER | 3 GOOD HEALTH AND WELL-BEING | 4 QUALITY EDUCATION

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

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

WE CREATE WELL-BEING

STAKEHOLDER ENGAGEMENT

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

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

CLIMATE

Fossil CO_2 emissions per product tonne 2009–2020:

Target -30%

Performance 2016 **-35%**

ETHICAL BUSINESS

Coverage of code of conduct training:

Target 100%

Performance 2016 **92%**

ENERGY

Energy efficiency improvement 2009–2020:

Target 10%

Performance 2016 **6%**

SAFETY AT WORK

Lost-time accidents frequency annually (LTA1: 7.4):

Target -10%

Performance 2016 **-22%**

RESOURCE EFFICIENCY

Process water use per product tonne 2010–2020:

Target -17%

Performance 2016 **-13%**

WELL-BEING

Sickness absenteeism:

Target <3%

Performance 2016 **3.9%**

5 GENDER EQUALITY · 6 CLEAN WATER AND SANITATION · 7 AFFORDABLE AND CLEAN ENERGY · 8 DECENT WORK AND ECONOMIC GROWTH · 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE · 10 REDUCED INEQUALITIES · 11 SUSTAINABLE CITIES AND COMMUNITIES · 12 RESPONSIBLE CONSUMPTION AND PRODUCTION · 13 CLIMATE ACTION · 14 LIFE BELOW WATER · 15 LIFE ON LAND · 16 PEACE AND JUSTICE STRONG INSTITUTIONS · 17 PARTNERSHIPS FOR THE GOALS

SAFE AND SOUND ALL DAY ROUND

Resource efficiency, responsible management, well-being and product quality are all in the DNA of Metsä Group. In 24 steps an example of daily operations that run all year-round.

6:00

The morning shift starts with the night shift giving an **update on the mill's performance**. Afterwards the morning shift divides up the tasks.

It's 7:15. A wood truck arrives at the measurement station – a new one arrives approx. every 30 minutes. The station personnel check the **certification chain of custody documents** and give instructions for unloading.

At 8 o'clock managers start the day with a meeting covering production performance, maintenance and customer feedback after which...

...they move on to the next meeting. On the agenda is the planning of the annual maintenance shutdown.

At 10 visiting customers arrive from a forest tour. Before entering the mill, **safety instructions** are discussed and safety equipment handed out.

There's a buzz in the mill canteen: lunch is served!

At noon a group-wide **R&D workshop** starts on product safety.

From 16 to 16:30 production managers have an online meeting **sharing best practices** between mills.

A visitor group from a vocational school is at the mill to see work in practice.

A short queue starts to form at the mill health clinic – voluntary flu injections are given to employees.

14:00

The morning shift is over – the **day shift begins** with a performance update from the morning shift. Tasks for the shift are then divided up.

Production side streams are loaded on a truck. The truck heads to the **on-site bioenergy plant** where the side stream is utilised for energy. Another truck drives to a partner company where our side stream is the main raw material.

At 18 a team from the day shift begins the team development discussion covering targets, safety and well-being at work. The supervisor reminds that also individual discussions will be booked.

A quick look on the intranet: news about the organisation functionality survey, new requirements for working gear and the Group's financial result.

The second 15-minute **coffee break** – in-line with legislation.

Mill figures are monitored. The main variables are CO_2 emissions, and energy and process water use.

22:00

The day shift is over. The night shift goes through the mill's performance update with the day shift. Shift tasks are divided up.

One shift task is cleaning the drying machinery. A junior employee gets **advice and guidance** from a senior employee on the task.

At midnight, on a rotating basis, a worker starts a 2-hour tour of the mill, checking everything is as it should be.

It's 1:15. Steam generation is adjusted according to the needs of the integrated production process.

A shift worker makes entries into the shift diary about the usability, safety and environmental performance of the mill.

Laboratory personnel frequently take **quality samples from every batch** for analysis.

At 4 o'clock an **advance maintenance** report is taken from SAP. According to the plan, the worker heads out to do the required maintenance for the water pumps.

At the warehouse an order is packed to be shipped by road, rail or sea to **customers around the world**.

HOW MUCH CAN BE MADE IN 24 HOURS?

Most of Metsä Group's mills run day and year-round. For example, it takes up to **20 hours for pulp** to be made from chip to dried pulp. When the pulp is further refined, in 4 hours a mill can manufacture some **200,000 kg of paperboard** or **40,000 kg of tissue paper**. Also **370 m³ of Kerto LVL** can be made during one day.

WE OFFER SUSTAINABLE CHOICES

PRODUCTS AND SERVICES

Safe products made from renewable raw materials are in high demand. Our services and business cover the entire value chain for wood and our products are sold in over 100 countries.

"Our competitive advantage lies in a unique value chain, guaranteeing sustainability from wood to tissue. We continuously improve our products and services to be more sustainable. Metsä Tissue is a reliable business partner with in-depth knowledge and extensive experience. Based on trends and consumer needs we offer well-planned marketing activities to individual businesses."

CHRIS ZEILER, senior vice president, tissue, Continental Europe, Metsä Tissue

BREAKDOWN OF SALES

AMERICAS

7%

OUR PAPERBOARDS CAN BE OVER

30%

LIGHTER THAN COMPETING GRADES.

"For the customer our lightweight boards mean more packaging from a tonne of board, lighter to transport and less waste. A key area of interest is sustainable forestry and the fact that Metsä Group is owned by 104,000 forest-owners. This really sets us apart from our competitors in consumer goods and food service markets."

NINA HAPPONEN, vice president, sales, Americas, Metsä Board

"For baking and cooking papers, product safety comes first. To us, safety means traceable raw materials from sustainably managed forests and product certification, and all raw materials must be approved for direct food contact. Naturally, the paper must be high quality and able to withstand high temperatures."

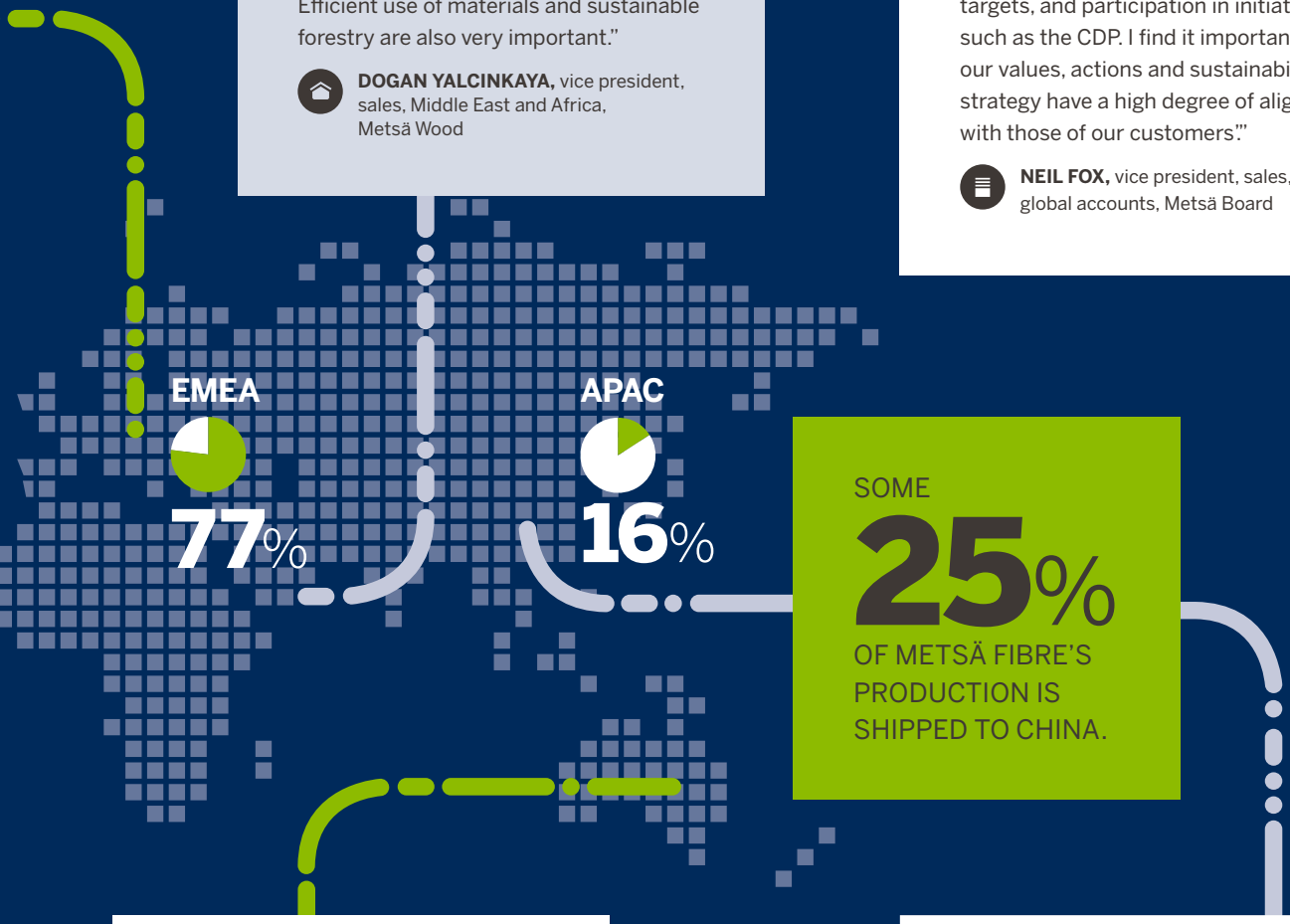
SIMO SCHULZ, vice president, sales, baking & cooking, Metsä Tissue

"Customer-focused services are important in the Middle East. These include ethical business practices and reliability. It is our performance in these areas which explains why our customers in the construction and industrial sectors prefer our sawn timber. Efficient use of materials and sustainable forestry are also very important."

DOGAN YALCINKAYA, vice president, sales, Middle East and Africa, Metsä Wood

"Metsä Board offers a full palette of services to global brand owner customers that includes products, supply chain options, packaging services, and collaborative R&D. It also includes sustainability with comprehensive and transparent reporting, performance targets, and participation in initiatives such as the CDP. I find it important that our values, actions and sustainability strategy have a high degree of alignment with those of our customers'."

NEIL FOX, vice president, sales, global accounts, Metsä Board



SOME **25%** OF METSÄ FIBRE'S PRODUCTION IS SHIPPED TO CHINA.

"Wood construction is growing in Australia. We recently introduced a new, stronger Kerto LVL product to the market which has been well received. Forest certification, sustainability of operations and logistics are of great importance to our customers."

MATTI PAJULA, vice president, sales, Asia, Metsä Wood

"Our established presence in Asia demonstrates our commitment to the market and our customers. Besides pulp quality, customers also rank our technical customer service very highly. In sustainability, the authorities place focus on pollution and customers on certification. Additives, such as optical brighteners, are not favoured."

HARRI VERTANEN, vice president, sales, East and Southeast Asia, Metsä Fibre

GLOBAL BENEFITS

Metsä Group's customers appreciate our high-quality products and services, which we manufacture sustainably.

METSÄ FOREST

METSÄ WOOD

PROFESSIONAL FORESTRY

Veikko Mattila is happy. His forests, 500 kilometres away from where he lives, are taken care of by Metsä Forest with know-how and a can-do attitude. "Metsä Forest's specialist and I share a common view on forest and nature management. **I have been given good professional advice** which has built a solid trust between us", says Mattila.

Mattila and the forest specialist meet twice a year – in Mattila's forest – but the main communication device is Skype and Metsä Forest's web service. Mattila's forest information and forest management plans are stored online. The service allows both to see which part of the forest they are talking about.

All Mattila's forests are certified; most is for commercial use and some forms part of the Metso voluntary biodiversity protection programme.

"All the forest work has been carried out well. There are no signs of damage to terrain and high-quality native seedlings are planted and protective zones left as planned."

This means that Veikko Mattila's forests are managed according to his wishes. The forests grow and provide him with a steady income – an approach that combines economic, ecologic and social benefits.

QUALITY REALIABLY

In Europe and especially in France, the legality of wood is important, says **Marko Terho,** Norsilk's director of wood procurement and sourcing. "Certified timber is one of the main drivers for Norsilk's and Metsä Wood's business together." Equally important are customer service, reliability of deliveries and, of course, good quality products.

"Metsä Wood's reliability is very good. Products arrive as promised, both time and quality-wise. Open communication, skilful personnel at both ends, and keeping promises have built a good relationship that benefits us both. Product development, for example, wouldn't be possible without all of these."

Norsilk delivers and processes sawn timber and plywood for their customers; DIY stores, merchants and for industrial upgrading. "Depending on the customer segment there are small differences between sustainability emphasis. All require **traceability of wood to its origins,** which is why it's important that Metsä Wood always knows the legality of its wood. As northern forests are managed sustainably, we are satisfied that Metsä Wood gets its main raw material from Nordic forests."

METSÄ FIBRE

SUSTAINABILITY A PART OF RELIABILITY

In 2016, Munksjö focused on sustainability. Metsä Fibre was chosen as a partner for this work as they are a reliable supplier of consistent pulps. Munksjö uses the pulps in speciality papers such as decor, release, labels, industrial and interleaving papers. "For these uses we need steady deliveries, high-quality pulp and a reliable supplier, to us sustainability is a part of reliability," says **Romain Baldi,** pulp category manager at Munksjö Group.

The sustainability work with Metsä Fibre has included **Code of Conduct evaluations, benchmarking work safety and the legality and origin of wood**.

"In the autumn we audited Metsä Group's certified forest in Russia. Certification is a necessity for the customer relationship, and there is no better way to increase the understanding of the forest than to visit and discuss the subject on the spot with the sustainable forest management professionals. It helps Munksjö to appreciate long-term work done well, and to understand the broader package of sustainability."

Collaborative innovation work continues to realise this broader sustainability package.

METSÄ BOARD

LIGHT, PURE AND CONSISTENT

Barilla and Metsä Board have a long relationship. Barilla's pasta has been packaged in Metsä Board's paperboards for some 10 years. During this time, the companies have developed a common view on sustainability.

According to **Michele Amigoni**, global packaging director at Barilla, using recyclable packaging for Barilla's products is essential, as are packaging materials that use raw material from sustainably managed forests.

According to Barilla's life cycle calculations for its products, **the environmental impact of paperboard is clearly lower with lightweight paperboards**. Here, Metsä Board supports Barilla with boards that can be over 30% lighter than competing boards. Made from fresh fibre, Metsä Board's pure and strong paperboards are particularly well suited for food packaging. Another plus is Metsä Board's efficient mills and logistics, which help to keep the carbon footprint of paperboards small.

As Barilla's products are sold globally, quality consistency of board is also important in supporting Barilla's global brand identity.

METSÄ TISSUE

COOKING PAPERS SAVE FOOD

Did you know that schools in Finland serve lunch to pupils – for free? Healthy and nutritious lunches guarantee that pupils have the energy to focus on learning throughout the school day.

This doesn't mean cost or sustainability are neglected. On the contrary, the cities providing lunch are constantly looking for more effective and environmentally conscious approaches. This is why Vantti has started to use cooking papers. Planner **Jutta Kontinen** at Vantti, a company providing property services and meals for the city of Vantaa, explains:

"We started using SAGA paper because it reduces the need for washing up, which means less electricity and water are needed. It works better because the food doesn't stick to the dishes and makes washing up easier, which, in turn, supports sustainability."

Cooking papers also save food as there are no leftovers stuck to the bottom of dishes. "This saves money. Usually as much as one portion of food is stuck to dishes when cooking papers are not used. In the school district where some 10,000 portions are made daily, one portion per dish adds up to a significant number."

MORE VALUE IN SYNERGY

The industrial ecosystems of Metsä Group and its partners are unique – even on a global level.

THE ECOSYSTEM CREATES SIGNIFICANT POTENTIAL FOR SMALL AND MIDDLE SIZED ENTERPRISES.

In industrial ecosystems – or symbiosis – companies generate a greater added value than when working alone. In the Äänekoski case in Finland, specifically, the ecosystem enables more added value to be generated per a certain amount of valuable wood raw material used. The benefits also extend to energy efficiency, water consumption and reduced waste.

Developing the industrial ecosystem towards improved competitiveness is a key objective of Metsä Group's bioproduct mill concept. One might say that the bioproduct mill serves as a breeding ground for novel company partnerships, resulting in new bioeconomy and circular economy value networks. The new bioproducts produced by these value networks are well-positioned in terms of the growing demand for material and chemicals made from renewable resources and a growing demand for recycling.

VALUE EXTENDS FAR AND WIDE

Another objective of the bioproduct mill is to avoid generating any waste at all and thus, maximise the resource efficiency of the operations. The ecosystems partners are also key to meeting this objective, as a waste of a company can be a valuable raw material of another. The ecosystem enables the economic, environmental and social dimensions of sustainability to be maximised.

In the current information age, the best new ideas are found by active participation in various networks. The emerging new value chains extend far and wide, all the way from Finland – often via partner companies – to foreign countries in the form of export products. New production processes placed next to the main mill in Äänekoski benefit from the synergies, while some other production processes are more feasible to locate close to the customers of the entire ecosystem.

The default product portfolio of the new bioproduct mill consists of bioproducts that are currently manufactured at pulp mills, i.e. pulp, tall oil and turpentine. In addition to these, the portfolio will widen in 2017 with the production of product gas and sulphuric acid, and biogas by a new partner company. Another partner company will start producing biocomposites at Metsä Fibre's Rauma mill.
p. 18

In Metsä Fibre's R&D pipeline additional concepts and bioproducts move systematically towards maturity. Some examples are lignin-based products and pulp-based textile fibres.
p. 22

POTENTIAL FOR SMALLER ENTERPRISES

The bioproduct mill's business model is based on a diverse partner network, where the development and upgrading of new products is cooperation between different professionals of the value network. The ecosystem is unusually complex, and development of new processes joining the mill brings synergies throughout the system. The ecosystem also benefits municipalities, such as the close cooperation with the city of Äänekoski with regard to the production of district heat.

The ecosystems create significant potential for small and middle sized enterprises; with opportunities to manufacture innovative high-value-added bioproducts.
p. 18

SYNERGIES ALREADY CREATED TODAY

The running mill integrate in Äänekoski, Finland, is a prime example of a vibrant industrial ecosystem. At the same site operates several companies, including Metsä Fibre's mill that supplies pulp to the neighbouring Metsä Board paperboard mill. Metsä Wood is building a peeling line at the site, and the company has a plywood mill less than 10 kilometres away.

The Äänekoski mill area has also CP Kelco, Specialty Minerals, Valio and Äänevoima. Of these CP Kelco manufactures CMC (carboxymethyl cellulose) out of Metsä Fibre's birch pulp. CMC can be used in food, cosmetics and pharmaceuticals as a viscosity modifier or thickener. Specialty Minerals captures carbon dioxide from pulp manufacturing and turns it into PCC (precipitated calcium carbonates). Metsä Board uses the PCC as pigments providing brightness, bulk and smoothness to the paperboard.

The energy generation is handled by Äänevoima which produces heat and electricity for the town and CP Kelco, as well as for Metsä Board's mill. Surplus energy of the integrate is also used at Valio's dairy processing plant.

MORE BIOPRODUCTS

In the near future, Metsä Group will double the amount of pulp production co-products. The bioproduct mill operates with zero fossil CO_2 emissions.

Metsä Group's bioproduct mill in Äänekoski, Finland, is a next-generation pulp mill that symbolises the start of a new era in the forest industry. The co-products of a traditional pulp mill generate a value equal to about 10% of the mill's total annual turnover. The bioproduct mill increases this share to 20%, with further increases expected in the future. This is one way to improve the competitiveness of the mill. In the first phase, in 2017, the product portfolio of the bioproduct mill will expand to include product gas, sulphuric acid and biogas. In due course, this portfolio will be expanded even further.

The first partner plant starting its operation, in the summer of 2017, is EcoEnergy SF, producing biogas. The plant is integrated into the bioproduct mill and will be the first in the world to utilise the sludge generated in pulp production as raw material. Today, sludge is simply combusted without any value creation. The biogas (bio-methane) will be sold as fuel to both road transport and industry. The production capacity is about 20 GWh of biogas per year, which is equal to the annual fuel consumption of roughly 1,800 cars. The biogas can be used to replace fossil fuels.

During 2017, Aqvacomp's biocomposite plant, integrated into Metsä Fibre's pulp mill in Rauma, will become operational. Biocomposites combine pulp fibre and traditional polymers and can be used in the electronics and automobile industries as a substitute for plastics. Biocomposites can also replace the use of rare tree species, for example, in the manufacture of musical instruments or consumer electronics. Aqvacomp is exploring the possibility of building a bigger plant in Äänekoski, once the bioproduct mill is operational.

PRODUCTS FOR THE MILL'S OWN USE

At the same time as the bioproduct mill gets underway the production plants for product gas and sulphuric acid will be started up. These are investments solely by Metsä Fibre and the mill will use the bioproducts. Product gas will be produced from bark using gasification. The product gas is a key factor in making the bioproduct mill fully free of fossil fuels. The renewable product gas will replace some 45,000 m^3 of heavy fuel oil a year.

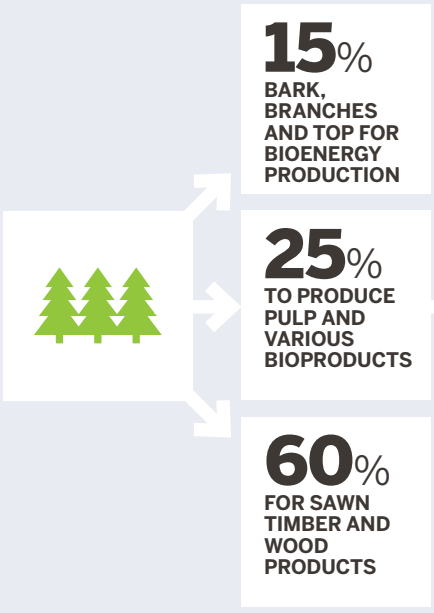
The sulphuric acid plant converts the odorous waste gases from the bioproduct mill into valuable sulphuric acid that can be used as a chemical by the mill. This reduces the need to purchase sulphuric acid from the market. A sulphuric acid plant connected to the pulp production process represents a significant step towards more closed chemical cycles.

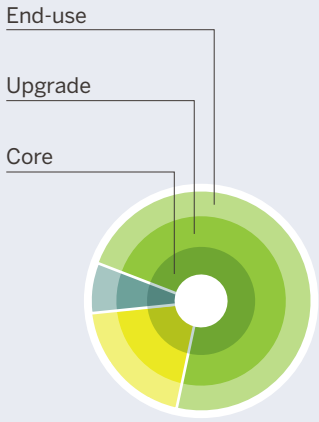
The bioproduct concept will be further developed along several avenues. For example, Metsä Fibre is exploring refining bark into high-value bioenergy products while the research concerning the processing of lignin into new products continues. Textile fibres made from softwood pulp is another central development project. p. 22

TRADITIONAL BIOPRODUCTS

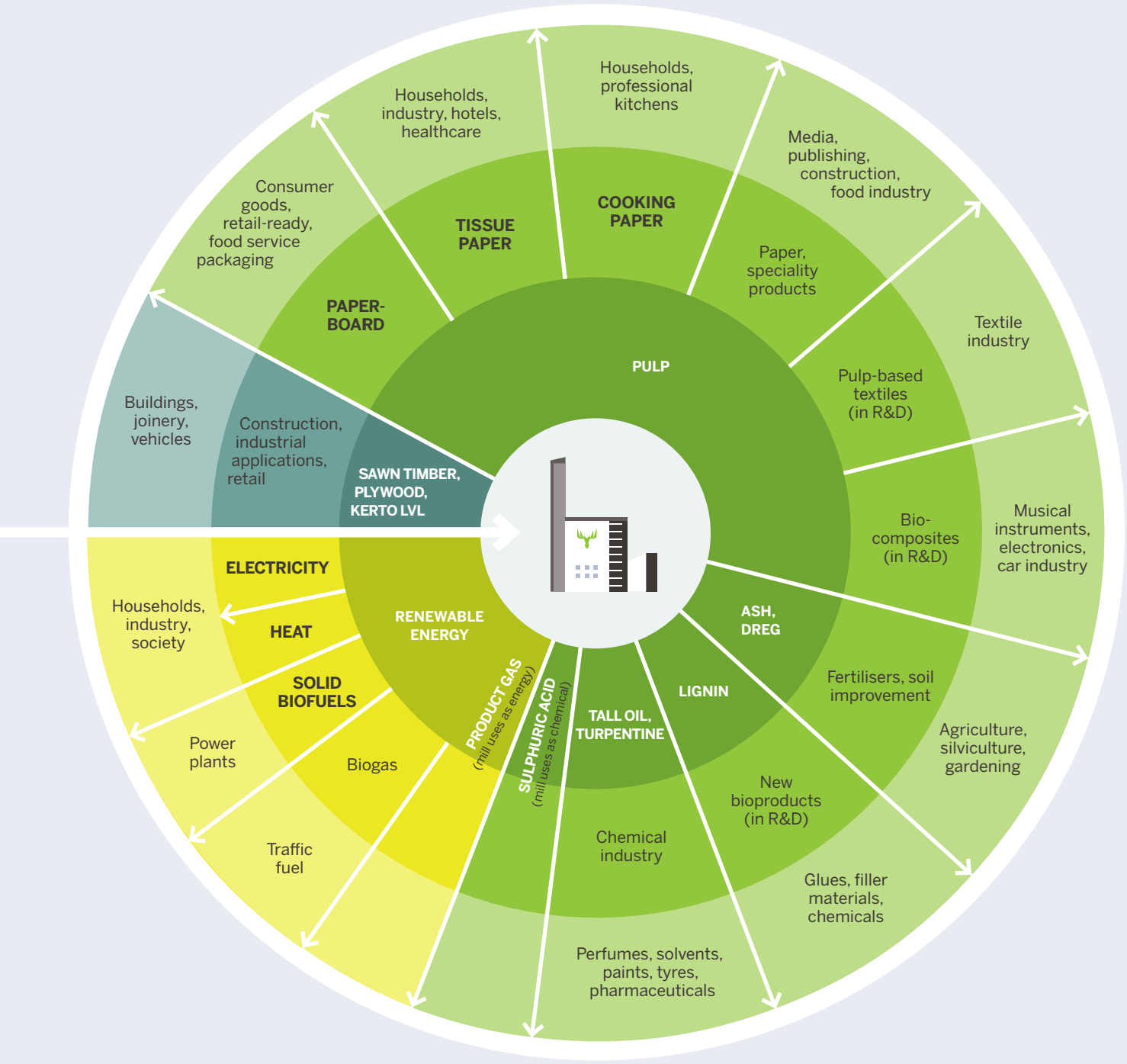
The core of the bioproduct mill concept is made up of bioproducts already produced at pulp mills. These include 1.3 million tonnes of high-quality pulps used in the manufacture of paper, tissue paper and board. The mill will also produce tall oil and turpentine used in paints, glues, inks and perfumes, as well as various bioenergy products.

BIOPRODUCTS MADE IN SYNERGY





XXX = made by Metsä Group
Xxx = made in the ecosystem


Households, professional kitchens
Households, industry, hotels, healthcare
Media, publishing, construction, food industry
Consumer goods, retail-ready, food service packaging
COOKING PAPER
TISSUE PAPER
Paper, speciality products
PAPER-BOARD
Textile industry
PULP
Pulp-based textiles (in R&D)
Buildings, joinery, vehicles
Construction, industrial applications, retail
SAWN TIMBER, PLYWOOD, KERTO LVL
Bio-composites (in R&D)
Musical instruments, electronics, car industry
ELECTRICITY
Households, industry, society
HEAT
RENEWABLE ENERGY
ASH, DREG
SOLID BIOFUELS
PRODUCT GAS (mill uses as energy)
SULPHURIC ACID (mill uses as chemical)
TALL OIL, TURPENTINE
LIGNIN
Fertilisers, soil improvement
Power plants
Biogas
Agriculture, silviculture, gardening
New bioproducts (in R&D)
Traffic fuel
Chemical industry
Glues, filler materials, chemicals
Perfumes, solvents, paints, tyres, pharmaceuticals

FROM TRASH TO TREASURE

Side streams replace primary raw materials in a broad range of applications. Materials previously regarded as waste are converted into added-value products that contribute to the circular economy.

FROM WASTE TO SIDE STREAMS

Compared to 2015, Metsä Group reduced waste by 23% to 499,000 tonnes. The reason for the reduction is the productisation of nearly 100,000 tonnes of side stream materials previously defined as waste supported by the EU Waste Framework Directive and Finnish Waste Act.

Metsä Group seeks new ways to utilise its production side streams and minimise the amount of landfill waste and storing at site. This significantly reduces the environmental effects of the final disposal of waste and saves natural resources. The quality and prices of materials made from side streams are competitive in comparison to primary raw materials.

WOOD BARK FULLY UTILISED

In the past, wet bark and bark that contains gravel from wood yards was often sent to landfill. During 2016, Metsä Group made real progress in reaching full usability of bark. This is considered a big step as all raw wood material coming to Metsä Group's sites needs to be debarked. There are three uses for the bark: as biofuel in bioboilers, in gasification plants and supplying it to produce soil.

The traditional method for producing energy from bark is in a bioboiler. Bark fuels the boiler which generates steam and electricity for our mills and often for the surrounding community. In the ideal situation, the bark is fully utilised as fuel and the resulting ash used as a fertiliser in the forest, or in agriculture.

Gasification of bark is still at a development stage, however, Metsä Group has actively participated in this development and since 2013 has had a bark gasifier running in Joutseno. Another bark gasifier is being built at the bioproduct mill.

OTHER USES FOR BARK

We have worked diligently to improve the quality of our wood yard bark and to find additional suitable uses for the share not suitable for bioenergy use. These bark materials are not suitable for use as fuel but are well suited for soil and growing media. Metsä Group delivers bark materials to several companies in the organic fertiliser and growing media industry in Finland, such as Biolan.

R&D IN SIDE STREAMS WITH BIOLAN

Pekka Kariniemi, Tuomas Pelto-Huikko and products made with Metsä Group's side stream: Garden Black Soil.

Biolan's history and future is based on sustainability and circular economy. "We started 30 years ago, converting chicken manure into fertiliser. Today, we convert annually more than 100,000 m^3 of organic side stream materials into organic bioproducts," says Biolan's owner **Pekka Kariniemi**.

Biolan manufactures growing media and fertilisers, and also plastic products such as composters and dry toilets. Raw materials for its bioproducts come from many sources, including from Metsä Group's pulp, board and sawmills. "During our 20-year relationship, the cooperation with Metsä Group has expanded into R&D looking at new bioproducts manufactured from side streams", says product manager **Tuomas Pelto-Huikko**.

Metsä Group has an important role in providing homogenous raw materials year-round to Biolan. Pelto-Huikko cites as an example, Garden Black Soil, which uses bark as the main raw material.

"Tree bark brings structure to the soil, as does mill sludge, which contains fibre. Fibre adds grain structure that aids air and water retention."

OVER

90%

OF PRODUCTION SIDE STREAMS ARE UTILISED.

FERTILISERS IN THE EU

As part of the Circular Economy package, the EU has started revising the EU Fertiliser Act. Currently fertilisers are not traded on an open internal market, and the focus of the revision is to develop a labelling system with common rules for production and product characteristics. Another high priority topic is the use of secondary raw materials in fertiliser products.

In Finland, Metsä Group is already delivering side stream materials to companies in the fertiliser industry and we are active in research and development in fertiliser production and nutrient recovery from side streams. We have developed the first fertiliser products and see opportunities for new products in the future.

Metsä Group is actively working on the Fertiliser Act revision with the Finnish Forest Industries Federation and the Confederation of European Paper Industries.

WASTE BY SOURCE
%

Process waste	61
Packing, absorbent and filter waste	23
Energy production waste	8
Waste water treatment	3
Municipal waste	3
Other	1
Hazardous waste	0.4

WASTE BY DESTINATION
%

Energy recovery	63
Material recovery	25
Landfill waste	12
Hazardous waste	0.4

MAKING MORE FROM LESS

Metsä Group's R&D&I work focuses on resource efficiency, vast potential of renewable raw materials and value of our products.

Metsä Group has set three focus areas for research, development and innovation work. These are circular economy and resource efficiency which emphasise making more from less, low impact production and zero waste. The second focus area is renewable raw material as a competitive edge that focuses upon reducing carbon footprint, new biobased products for new value chains, and sustainable forest management. Thirdly we seek new ways for adding value to products and services by lightweighting and less energy-intensive structures.

Part of our R&D&I work is staying up-to-date with relevant topics within the industry from process development to forestry and climate research. For example in 2016 we held an internal seminar with the University of Helsinki on global megatrends and carbon balance. FS p. 7

METSÄ FOREST

BETTER FORESTRY WITH DRONES

Digitisation has changed Metsä Forest's operations since the 1990s: digital maps, forest information, GPS all have made forest management easier and more sustainable. With online services it's not always necessary to travel to meet the forest owner – just log online and a wealth of information is available.

The most recent leap was taken in 2015 when the first online wood trade was made. Since this, around 20% of wood trade and over 25% of service contracts have been made through Metsä Forest's online services.

What next? Metsä Forest has set up a pilot scheme with drone helicopters for forest inventory. Using drones increases the amount of information about forests, which in turn **makes forest management planning and ground work more efficient**. Virtual reality can make it possible to construct a digital twin of the forest so that forest issues can be discussed from the comfort of forest-owner's sofa with a virtual reality headset on.

METSÄ WOOD

QUICK RESPONSE TO A CUSTOMER

For the Australian laminated veneer lumber (LVL) market, Metsä Wood needed a **stiffer Kerto product than for Europe, or the US – 15% stiffer**. Reacting to the changed building code, Metsä Wood started a research project testing the effects of adding birch to the product which is typically manufactured with spruce.

Metsä Wood needed to react quickly, and together with their Australian customer, they ensured that the product met the market requirements.

As with all products used in construction, the importance of product liability is significant and a large part of product development consists of testing the product itself, and then its manufacturing process. Products must meet strict regulations verified by a third party. The development of birch Kerto also involved employees from Metsä Forest as obtaining good quality birch logs can be challenging. This cooperation took off quickly and all parties worked flexibly, with production starting successfully at the Lohja mill in Finland. The first products have been delivered to Australia.

METSÄ FIBRE

TEXTILES FROM WOOD

Metsä Fibre is developing new methods for conversion of pulp into textile fibres. First, work to identify new pulp-dissolving ionic liquids was initiated. Then we partnered with research institutes and companies to invest in laboratory-scale production equipment. In 2016, the first concrete item, a scarf, was made to prove that the new concept might actually work. The next step is to further develop the concept in a pilot plant.

This wood-based textile fibre may replace current commercial textile fibres – oil-based, cotton and viscose – as a more environmentally friendly option. For example, cotton production competes with land needed for agriculture and requires a lot of water and pesticides. Further, compared to competing fibres, the production process of new wood-based textile fibres is **potentially more energy-efficient and creates more textile fibres** from the same amount of raw material.

The basis for the new concept was developed in joint research programmes led by CLIC Innovation, where Metsä Fibre holds a leading role.

METSÄ BOARD

NEW BOARDS, NEW BARRIERS

Metsä Board's Husum mill in Sweden has been the centre of attention. First, a new board machine started in February 2016. Second, a polyethylene (PE) extrusion coating line will start during the first half of 2017. Both add to Metsä Board's product portfolio: food service boards with barrier properties against, for instance, moisture and grease.

For both, there has been an extensive programme of test runs and pilots ensuring that the end product fulfils customers' requirements. One part of the work has been product safety, for example evaluating different polymers in extrusion coating.

Now Metsä Board can offer a complete solution. Efficient production with extrusion coating will make it easier to **ensure consistent quality and efficiency of the supply chain**. It also eliminates the need to transport the board to external partners for coating.

Metsä Board isn't resting on its laurels but continuing the development work on other barrier solutions, including biobased materials.

METSÄ TISSUE

SMART FORM FOR BAKING

It took two years from idea to product. But here it is: SAGA Baking Form that partners up baking paper with corrugated board.

This development started with an interest towards reducing the use of baking forms made from, or coated with plastic. Soon it was discovered that collaboration with Metsä Board would bring added benefit: a strong form with the same ease of use one gets when using baking paper. To make the baking form strong, it combines baking paper coated with silicone on one side with a two-wall corrugated board.

An important aspect was confirming the form's product safety as food forms need to stand heat and moisture. This is why **all the layers of the product have been carefully tested in a third-party laboratory against quality and product safety criteria**. The SAGA Baking Form has been launched to the Finnish market with the potential to expand to European markets – where there is demand for products that can replace the use of plastics but aluminum as well.

STRICTLY SAFE

Traceability and approvals of raw materials secure product safety.

Metsä Group's products are made from fresh fibres according to good manufacturing practice and an in-house control plan. The certified ISO 22000 food safety management system ensures that products, such as paperboards, greaseproof cooking and baking papers and their main raw material, pulp, meet the strictest safety requirements. Numerous end use tests of finished products are conducted in both internal and external laboratories.

Extensive work is done to fulfil the requirements of different end uses. Safety is especially fundamental for materials used in contact with food, pharmaceuticals or products used by children. To maintain up-to-date knowledge, Metsä Group has a global product safety network – at mills, product development and headquarters – who systematically follow relevant global product safety concerns, react accordingly and attend training. The followed issues include food contact material regulations in the EU, the USA and the APAC area, chemical regulations such as REACH and biocidal products regulations. This network ensures that Metsä Group has a unified vision of product safety and that new requirements are implemented at the production units. The network attends product safety audits that are conducted both internally and with suppliers and sub-contractors.

NATURALLY PURE

The Northern clean waters and fresh fibres provide a good basis for managing product safety. Before taking any chemicals into use in production, the risks are assessed and safety ensured. The compliance work is done together with chemical manufacturers, and occupational physicians check that chemicals are safe for the workers to handle. Also the environmental managers verify that it's safe for the environment. Safety is also included in manufacturing with high-tech online quality controls and laboratory tests for example on microbiological purity.

Both Metsä Board and Metsä Tissue products fulfil ethical requirements on different continents, and their mills are audited accordingly. We do not use any genetically modified raw materials nor approve of nanotechnology-based substances until more information on their safety becomes available. Also, all Metsä Group's products are manufactured without fluorochemicals.

To meet safety, health and environmental protection requirements within the EU, Metsä Wood's products are CE-marked. The use of formaldehyde is also controlled as it is used in wooden building materials. All Metsä Wood's products fall well below the Class E1 requirement for formaldehyde emissions to indoor air. Plywood and Kerto LVL fulfil the most stringent formaldehyde emission requirements in the world.

RESEARCH SUPPORTS THE USE OF FRESH FIBRES

Use of paper and board in direct food contact is not harmonised at a EU level in the same way as plastics. We support harmonised regulation to simplify the fragmented regulatory framework and reduce both compliance costs and costs to consumers. In 2016, the EU Commission announced plans to have legislation in place for all printed food-contact materials.

Metsä Group promotes the use of fresh fibres for both primary and secondary packaging. A recent study supports the use of paperboard in packing food when compared to plastic. For example, the use of paperboard can significantly reduce the potential of microbial transfer from packaging to fruit, thereby reducing the risk of fruit contamination and increasing shelf-life.

SAFETY ON BOARD

The safety of Metsä Board's boards are monitored from the forest to customer.

RECYCLING

- Paperboards are safe to dispose of, as they contain no harmful ingredients

STORE

- Fresh-fibre paperboards make strong packaging that protects the packed product as it makes its way through the world
- Before the packaging hits the store shelves, its different components have been tested for safety several times by the material manufacturers, converters and food packagers

PACKAGING

- The chosen paperboard has significance: there are grades for example for moist, dry and fatty foods and various temperatures
- The safety of all packaging components is relevant, for example using mineral oil free or low migration printing inks. Also relevant are the hygiene of the converting and packing lines, logistics and storage

FOREST

- Fresh fibres are pure, as they contain no unknown chemical loads, as opposed to recycled materials
- It's all Metsä Group from forest to pulp mill and board mill. This is unique in the industry, and is the reason we know what our boards are made of

MILLS

- Both pulp and board mills have ISO 22000 food-safety certification, the same standard as the food industry
- To avoid any tainting and odour, for example the forklifts at the board mills use liquid gas or electricity
- Finished product is carefully packed in materials designed to avoid contamination during transportation

UNPRINTED BOARD

- The raw material and chemical approval processes are thorough and based on global legislation
- An example of the depth of analysis is measuring mineral oils: it equals searching for a tablespoon of sugar spread over a football field – the area a 2 tonne paperboard reel covers
- Metsä Board uses 120 kg of chocolate a year in taint neutrality testing. Chocolate is a sensitive indicator

RELIABLE SERVICES

We provide customer focused services and solutions that enhance sustainability. For Metsä Group, service is about availability, know-how and transparency.

METSÄ FOREST

METSÄ WOOD

TRANSPARENT INFORMATION

Metsä Group has third-party environmental certification and our products have environmental labels. They help our customers to make sustainable choices. We also prepare the following environmental product calculations:

- Life cycle assessment (LCA): Environmental impact of products, from procuring raw materials to delivering products to customers
- Environmental product declaration (EPD): Life cycle assessment in accordance with the ISO 14025 standard
- Carbon footprint: Product-specific life cycle calculations including the effect on climate warming
- Paper profile: Environmental performance of products and product composition
- Environmental labels: For example the EU Ecolabel and the Nordic Ecolabel
- Supplier Ethical Data Exchange (SEDEX): 15 mills have registered ethical supply chain data

ON CALL FOR FOREST OWNERS

To be able to offer easy-access services to Metsäliitto Cooperative's owner-members, Metsä Forest has a wide range of service channels. There are over 100 offices around Finland and over 300 dedicated forestry experts. The newest channels to contact Metsä Forest are through Facebook, Twitter and webpage chat. There is also a phone service centre with extensive opening hours. **This ensures that Metsä Forest can be reached at a time that best suits the forest owner.** The service centre team also answers questions via social media and updates feeds with info and tips.

According to feedback, the wider service hours and choice of channels are clearly welcomed, for example, the number of chat sessions has quadrupled in a year.

TRACK & TRACE WOOD PRODUCTS

Metsä Wood offers online services to bring added value to customers. The newest addition to metsawood.online is Track & Trace where customers can follow their orders 24/7 during both manufacturing and delivery.

For customers the ability to follow their orders creates transparency. It also brings flexibility to the relationship and improves reliability with order follow-up. Before tracking, production often required many phone calls between the customer, Metsä Wood sales and the mills. Now, with metsawood.online, the deliveries can be followed step by step from the mill, all the way to the customer.

For many customers, it is critically important to know the precise arrival time of their delivery because it helps them plan their own work.

METSÄ FIBRE

METSÄ DAY – SHARING EXPERTISE

Metsä Fibre has reconfigured its customer visit programmes to Finland's forests into a Metsä Day. The day gives visitors, from all over the world, a unique opportunity to get to know the forest – an unfamiliar environment for many. On forest excursions customers see tree stands at various stages of growth, including visiting seedling nurseries or exploring the use of digital devices in tree harvesting. Besides explaining the growth of wood reserves, we also draw attention to **biodiversity and to the public right to roam in forests that is uniquely recognised in Finland**.

Besides gaining a better understanding of forests, visitors can also choose to learn about other areas such as technical services, innovation work and logistics.

The day is Metsä Fibre's way of sharing expertise that brings benefits to customers' organisations.

METSÄ BOARD

AWARD-WINNING PACKAGING

Metsä Board offers innovative packaging design services with a golden track record including several awards in global packaging design competitions and patented construction designs, for example for the elevated drink box.

To achieve these, the packaging services team works their magic on every aspect of the packaging, including visuals, structure, branding and overall efficiency of the manufacturing process – not forgetting sustainability. For example, using Metsä Board's paperboards can give benefits of reduced weight or packaging without glue. The awards show that Metsä Board is able to help customers **enhance their brand value by delivering sustainable, secure and innovative packaging solutions**.

The service is offered globally to Metsä Board's key customers, ensuring the same design can be adjusted easily to suit different markets.

METSÄ TISSUE

CONSUMPTION KNOW-HOW

Customer insight is power. Metsä Tissue's Katrin team helps cleaning, facility and maintenance companies to optimise the capacity of refillable tissue paper dispensers. For example we can **estimate and calculate the usage as well as recommend the most optimal products when we know the type of the premises**.

For instance in hospitals, paper towels need to be easily accessed to increase hygiene, and in luxury hotels, soft, white paper towels are a necessity. After all, washing hands with soap and drying them with paper towels is the best way to prevent the spread of disease.

Metsä Tissue offers training on maintenance efficiency to buyers, regional managers and merchants. The training can include topics such as logistics, environmental efficiency and recyclability, hygiene or product usability.

WE BRING THE FOREST TO YOU

RAW MATERIALS AND SUPPLY CHAIN

Wood, Metsä Group's main raw material, comes from northern forests where their growth exceeds use. Enhancing sustainability in the value chain applies to all materials and services used.

WOOD

Maintain the share of certified wood:

Target
>80%

Performance 2016
86%

COMMENT

Achieved. We promote forest certification in areas where we operate and continue our work for increasing the share.

LOGISTICS

Ensure sustainability of the main logistics flows:

Target
100%

Status 2016
Evaluation of service providers will be finalised in 2017

COMMENT

On track. The important work for mapping and improving sustainability in the supply chain continues.

100% TRACEABLE

Wood from certified forests (PEFC™ or FSC®)
The forest owner is committed to the requirements of forest certification. Forest management audit is conducted by an external auditor
(Licence code: FSC-C014476)

Controlled wood from non-certified forests
The wood supply company ensures the forest area meets the criteria of controlled origin. The wood supply practices and areas are controlled by external chain of custody auditor

Customer
Can use the forest certification logo and apply for ecolabels requiring specific certifications. Certification is also an additional proof of legality of origin in timber regulations

CERTIFICATION IS AN OPPORTUNITY FOR THE CUSTOMER TO PROMOTE SUSTAINABILITY.

Origin of wood is identified by maps, logging permits and information systems. Checks ensure the site meets the logging permit

Wood supplier, contractor and logging site audits made on-site to check for example good forestry, safety at work, and biodiversity

Legally binding contracts define safety at work, origin of wood, biodiversity and regeneration of forest

Verification programmes for non-certified wood in Russia and globally where there are risks related to origin

Wood and sawmill chips from Finland, Russia, Sweden and the Baltics

Sale documentation includes invoices, transport documents and forwarding information about the share of certified and controlled wood using certification claims

Sawmill, plywood and Kerto LVL mill
Receives the wood, calculates the share of certified wood, sells the timber indicating the certification share

Certification share is calculated based on physical separation, calculations on percentage, or credit accounting

Board and paper mill
Receives the pulp, calculates the certification share of the finished product, sells it indicating the certification share to customer

Pulp mill
Receives the wood, calculates the share of certified wood, sells the pulp indicating the certification share

CERTIFIED AND CONTROLLED WOOD SUPPLY

- Certified forests: origin and certification status forwarded with Forest Management Certificate claim
- Controlled forests: origin forwarded with Chain of Custody and Controlled Wood certificate claims. The claims allow the wood to be mixed with certified wood

CHAIN OF CUSTODY CERTIFIED PRODUCTION CHAIN

- The mill holds a Chain of Custody certificate and maintains the certification status
- The certification share is calculated based on wood certification claims
- Sale documentation includes the certification claim, allowing the customer buying the product to accept it as certified

CUSTOMER AND PRODUCTION

- The mill holds a Chain of Custody certificate maintaining the certification status purchased with certification claims
- The mill calculates production's certification share based on incoming certification claims

VERSATILE NORTHERN FORESTS

Forests provide wood raw material – but also recreation, wild berries, mushrooms and game.

In Finland, a large share of the wood originates from family-owned forests belonging to Metsäliitto Cooperative's 104,000 owner-members. The forest owners are provided with services that help enhance the value of their forest assets and ensure future growth of forests. Metsä Group also puts considerable effort into the development of forest-owner services, such as increasingly important electronic services. p. 14, 26

We take care of our future forest growth together. For example, Metsä Group delivers seedlings to forest owners for regeneration; during the past couple of years this has amounted to 30 million seedlings annually.

STATISTICS FROM THE 1920S

The Finnish National Forest Inventory (NFI) produces a time series on the status of Finnish forests. Extensive information is gathered in inventories, which date back to the 1920s, providing a unique opportunity to monitor the changes in forests over the last 100 years.

Since the 1970s, the growth of Finnish forests has annually exceeded the total removal by an average of 25%. This supports expert evaluation that the total annual felling of softwood pulpwood can increase sustainably by 7 million m^3 – the bioproduct mill will increase the annual consumption of pulpwood in Finland by approx. 4 million m^3.

The data also provides information on biodiversity: the share of tree species has remained unchanged since the 1920s with a remarkable increase in growing stock. The volume of decayed wood has exceeded recorded volumes for the first time.

FORESTS OWNED BY FAMILIES

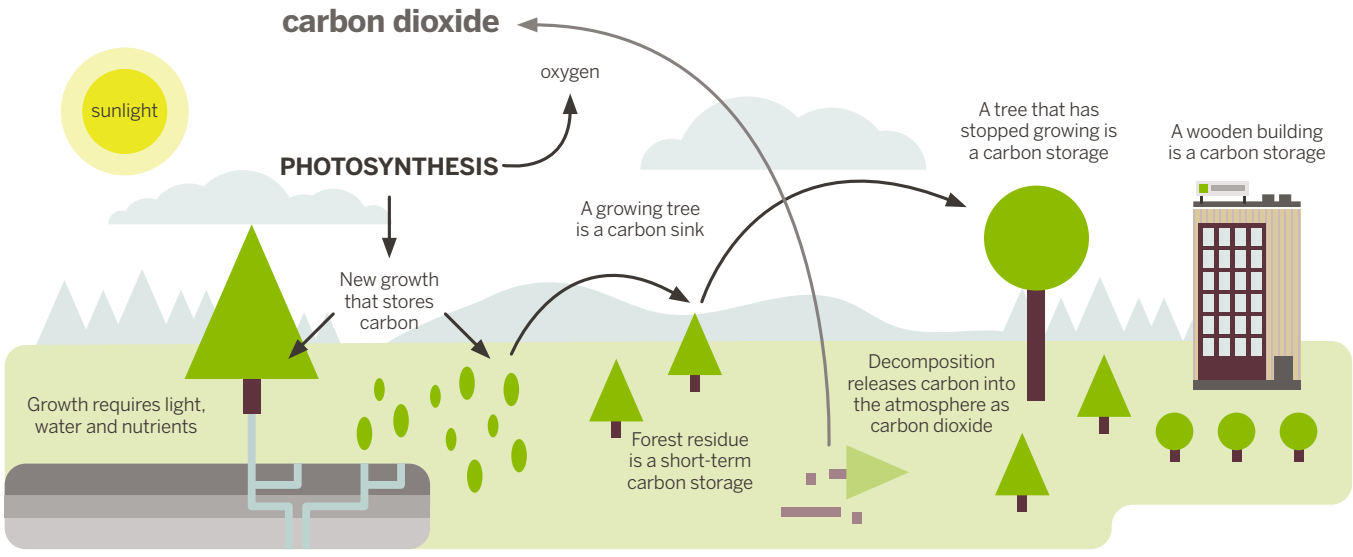
One characteristic of family forestry is that the forests are often inherited. The forests are managed and used responsibly ensuring each generation receives its fair share of forest income as well as other benefits the forests provide. Forestry plays a significant regional role, not only for income from wood sales but in offering vital harvesting and transport work opportunities.

Although we use the term commercial forests to describe wood-supply forests, a better term could be multiple-use forests as this reflects also their recreational use such as for collecting wild berries and mushrooms.

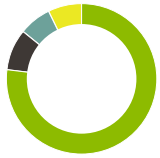
Since the forests are grown almost chemically free, as much as 97–99% of Finland's forests could obtain organic production certification without modifying current forest management practices. Currently, more than 12 million forest ha of the 23 million total in Finland are certified as organic.

FORESTS IN THE CARBON CYCLE

The ecosystem services for forests include wood production, maintenance of hydrological systems and soil quality. In the carbon cycle forests act as carbon sinks while growing but are sources of CO_2 when wood is burnt. Timber products lock about a tonne of CO_2 per 1 m^3 of wood.

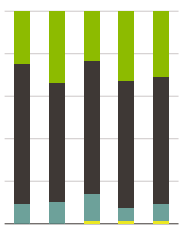


WOOD SUPPLIES
BY COUNTRY, %



Finland 77
Baltic countries 9
Russia 7
Sweden 7

NATURE MANAGEMENT IN HARVESTING
METSÄ GROUP IN FINLAND, %



Excellent
Good
Fair
Poor

LOGGING SITE AUDITS
RUSSIA AND BALTICS, %

Good
Fair
Poor

BOOSTING FOREST GROWTH IN RUSSIA

Metsä Group constantly develops forestry practices in Finland and also in the company's leased forests in Podporozhye, Russia. In 2015, we introduced mounding, a soil preparation method that benefits the growth of seedlings. After successful testing, it came into wide-spread use in 2016. The advantages are obvious: planting is easier and growth is rapid with less brushwood and reduced costs. Nutrient runoff into waterways is also lowered and roots remain better intact. Mounding is expected to help control the vigorous spread of aspen, a problematic issue in Russian forestry.

We cooperate with a research institute and authorities to develop Russian forestry practices, new forestry standards and introducing a more effective method in the precommercial thinning of young stands.

RELIABLE TOOL – CERTIFICATION

Metsä Group supports forest certification, the most reliable tool to ensure and communicate the sustainable and traceable origin of wood.

86%
OF THE WOOD METSÄ GROUP SUPPLIES COMES FROM CERTIFIED FORESTS.

Forest certification is a comprehensive tool that covers sustainability from safety at work to nature values. It secures future growth of forests, and is a good way to measure the sustainability of wood. Studies confirm that for example PEFC certification has had a positive impact on biodiversity of forests. During its 15 years of use in Finland, PEFC has also increased coherence in forestry employers' responsibilities. For these reasons we have set a target to maintain the share of certified wood in operations above 80%. In 2016, 86% (84; 84) of the wood supplied by Metsä Group was PEFC™ (Programme for the Endorsement of Forest Certification) and/or FSC® (Forest Stewardship Council®; Licence Code FSC-C014476) certified.

GROUP CERTIFICATION ADVANCES AVAILABILITY

In Finland, Metsä Group's main country of wood supply, the share of PEFC certified forests is currently around 75% (16.5 million ha), representing some 85% of forests in commercial use. The share of forest estates belonging to forest certification diminished in 2015–2016 due to a new model in national-level group certification. FSC certification continues to grow in Finland, now covering some 6% (1.2 million ha) of Finnish forests. Forests certified by FSC are mostly double-certified, both by PEFC and FSC. In 2016 some 1,300 forest owners joined PEFC forest certification. The area covered by Metsä Group's FSC Forest Management group certificate in Finland continued to grow and currently stands at 150,000 ha.

In 2016, shares of Metsä-Botnia Metsät Oy were sold and forest ownership in Metsä Group companies diminished to a few small estates. Metsä Group's PEFC certification group for forest owners was merged into the Association of Sustainable Forestry's certificate.

Metsä Group's leased forest areas in Russia have been certified by both PEFC and FSC. In 2016, Metsä Group established a PEFC certification group. The FSC certification group, established in 2015, grew by one member.

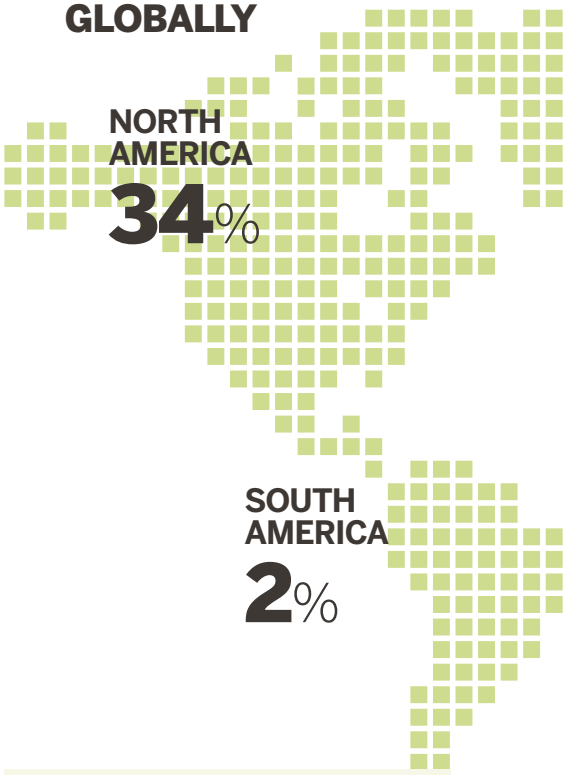
CHANGES IN CERTIFICATION

While further development of forest certification has been welcomed for FSC, the changes have caused concerns, particularly regarding the implementation of new requirements within the given time frame. Working groups worldwide are producing obligatory updates to national FSC Forest Management standards as well as creating FSC Risk Assessments and finding agreeable solutions for stakeholders. Simultaneously, certificate holders and certification bodies are under pressure to meet the requirements of the updated FSC Controlled Wood standard and have the audit completed by July 2017. The updated FSC Chain of Custody standard is also expected to be published at the beginning of 2017.

PEFC is updating its international standards, including its Forest Management and Chain of Custody requirements. The revision process began in 2016 and is scheduled to finish in 2017.

METSÄ GROUP IS ACTIVE IN FOREST CERTIFICATION WORKING GROUPS.

DEGREE OF FOREST CERTIFICATION GLOBALLY

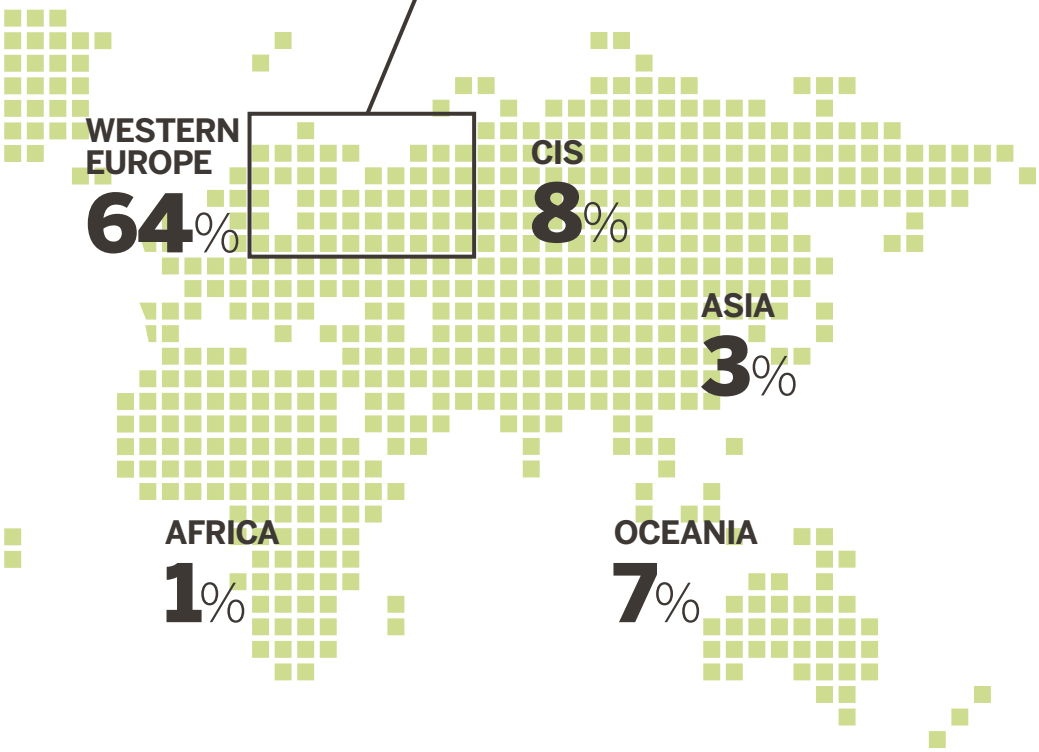


"My forests are included in Metsä Group's PEFC certificate. I have received recommendations on how to manage important forest habitats during harvesting in accordance with the certification scheme. For me, **forest certification is a mandatory business card needed in global markets**."

JUHANI REPO, forest owner, Simo, Northern Finland

DEGREE OF FOREST CERTIFICATION IN METSÄ GROUP'S WOOD SUPPLY AREA

SWEDEN 60%	FINLAND 75%	RUSSIA 5%
ESTONIA 60%	LATVIA 55%	LITHUANIA 50%



PEFC OR FSC – WHAT'S THE DIFFERENCE?

Metsä Group uses both PEFC and FSC certification to promote sustainable forest management. Availability of FSC certified wood in the Group's wood supply area is limited as Finnish forest owners traditionally rely on a local scheme under PEFC. Small forest owners usually prefer PEFC while FSC is mainly used by companies owning forests.

Both schemes create their standards in multi-stakeholder processes. PEFC standards usually target the protection based on existing nature values, while FSC standards generally set a minimum share of 5–10% for forest protection.

FSC may be a more familiar brand to the general public because of its use worldwide, whereas PEFC allows its member organisations to use their own brands (e.g. American SFI) and so might not be so widely recognised.

Having worked with both schemes, Metsä Group recognises that each ensures sustainable forest management. This view is supported by expert assessments evaluating sustainability criteria for public procurement policies. PEFC and FSC face a big task in enlarging their share of the world's certified forest area, which currently reaches only around 10% of the world's forests.

"DT Group supports sustainable forestry through all purchases of timber and is why we prefer certification. It guarantees the timber comes from **legal sources harvested in compliance with the legislation of country of origin**. We also increase consumer understanding of the contents of the certifications."

JOERGEN HOLMGAARD, group vice president, group sourcing, DT Group, Denmark

"For Sothys, nature is the source of inspiration behind our cosmetics products. For example, our gardens offer such a remarkable biodiversity that it is classified as a Natura 2000 European ecological site. **To support biodiversity, we also require that the paperboards we use in our packaging come from certified forests**."

STÉPHANIE DU CHAXEL, international marketing director, Sothys, France

"Coop Nordic requires investments in the traceability of products and transparency of production chains. We source private label products for 11 million consumers. **Through products with Nordic Swan Ecolabel, that require certified pulp, we show that our tissue papers fulfil the same sustainability standards as other consumer goods.**"

MICHAEL BJUNES, category manager, Coop Trading, Denmark

BIODIVERSITY ENSURED EVERYDAY

Measures to ensure forest biodiversity can be divided into two groups – establishment of protection areas, and nature management in forestry operations. Each has its important role that supports the other.

Protection areas are usually established by state or other large forest owners. In Finland, almost 90% of protected forests are owned by the state. In total there are 2.7 million ha of protected forests in Finland, i.e. 12% of the forest area is classified as productive and poorly productive land. This area, almost the size of Belgium, consists primarily of statutory forest protection areas where forestry activities are forbidden.

The Forest Biodiversity Programme METSO introduced a voluntary-based approach to the protection of forests in 2008. It introduced a scheme where authorities and forest owners agreed on voluntary conservation, fully compensated by the state. The programme achieved broad support in the forest industry among environmental organisations and forest owners. Metsä Group, along with other forest industry companies and stakeholders have appealed for continued METSO funding.

NATURE MANAGEMENT IN A KEY ROLE

Nature management in forestry includes several measures to maintain and increase nature values in ordinary forests alongside wood production. Nature management is a part of every measure in forestry, including retention of trees, leaving a mixture of broadleaved trees in the thinning of a young stand, buffer zones to safeguard cleanliness of watercourses and protecting key habitats for forest-dwelling endangered species. The importance of nature management measures, such as leaving retention trees, has now been recognised in scientific research.

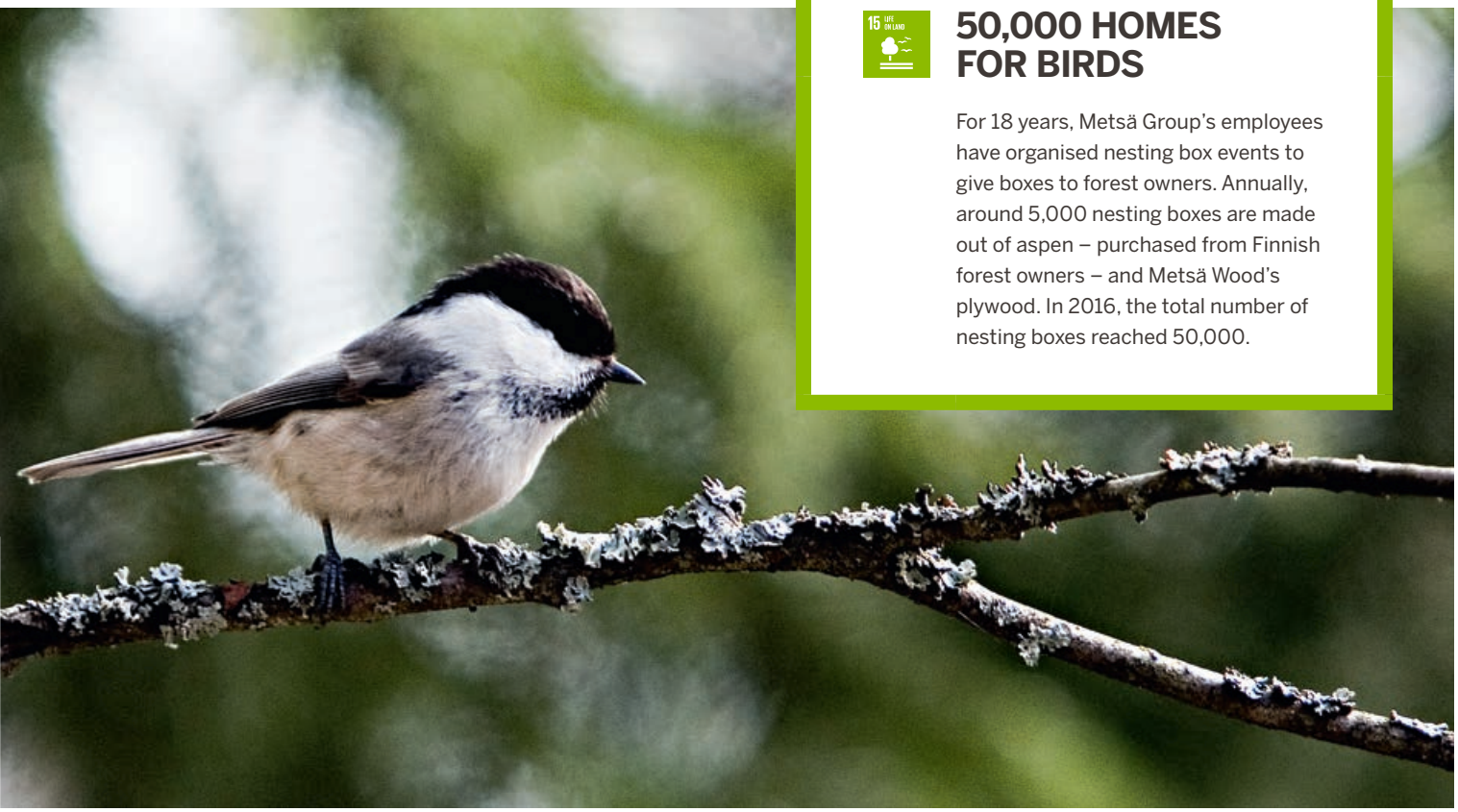
Additionally, there are active nature management measures imitating natural processes in order to safeguard biodiversity. For example, due to the small size and rarity of forest fires in Finland, controlled burning has become essential for endangered species dependent upon burnt wood.

To further develop environmental performance, Metsä Group and other forest industry companies launched a Forest Environment Programme 2016–2020, led by Finnish Forest Industry Federation, consisting of research and development projects.

EDUCATION ON NATURE AND FORESTRY MANAGEMENT

Metsä Group has identified the most important factors in minimising the environmental impacts of forestry. In 2016, the targets set for these factors were largely met, with some shortages in leaving retention trees in Finland and meeting the target share of certified wood in Latvia. Nature management is a basic skill for everybody working in the forest, and one of the targets is to keep employees up-to-date on this. In 2016, around 50 of Metsä Group's forestry specialists took part in a Nature Management Card course and passed the exams that included questions on species, habitats, water conservation and landscape.

www.metsagroup.com/CSR



50,000 HOMES FOR BIRDS

For 18 years, Metsä Group's employees have organised nesting box events to give boxes to forest owners. Annually, around 5,000 nesting boxes are made out of aspen – purchased from Finnish forest owners – and Metsä Wood's plywood. In 2016, the total number of nesting boxes reached 50,000.

CONTROLLED BURNING WITH WWF FINLAND

Since 2011, Metsä Group and WWF Finland have worked together to increase forest biodiversity, for example, with training on managing valuable habitats and, in 2016, accepting the Forest Challenge. We have also controllably burned forests in Northern Finland. In 2016, a field trip was made to a burned site to monitor the species development. In four years, various kinds of fungi and robustly-growing trees have found their way into the area demonstrating the effectiveness of controlled burning.

BIODIVERSITY INNOVATION – HIGH STUMPS

Every hectare of forest that Metsä Group harvests in Finland could include two high biodiversity stumps. The voluntary practice has been offered to forest-owners since October 2016 in connection with wood sales to Metsä Group. As the high stumps gradually decay, they provide a home to different species, from fungi to birds.

SUSTAINABLE PURCHASES

Transparency and responsibility of our entire value network is of rising interest. Metsä Group sources from over 20,000 active suppliers.

Metsä Group Purchasing is a cross-organisational entity. Procuring wood, Metsä Group's main raw material, is the core business of Metsä Forest and excluded from the scope of the Group purchasing organisation. Metsä Group purchasing sources everything else, from pulp to process chemicals and services.

Metsä Group spends over EUR 2 billion annually on external purchases. The majority of our purchases are from Europe 98% (97; 97) with 85% (86; 87) from countries where we have production sites.

Our target is to use local suppliers if possible. From over 20,000 active supplier relationships, less than 200 are defined as key vendors. Key vendors bring significant value to our business and make up 44% of our total spend on external purchases.

STANDARDS FOR SOURCING

Because our purchasing has such wide impacts, Metsä Group identifies and addresses these impacts in the value network. Metsä Group's Code of Conduct for Suppliers provides common ethical guidance, which we expect all our suppliers to commit to. This Code of Conduct is based upon internationally recognised guidelines such as the United Nations Global Compact and the International Labour Organization (ILO) Conventions.

Our aim is to ensure that we work with suppliers that are committed to sustainability and safe working practices. In addition, we expect all suppliers to have high standards of business ethics and integrity. Our Code of Conduct for Suppliers prohibits the use of forced, or child labour, emphasises the respect for human rights as well as actions against corruption and bribery. Our Supplier Code of Conduct was included in 515 new or renewed supplier contracts made during 2016. By the end of 2016, 81% of our total spend was covered by the Metsä Group Code of Conduct for Suppliers. We continued performing audits based on category plans; sustainability criteria were included in 88 supplier audits (54; 59).

In 2016, Metsä Group set a new target for ensuring the sustainability of the main logistics flows. p. 38

SYSTEMS AND TOOLS FOR PURCHASING MANAGEMENT

For the management of purchasing and logistics, Metsä Group in 2016 started developing a joint steering and management system. The system gives Metsä Group an up-to-date view of vendor relationship status and ongoing activities from both economic and quality perspectives.

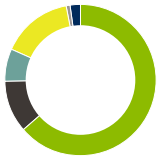
A tool has been developed that helps us determine the sustainability performance of our key suppliers, with the aim of ensuring that the Supplier Code of Conduct is followed. Sustainability was examined from different perspectives such as commitment to general sustainability principles, environmental responsibility and ethical working conditions. This tool is being further developed, and production related service providers will also be evaluated during 2017.

The United Kingdom has enacted the Modern Slavery Act 2015 which is aimed at eliminating modern slavery and human trafficking from supply chains. Metsä Group is revising its processes against the UK Modern Slavery Act and preparing a statement as required, by the end June 2017.

COMPOSITION OF PURCHASES
% OF MATERIAL AND SERVICE PURCHASES

Wood	24
In-direct materials and services	26
Pulp and recovered paper	16
Logistics	14
Chemicals, pigments, binders and coatings	7
Other (incl. packaging)	8
Energy	5

EXTERNAL PURCHASES BY COUNTRY [1)]
%

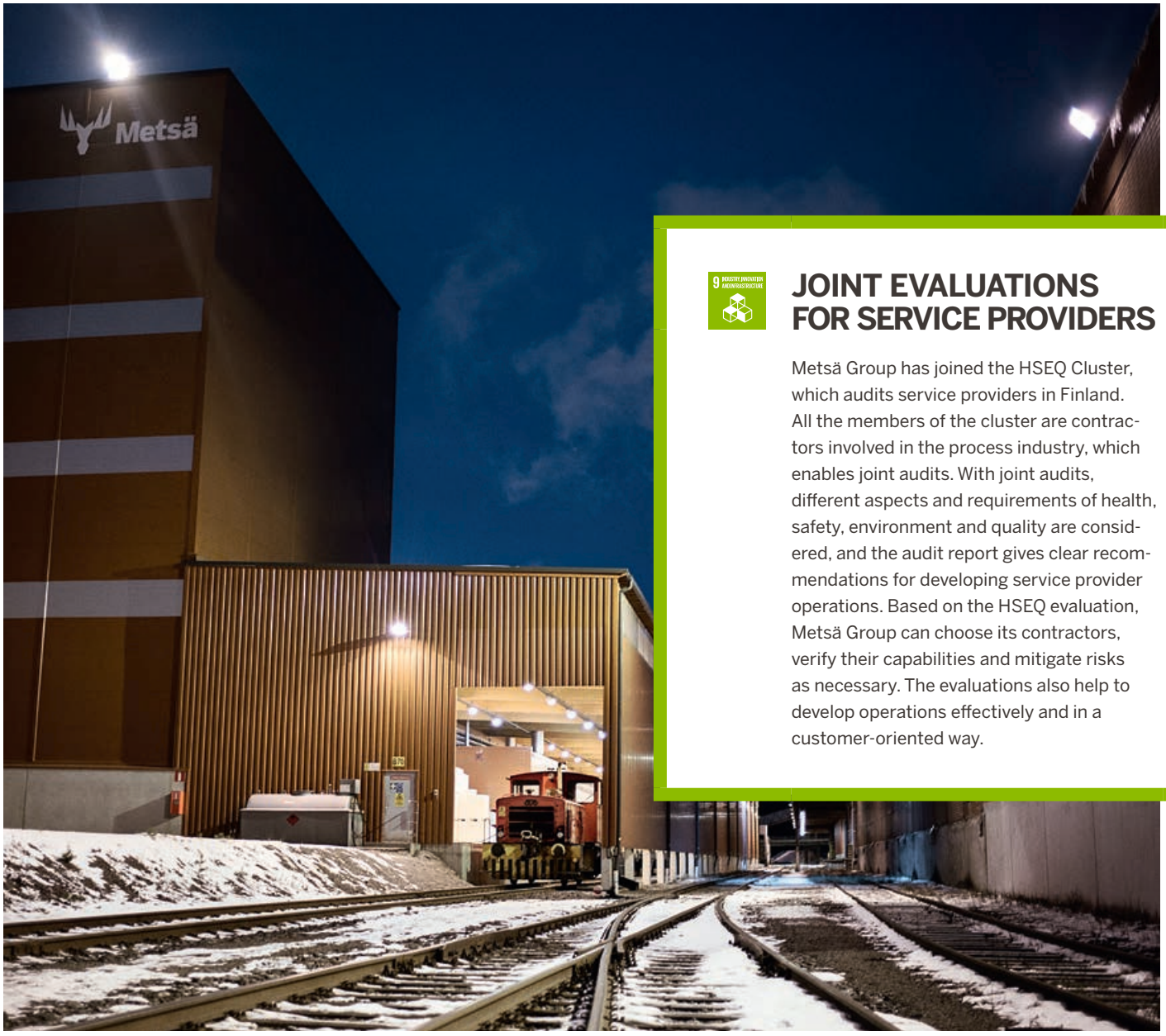


Finland	63
Sweden	11
Germany	7
Other EU countries	15
Other European countries	1
Outside Europe	2

1) Wood procurement excluded

98%
OF OUR PURCHASES ORIGINATE FROM EUROPE AND

85%
ARE FROM OPERATION COUNTRIES.



JOINT EVALUATIONS FOR SERVICE PROVIDERS

Metsä Group has joined the HSEQ Cluster, which audits service providers in Finland. All the members of the cluster are contractors involved in the process industry, which enables joint audits. With joint audits, different aspects and requirements of health, safety, environment and quality are considered, and the audit report gives clear recommendations for developing service provider operations. Based on the HSEQ evaluation, Metsä Group can choose its contractors, verify their capabilities and mitigate risks as necessary. The evaluations also help to develop operations effectively and in a customer-oriented way.

METSÄ GROUP'S PURCHASING CATEGORIES

DIRECT MATERIALS (EXCL. WOOD)	
PULP	Hardwood, softwood, high-yield pulp for the production of tissue and cooking papers and paperboards
RECOVERED PAPER	Mixed office waste and other higher grades, recycled newsprint or corrugated containerboard used in tissue
BASIC CHEMICALS	Chemicals for pulp manufacturing
PROCESS CHEMICALS	Chemicals for board, tissue and cooking paper manufacturing
PIGMENTS	Pigments as fillers and coating pigments used in board manufacturing
BINDERS AND COATINGS	Binders (starches and latexes) are used for the retention of pigments, mainly in coating recipes
PACKAGING MATERIALS	PE film and hoods, shrink and stretch film, fibre-based boxes and packaging, pallets and bale wire
INDIRECT MATERIALS AND SERVICES	Energy, Logistics, ICT, Communications, Human Resources, Production Consumables, Maintenance, Repair and Operation, Administrative Services, Mill related support services and Investments

GLOBAL LOGISTICS

Logistics from forest to mills and to customers efficiently, reliably and sustainably.

Logistics in Metsä Group is both local and global. For example, Metsä Group's products are transported to about 120 countries by road, rail and sea but at the same time, the wood is procured mainly from Finland, close to our production sites. Efficient and reliable logistics would not be possible without our extensive network of more than 1,000 logistics service providers. The main logistics flows are operated by some 500 service providers.

A competitive forest industry supply chain from harvesting to the end customer requires various transport modes. Metsä Group logistics has three main categories: Land Logistics, Ports and Terminals, and Maritime Logistics. Category management focuses on ensuring that service providers meet the service, efficiency and sustainability requirements.

TARGET FOR LOGISTICS

We require all of our logistics partners to commit to our ethical guidance, Metsä Group Code of Conduct for Suppliers. Regarding this, Metsä Group set in 2015 a sustainability target to ensure the sustainability of our main logistics flows by end of 2017. In 2016, our respective logistics providers were assessed against our sustainability criteria. The self-assessment questionnaire covered perspectives such as commitment to general sustainability principles, social responsibility, health and safety, environment as well as ethical business practices. The questionnaire covers wood logistics; all the logistics in Finland and Sweden; Maritime logistics and ports in Europe, the USA and China; Export trailers; and European, Russian and North American distribution.

The questionnaire was responded by 441 suppliers, and we gained a lot of insight about the sustainability of our service providers. We are in the process of assessing the responses and planning actions to make sure that our suppliers meet the required criteria.

Metsä Board started a direct shipping service from Husum to Baltimore, Maryland, and Jacksonville, Florida, in the US. The frequent and punctual service supports production planning and customer service. Environmentally efficient vessels and non-stop service also generate fewer emissions.

Cooperation within Metsä Group ensures high utilisation. When a vessel bringing wood to Kaskinen port is loaded with sawn timber to UK and France, the travel of an empty ship is minimised.

BREAKDOWN OF LOGISTICS MODES

SEA

REDUCED ENVIRONMENTAL IMPACTS

As logistics is a major cost element, one of the key remedies to mitigate the cost effect is to increase logistics efficiencies. Efforts to accomplish this often go hand-in-hand with decreasing the environmental impact of transports. Maximising payloads, as an example, decreases the amount of CO_2 generated per unit delivered and at the same time decreases the unit cost. Likewise, optimising ship sailing speeds can have a clear impact on the amount of fuel consumed – effectively impacting the amount of emissions as well as fuel costs.

A weekly round-service vessel carries paperboards from Metsä Board's Husum mill to Lübeck. From Lübeck the vessel is loaded with starch and from Kaskinen high-yield pulp – both to Husum. With fewer loading ports, the vessel runs at optimal speed, which has lowered fuel consumption by some

25%.

In Finland the use of heavier timber transportation vehicles has had a positive effect on the efficiency of the transport business. The fuel consumption is 10% less per tonne-kilometre, which in turn means lower CO_2 emissions.

-10%

FUEL PER TONNE-KILOMETRE.

ROAD

RAIL

PORT AND WAREHOUSE

TISSUE PRODUCTS ARE DISTRIBUTED AROUND THE MILLS – THE SPAN IS TYPICALLY MAX.

500

KILOMETRES.

Ships take Metsä Wood's and Metsä Fibre's products to Asia. As the export flows are typically from China to Europe using otherwise empty shipping containers for our products minimises the travel of empty vessels on the seas.

WE WORK FOR A BETTER CLIMATE AND ENVIRONMENT

RESOURCE EFFICIENCY AND EMISSIONS

Metsä Group has production facilities in seven European countries. We use raw materials, energy and water as efficiently as possible and make use of every part of the tree. We maximise the share of bioenergy and have significantly reduced emissions into water and air.

CLIMATE

Fossil CO_2 emissions per product tonne 2009–2020:

Target
-30%

Performance 2016
-35%

COMMENT

Achieved. Investments in efficient technology and bioenergy production have reduced CO_2 emissions.

ENERGY

Energy efficiency improvement 2009–2020:

Target
10%

Performance 2016
6%

COMMENT

Behind of set target due to major investments and ramp-up phases. We expect to recover when the bioproduct mill starts up.

RESOURCE EFFICIENCY

Process water use per product tonne 2010–2020:

Target
-17%

Performance 2016
-13%

COMMENT

On track. Recycling water in process and investing in efficient technologies have decreased process water use.

RAW MATERIALS	2016	2015
WOOD-BASED RAW MATERIALS		
Wood (1,000 m³)	21,772	21,618
Pulp (1,000 t)	213	282
Recovered paper (1,000 t)	387	409
OTHER RAW MATERIALS (1,000 t)		
Pigments	238	343
Adhesives	68	75
PURCHASED ENERGY (GWh)		
Fuels	4,216	4,124
Fossil fuels	3,078	3,214
Biofuels	1,138	911
Electricity	2,325	2,315
Heat	8	376
WATER INTAKE (1,000 m³)	293,895	294,376
Surface water	292,589	292,025
Groundwater	1,306	2,351

EMISSIONS TO AIR (t)	2016	2015
Biogenic carbon dioxide (as CO_2 bio)	7,105,813	7,039,847
Fossil carbon dioxide (as CO_2)	760,013	802,529
Nitrogen oxides (as NO_2)	6,319	6,138
Sulphur (as SO_2)	1,213	2,060
Particles	1,175	1,356

-40 %
SO_2 EMISSIONS

Combating climate change with renewable energy that lowers all emissions to air.

86%
BIOBASED PRODUCTION

Wood is upgraded for products with high value.

Efficient production with best available technologies.

The production of most products increased.

+16 %
OF KERTO LVL

PRODUCTION	2016	2015
Chemical and CTMP pulp (1,000 t)	3,553	3,559
Paperboard (1,000 t)	1,666	1,498
Paper (1,000 t)	65	413
Tissue papers (1,000 t)	591	594
Cooking papers (1,000 t)	43	41
Sawn timber (1,000 m^3)	1,795	1,637
Plywood (1,000 m^3)	238	263
Kerto LVL (1,000 m^3)	214	185
Other upgrade products (1,000 m^3)	382	412
By-products sold for energy production (GWh)	2,226	2,345

Water intensive processes but not with groundwater.

Improved utilisation of side streams.

99.6 %
SURFACE WATER

-23 %
WASTE

DISCHARGES TO WATER (t)	2016	2015
WASTE WATER FLOW (1,000 m^3)	140,449	140,357
Chemical oxygen demand (COD)	39,745	38,914
Total suspended solids	3,515	3,646
Biological oxygen demand (BOD)	1,297	1,287
Nitrogen (N)	586	532
AOX	355	324
Phosphorus (P)	51	41
WASTE (t)		
Utilised waste	436,213	596,921
Landfill waste	60,649	44,971
Hazardous waste	1,938	1,986

BUILDING A RESOURCE-WISE BIO-ECONOMY

While the global population and consumption are growing, it is our responsibility to use scarce resources efficiently.

In our wood supply area, forest growth exceeds use, but despite being renewable and vigorously growing, wood is a limited resource. Each part of it is therefore used for products with the highest value. Valuable side streams, energy and water are also used efficiently.

As wood is our main raw material, we pay close attention to sustainable forest management. Ensuring that the highest value is obtained from this raw material is significant to advancing circular economy and mitigating climate change. As the value network Metsä Group covers is unique, we have outstanding opportunities to take the synergies and utilisation of resources to another level. Our mindset is that all the components of production are valuable and nothing goes to waste. Our partner network plays an important role in making the best out of the smaller side streams.

INCREASED PROCESS EFFICIENCY

Metsä Group's processes are both energy and water intensive. We have made major investments in making processes more efficient by utilising the best technologies. Also, the processes need to be reliable, as the less there are disturbances, the better is the environmental performance of the mill. Here, we are already leading the way, and we will further develop our processes for smarter use of resources.

We invest in sustainable, side-stream-based bioenergy production. Metsä Group produces most of the energy with CHP (Combined Heat and Power) technology in order to gain the highest efficiency. In addition to producing energy for our own operations, we also supply renewable heat to local communities, and electricity to society as a whole. Using biobased fuels in production is the main reason why the Group's fossil CO_2 emissions keep on decreasing. p. 46, 48

Energy use in operations is closely reviewed and followed carefully for each business area and production unit. p. 48

CIRCULATING FRESH WATER

Fresh water is one of our key assets. Our operations regarding this scarce resource are intensive with a commitment that we circulate and purify it carefully before releasing it back into the external water bodies. For these reasons, we have a target for reducing the use of process water. p. 44

It is a scientific fact that climate change is accelerating polarisation of water resources. We are keen to ensure that Metsä Group's operations in the north do not prevent, or weaken any parties' water access rights now or potentially in the future. p. 44

SWITCHING TO MORE EFFICIENT LIGHTING

At several Metsä Group sites, the lighting has been switched to LED bulbs. For example at the Vilppula sawmill, a new operating system, with over 350 LED bulbs was installed across the site. Compared to 2015, the energy savings in lightning have been 0.5 GWH or 82%. With the brighter LED lighting work safety has also been improved.

THE BIOPRODUCT MILL SETS NEW LEVELS

The bioproduct mill will raise resource efficiency to a significantly higher level compared to sites of previous generations:

- 2.5 times more pulp under the same environmental limit
- -50% need of process water per tonne
- -30% chemical oxygen demand (COD) emissions per tonne
- 0% fossil energy
- 100% side streams utilised
- 1.0 TWh renewable electricity for sale

p. 16, 18

KERTO LVL PRODUCED WITH BIOENERGY

Metsä Wood's Lohja mill in Finland produces Kerto LVL for the global construction industry. The facilities are modern and 100% self-sufficient in energy. In addition to producing Kerto LVL purely with bioenergy made from production side streams, the site provides wood-based bioheat for the local community. The bioheating plant is next to the mill to capture the full potential of the production. Other sidestreams, such as chips, are utilised at the Group's pulp production plant.

Kerto LVL has many larger scale benefits: it stores carbon from the atmosphere for the entire life cycle of a building where it is used. In the construction phase Kerto LVL offers a competitive, light-weight alternative to fossil-based building materials with heavier environmental footprints.

www.metsawood.com

PURELY IMPORTANT WATER

Metsä Group is making clear progress to reach the targets set for reducing water use.

Without water, there would be no trees, pulp, board or paper. Most of Metsä Group's mills are in the Nordics which are the world's most water rich areas, and the mills have been built close to fresh water sources.

Optimising water use has had a major impact on the Group's water consumption. Since 2010 the Group's process water usage has decreased by 13% (15; 13) per produced tonne. Efficient use of water reduces the amount of waste water produced and the need for energy, which can have a positive impact on the climate.

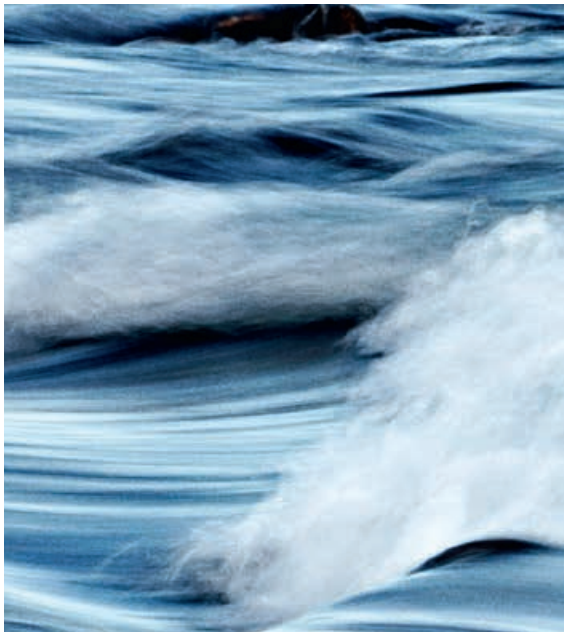
Limits for emissions are set in the mill's environmental permit and they must meet the EU-level BAT (Best Available Technique) values. At all Metsä Group's mills, the emissions are well below the BAT maximum levels.

WATER IN THE PRODUCTION PROCESS

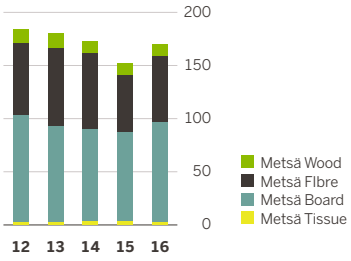
Water is needed at every stage of pulp, board and paper production. It keeps logs fresh, carries fibres to different stages in the production and helps to bind wood fibres together in the process. Water is used also in cleaning, cooling, and in smaller quantities for steam generation.

Since water is used as efficiently as possible, it is a case of recycling rather than using: a litre of water goes around the mill up to 15 times. For example, a pulp mill's washing water is recycled upstream from a cleaner pulp phase to the brown mass phase. Similarly, water is recycled in bleaching and drying.

Before releasing the water back to nature, it is purified by efficient waste water treatment plants, which remove up to 99% of the emission load. After the water treatment plant, there are only very small amounts of residues, for example phosphorus (P), a combination of organic chlorine compounds (AOX) and oxygen depleting substances (COD). Metsä Group's eutrophication emissions were 170 tonnes P eqv. (152; 173).



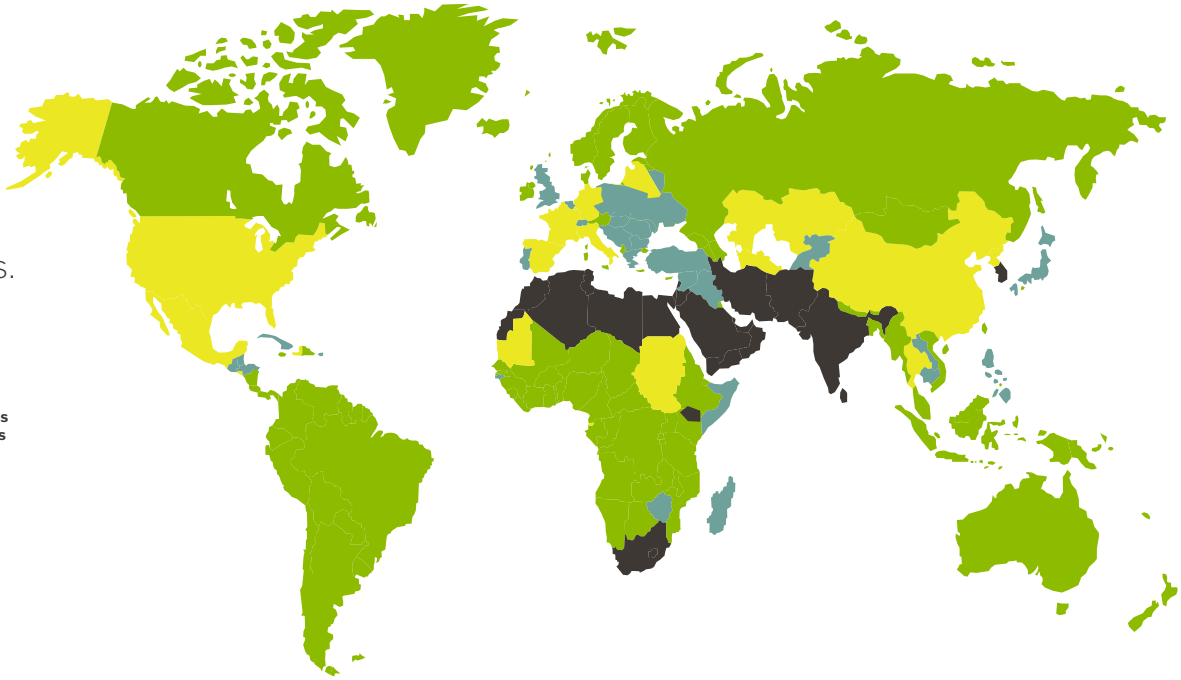
EUTROPHICATION (P EQUIVALENT)
BY BUSINESS AREA

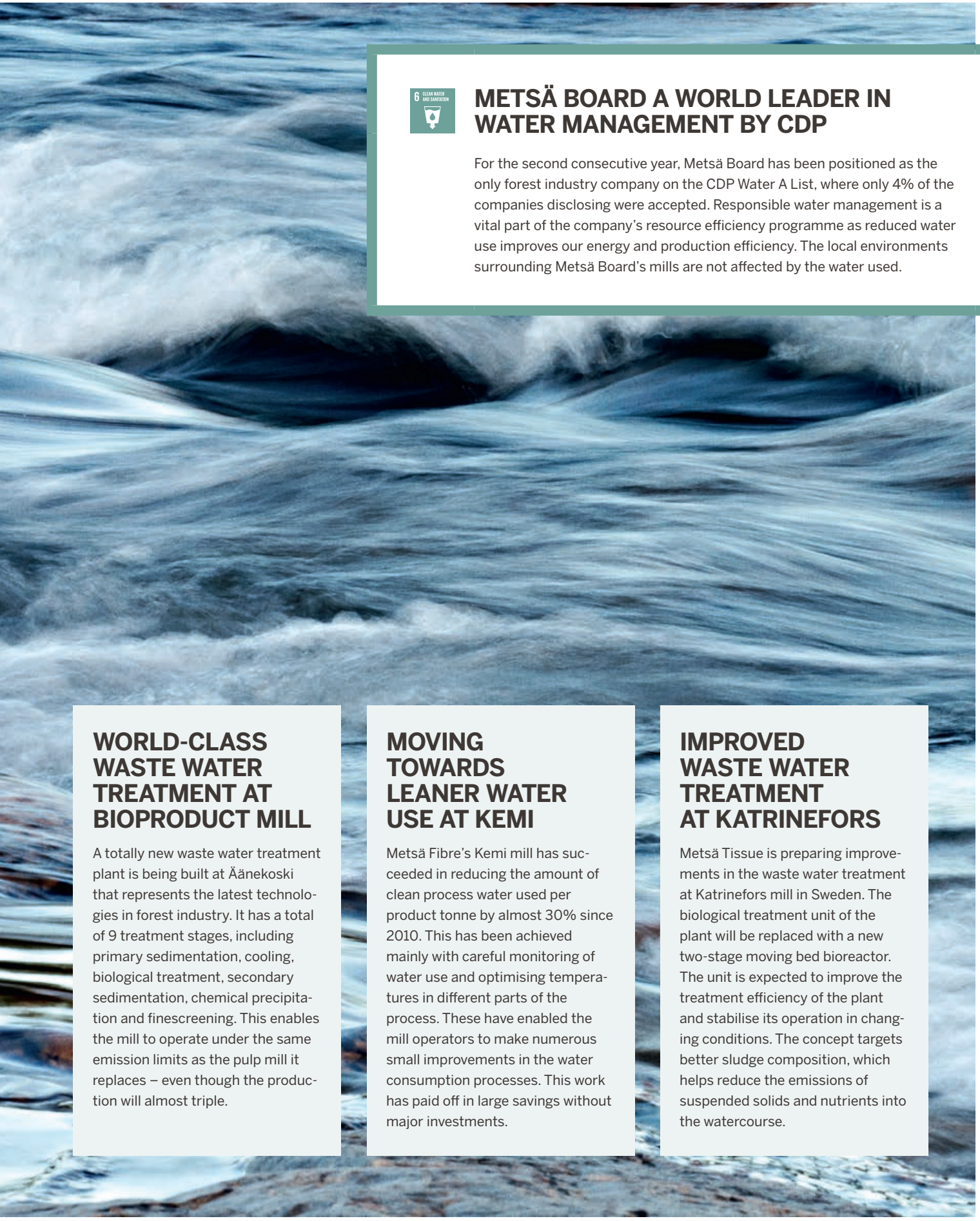


12 RESPONSIBLE CONSUMPTION AND PRODUCTION

WORLD WATER

The Nordics have abundant water resources.





METSÄ BOARD A WORLD LEADER IN WATER MANAGEMENT BY CDP

For the second consecutive year, Metsä Board has been positioned as the only forest industry company on the CDP Water A List, where only 4% of the companies disclosing were accepted. Responsible water management is a vital part of the company's resource efficiency programme as reduced water use improves our energy and production efficiency. The local environments surrounding Metsä Board's mills are not affected by the water used.

WORLD-CLASS WASTE WATER TREATMENT AT BIOPRODUCT MILL

A totally new waste water treatment plant is being built at Äänekoski that represents the latest technologies in forest industry. It has a total of 9 treatment stages, including primary sedimentation, cooling, biological treatment, secondary sedimentation, chemical precipitation and finescreening. This enables the mill to operate under the same emission limits as the pulp mill it replaces – even though the production will almost triple.

MOVING TOWARDS LEANER WATER USE AT KEMI

Metsä Fibre's Kemi mill has succeeded in reducing the amount of clean process water used per product tonne by almost 30% since 2010. This has been achieved mainly with careful monitoring of water use and optimising temperatures in different parts of the process. These have enabled the mill operators to make numerous small improvements in the water consumption processes. This work has paid off in large savings without major investments.

IMPROVED WASTE WATER TREATMENT AT KATRINEFORS

Metsä Tissue is preparing improvements in the waste water treatment at Katrinefors mill in Sweden. The biological treatment unit of the plant will be replaced with a new two-stage moving bed bioreactor. The unit is expected to improve the treatment efficiency of the plant and stabilise its operation in changing conditions. The concept targets better sludge composition, which helps reduce the emissions of suspended solids and nutrients into the watercourse.

LESS EMISSIONS, MORE FRESH AIR

We work actively to control and mitigate environmental impacts related to air emissions of our production.

Preventive environmental management is a core principle for Metsä Group. We react to any non-conformities to minimise the environmental effects of our production.

Pulp mills and power plants are the main sources of air emissions. The primary emissions are odorous sulphur compounds (TRS) from pulp production and sulphur dioxide (SO_2), nitrogen oxides (NO_X) and particles from pulp production and power plants.

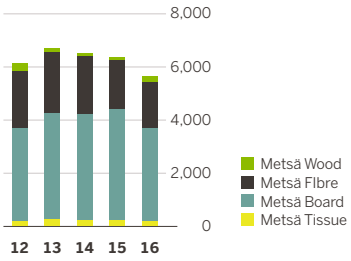
Most of the energy Metsä Group uses is produced at power plants from black liquor and other renewable biomass such as bark. Use of biomass energy ensures low emissions of fossil CO_2 and has a positive effect on other air emissions.

Efficient control and reduction of air emissions is an integral part of Metsä Group's sustainability work. Investments have been made and several are planned to comply with the stricter regulations for large power plants coming into force in 2020. Currently the majority of our emissions do not cause noticeable environmental impacts. However, odorous sulphur compounds from pulp mills are challenging to control and can cause a nuisance even at very low concentrations. Recent investments at Joutseno and Rauma pulp mills have improved the local air quality. The Group's acidification emissions were 5,636 tonnes SO_2 eqv. (6,357; 6,543). The bioproduct mill is expected to set new standards in air emissions management.

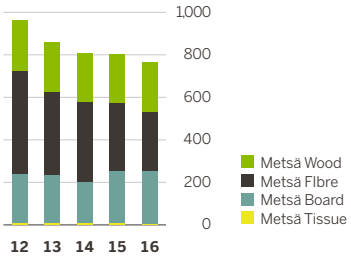
Our Scope 1 greenhouse gas emissions were 760,000 tonnes CO_2 (803,000; 803,000 tn). Scope 2 emissions were 576,000 tonnes (550,000; 621,000). Some 48% of the Scope 1 and 2 emissions came from Finland.

Metsä Group's environmental obligations at the end of 2016 totalled EUR 16 million (15; 19). The liabilities have decreased due to sold operations and remediation of contaminated sites and old landfills. Environmental expenditures were EUR 82 million (108; 96).

ACIDIFICATION (SO_2)
BY BUSINESS AREA



GREENHOUSE GAS EFFECT (CO_2)
BY BUSINESS AREA



METSÄ BOARD A WORLD LEADER IN CLIMATE ACTION BY CDP

Metsä Board has been identified as a global leader for its actions and strategies in response to climate change. It is among 9% of corporations participating in CDP's climate change programme and was awarded a position on the Climate A List. Metsä Board is continuously looking for new areas of improving energy and material efficiency and currently uses mostly biofuels in production.

IMPROVED AIR QUALITY AT BIOPRODUCT MILL

The Äänekoski bioproduct mill is being built to comply with the latest requirements for air emissions. All equipment is based on clean technology which results in very low emissions, particularly for odorous sulphur compounds. This will improve the air quality in the town significantly. Also the noise generated by the mill site will not exceed the guidelines.

ENVIRONMENTAL INCIDENTS AND LIABILITIES

All environmental incidents that resulted in major permit violations, claims, compensations, or significant media coverage are detailed below. Additionally minor short-term non-compliances with environmental permit requirements were reported at Joutseno and Kreuzau mills. The authorities were informed and corrective actions agreed and taken into use. The Svir sawmill in Russia paid EUR 246 as a fiscal levy related to water discharges and waste handling.

MILL	INCIDENT	CORRECTIVE ACTIONS
METSÄ FIBRE KEMI	The permit limit for particle emissions into air from recovery boiler was exceeded for several months due to persistent operational problems at the flue gas treatment system.	Several studies and mechanical improvements were carried out to the electrostatic precipitator and flue gas scrubber. The emissions have decreased but the situation remains unstable.
METSÄ FIBRE RAUMA	The permit limit for exhaust gases from the chlorine dioxide plant was exceeded in June.	The chlorine dioxide scrubber was maintained and process parameters adjusted. Emissions have returned to a normal level.
METSÄ BOARD KASKINEN	The permit limit for phosphorous emissions to water was exceeded in March due to poorly settling sludge in the effluent treatment plant.	The operation of the plant has been stabilised and emissions have returned to a normal level.
METSÄ BOARD KYRO	The permit limit for BOD and phosphorous emissions to water were exceeded in July due to poorly settling sludge in the effluent treatment plant.	The operation of the plant has been stabilised and emissions have returned to normal. New on-line measurements for nutrients have also been installed.
METSÄ BOARD TAKO	The permit limit for COD emissions to water was exceeded in May due to excess loading of the internal effluent treatment plant.	The operational parameters of the effluent treatment system were adjusted and emissions have returned to a normal level.
METSÄ TISSUE KATRINEFORS	The permit limit for nitrogen emissions to water was exceeded in July due to an accidental release of nutrient chemical to effluent treatment plant.	The leakage in the nutrient tank has been repaired and emissions have returned to a normal level.

MORE INVESTMENTS IN BIOENERGY

Investment in resource-wise bioenergy decreases fossil CO_2 emissions, improves energy efficiency and increases the share of production made with renewables.

Metsä Group is both a significant bioenergy user and a producer. As we operate in an energy-intensive business, we carry a responsibility for improving our energy performance through continuous investment and the application of new technologies. Our energy efficiency work is supported by the Energy Efficiency Systems and the ISO 50001 Energy Management Systems. In 2016, Metsä Group signed the extension of the national energy efficiency agreement for the years 2017–2025.

Metsä Group has set two targets that both play a key role in planning investment and development programmes in efficiency. We have a target for improving energy efficiency by 10% by 2020 from the 2009 level. By the end of 2016, our energy efficiency had improved by 6% (7; 6). Due to major investment and following production ramp-up phases, we were behind the set target development. However, it is expected that we will be back on plan when the bioproduct mill is in full operation.

The other target is for reducing fossil CO_2 emissions by 30% by 2020 from the 2009 level. By the end of 2016, we had exceeded this target and our fossil CO_2 emissions have reduced by 35% (34; 36).

PRODUCTION WITH BIOBASED FUELS

We have systematically increased the share of biobased fuels used in production and the biomass is used with high efficiency and several mills produce district heat. Currently, 86% (86; 86) of our production is powered by biobased fuels that are mostly side streams from our industrial processes.

Our renewable energy supply to the local communities is significant. Our pulp mills produce surplus electricity and heat for local residents and partners. Currently, Metsä Group produces 14% of the renewable energy in Finland. Renewable energy includes biomass-based and other non-fossil energy forms.

OPERATING WITHOUT FOSSIL ENERGY

Resource efficiency in energy has been the corner stone when planning the industrial ecosystem of the bioproduct mill. The mill will operate with zero fossil energy or emissions, even in exceptional circumstances such as maintenance breaks and winter peaks. The mill increases the share of renewable energy in Finland by at least 2%-points and it will be 240% self-sufficient in electricity. The amount of electricity the mill provides to the society will rise to over 1 TWh, after supplying its own operations with 0.75 TWh. The mill provides surplus heat to the paperboard, chemical and plywood mills. Currently, the Group's pulp mills' self-sufficiency in electricity is 140%.

SIDE STREAMS TO BIOENERGY

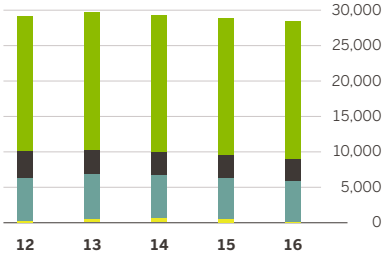
Metsä Group promotes sustainable bioeconomy and the use of wood for the highest added-value products. Material use of wood offers unlimited possibilities compared to its one-time only combustion into energy. Remaining forest residues and side streams are utilised for bioenergy production at our mills, or externally.

The wood-based fuels supplied by Metsä Group represent a total of 3.8 TWh (4.5; 4,4). In energy production at customers' power plants these fuels help reduce the fossil CO_2 emissions by over 1,1 million tonnes (1,3; 1,2), which is over 41% more that the Group's annual equivalent emissions.

FUEL CONSUMPTION
%

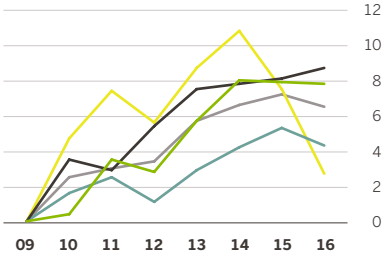
Wood-based fuels	86
Gas	8
Oil	4
Peat	1
Coal	1

PRIMARY ENERGY CONSUMPTION
GWh



Wood-based fuels	(69%)	19,548
Fossil fuels	(11%)	3,078
Purchased electricity	(20%)	5,813
Purchased heat	(0%)	9

ENERGY EFFICIENCY IMPROVEMENT
BY BUSINESS AREA AND GROUP TOTAL



- Metsä Tissue
- Metsä Board
- Metsä Fibre
- Metsä Wood
- Metsä Group total

MORE BIOENERGY TO CURRENT SITES

Today, 23 of our 35 production units have bioboilers and bioenergy production on site, and such investments will continue.

The second bioboiler at Metsä Tissue Katrinefors mill in Sweden was introduced in 2015. The boiler provides electricity and heat to the mill and the surrounding community, and has decreased the mill's oil use by 90%.

The next bioboiler investment will take place at Metsä Tissue Nyboholm mill in Sweden with the purpose of making heat generation 100% biobased. The boiler will be introduced in autumn 2017, after which the mill will use oil only as a reserve fuel for heat generation.

In Finland, the project to modernise the energy plant at Metsä Tissue Mänttä mill site is under way and will be finished in autumn 2017. This investment will rise the share of bioenergy for heat to 60% through decreasing the use of peat and replacing it with dried de-inking sludge and biomass. Dried de-inking sludge binds sulphur and hence reduces emissions to air. It also improves the quality of ash for further utilisation as a soil fertiliser and construction material.

WE CREATE WELL-BEING

STAKEHOLDER ENGAGEMENT

Metsä Group creates thousands of jobs both within the company and the external value network. We invest in safety at work and promote responsible management and ethical business.

ETHICAL BUSINESS

Coverage of code of conduct training:

Target
100%

Performance 2016
92%

COMMENT
Left behind. We proceed to ensure that Code of Conduct training covers all personnel with an emphasis on new employees.

SAFETY AT WORK

Lost-time accidents frequency annually:

Target
-10%

Performance 2016
-22%

COMMENT
Achieved. Our long-term goal is zero accidents and we continue our work in achieving this. The Group's LTA1 was 7.4.

WELL-BEING

Sickness absenteeism:

Target
<3%

Performance 2016
3.9%

COMMENT
Left behind. An early intervention process is in place. Additional actions to mitigate absenteeism are introduced.

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

RESOURCES AND COMPETENCES

Secure supply

COOPERATIVE OWNERSHIP
- Steady wood flow secured by 104,000 forest-owner members
- Covering about 50% of Finland's privately owned forests

PERSONNEL
- 9,600 employees in 26 countries
- Retention rate 98%

Efficient use of resources

PRODUCTION
- 35 production units in 7 countries in Europe using best available techniques

WOOD
- Supplying 30 million m^3 of wood with 100% traceability

ENERGY
- 86% of production made with bioenergy

WATER
- 99.6% surface water – no impact on water scarcity

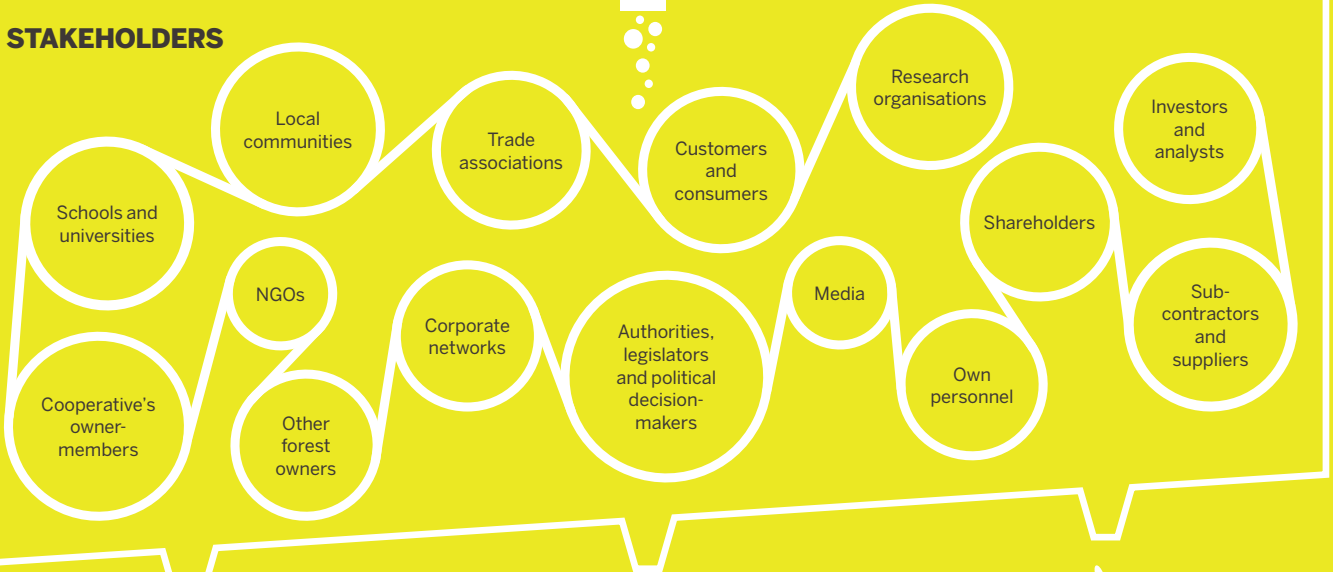
Steady outlook for future

FINANCIAL
- In liquidity and undrawn credits EUR 2,303 mill.
- Capital employed EUR 4,535 million
- Equity ratio 43,9%

RENEWING THE INDUSTRY
- EUR 776 million in investments and research and development

For more information, please see table of contents

STAKEHOLDERS



LOCAL VALUE

93% permanent employees

EUR 626 million in wages, salaries and benefits

EUR 460 million to Finnish forest owners from wood sales

EUR 310 million to harvesting and transportation entrepreneurs in Finland

30 million seedlings delivered to forest owners annually

900 summer jobs

Vast employment impact: each forest industry job creates three others indirectly

NATIONAL VALUE

The value of exports from Finland EUR 2.7 billion, corresponding to 5% of Finnish exports

Producing 14% of Finnish renewable energy

Partnering in circular economy: over 90% of production side streams utilised

91% of wood and 86% of other purchases from production countries

Ensuring biodiversity by leaving at least 2 high biodiversity stumps per ha in forests

EUR 52 million paid as interests to Metsäliitto Cooperative's owner-members

INTERNATIONAL VALUE

Reducing the dependence on fossil resources

- Wood products that store carbon
- Pulp for recyclable products
- Paperboards for safe packaging
- Tissue papers for improving hygiene

Sales from products EUR 4.7 billion

- 77% from EMEA
- 7% from Americas
- 15% from APAC

EUR 73 million as interest expenses

EUR 87 million of dividends to shareholders other than Cooperative's owner-members

CREATING VALUE IN NETWORKS

Networks and close cooperation with stakeholders and partners is the key to creating value locally, nationally and internationally.

Our business areas create a strong value chain from processing northern wood into sustainable high-quality products for global markets. In a long-term cooperation with stakeholders and partners, Metsä Group forms a versatile, unique and wide-ranging value network benefiting all parties involved with financial, environmental, social and societal measures. Members of this network all contribute and benefit from the value we create.

This year our stakeholder dialogue has been varied including events and engaging in social media. We continued hosting a series of bioeconomy roundtable discussions inviting parties with different views on the growth of the bioeconomy and sustainable use of natural resources to share and learn from each other. We had meetings with local, national and European decision-makers to enhance bioeconomy in circular economy. Partnerships, as well as research and development activities, especially related to the bioproduct mill, have all advanced. p. 58

CONTINUING THE VALUE CREATION WORK

In 2016 we updated our stakeholder analysis, and started the work from our production units, with the aim of sharing best practises of local stakeholder engagement.

In 2015 we started the discussions on how we create value with our stakeholders and partners by reviewing value creation locally, nationally and internationally. In 2016 we continued the work in the Group to better understand our total impact on society. The process involved extensive participation throughout the Group from customer relations and sales, to wood supply and advocacy. Our key assets in creating value are:

- for customers; products and solutions for global challenges, such as for replacing the use of fossil-based materials.
- for sustainable bioeconomy; a strong and comprehensive value network built by our businesses, stakeholders and partners.
- for wood supply; a parent company owned by 104,000 private forest-owners covering nearly 50% of the privately-owned forests in Finland.
- for current and future employees; competence-driven approach for continuous development of skills, job rotation and career opportunities in all phases of life.

INTEGRATED VALUE AT HUSUM

Metsä Board's Husum mill in northern Sweden produces pulp, linerboard, folding boxboard and food service boards for global markets. The value of this highly efficient mill is generated for various stakeholders:

- recyclable fresh fibre paperboard is a safe alternative for fossil-based packaging materials p. 24
- lightweight paperboard impacts the whole chain with lower transportation weights, costs and emissions
- strong paperboard with good runnability is an efficient choice
- the wood supply, mill and logistics employ people in the rural area, the mill alone has some 725 employees
- the integrated pulp mill supplies the board mill with wet pulp that decreases the need for energy to dry pulp
- the board mill uses biobased electricity and heat, produced in the pulp mill. District heat is also provided to the local community
- own harbour enables efficient logistics that maximises cargo efficiency levels p. 38

BENEFITS OF METSÄ GROUP'S PRODUCTS TO VALUE NETWORK

BUSINESS AREA	PRODUCTS	BENEFITS AND VALUE CREATED	CUSTOMER GROUPS
METSÄ FOREST	Reliable wood supply and excellent forest services	• renewable wood raw material • sustainable forest management services • 100% traceable certified or controlled wood	• owner-members of the Cooperative • wood refining industry
METSÄ WOOD	Industrially efficient wood products	• strong and light wood products • products act as carbon sinks	• construction • industrial customers • distributor partners
METSÄ FIBRE	Top-quality fresh fibre softwood pulp	• pure and safe pulp • pulp and bioproducts with excellent environmental performance	• paper and board manufacturers • wood-based biochemical users
METSÄ BOARD	High-quality lightweight paperboards	• pure and safe paperboards • lightweight paperboards have a smaller environmental impact and produce less waste	• brand owners, converters and merchants in consumer goods, retail-ready and food service packaging industries
METSÄ TISSUE	Tissue and cooking papers offering improved hygiene	• tissue papers improve health, hygiene and well-being • cooking papers reduce food waste and use of energy and water	• households • hotels and restaurants • public sector (hospitals, schools) • industry

ENCOURAGING EMPLOYER

Metsä Group offers a diverse range of opportunities and development paths. Also employees' work-life balance is considered at every stage of their career.

Fair treatment, equality and responsible leadership are key elements in Metsä Group's organisational culture. Each employee has a job description and clear targets, opportunities for continuous development and a safe working environment. We consider our employees' work-life balance at every stage of their career.

In 2016, Metsä Group's human resources management focused on strengthening the company's employer image and a wide range of practical development activities. We offer a variety of development and leadership programmes, as well as training tailored to specific team and individual needs. In 2016, nearly 25,146 training days were held with 3,440 employees in Finland and 3,419 abroad participating in training programmes.

METSÄ GROUP HAS
9,300
EMPLOYEES IN 26 COUNTRIES.

93%
OF THE EMPLOYEES HAVE PERMANENT CONTRACTS.

Metsä Group has a systematic Personal Development Appraisal (PDA) processes. In the PDA's employees can discuss their current role, performance and to plan their personal development activities. We follow the same PDA practices for all employees in Finland,

VERSATILE DEVELOPMENT PATHS

Metsä Group employees visited some 100 schools to tell 15-year-olds about the forest industry and its job opportunities.

Metsä Forest took its sponsor class of future forest machine operators from South Savo vocational college to explore work in practice.

GOOD LEADERSHIP
Responsible recruitment and induction gives a good start for a career. We ensure that professional capabilities are up-to-date by providing development programmes.

AGE 7 — 15 — 18 — 25

We introduce ourselves as an industry with numerous career opportunities. We visit schools and universities to motivate students to apply for jobs in the industry.

Metsä Group offers summer jobs to some 900 employees annually. We also provide thesis work and trainee programs.

”A Group-wide development programme enables networking and sharing best practices and know-how.”

DIRK VAN ROEYEN, logistics manager, West Europe & UK, Metsä Board

and have been continuing the harmonisation of our personal development practices elsewhere, including Poland, Germany and Slovakia. 96% of our employees received a PDA in 2016.

RIGHT TO PARTICIPATE

We recognise our employees' freedom to form unions and the right to negotiate representative collective agreements based on each country's local legislation and regulations. In total, 77% of all of our employees fall within the scope of collective agreements, and a shop steward system is in place in many of our operating countries.

In 2016, Metsä Group hired 147 new employees in Finland and 272 abroad. 3% of our employees work part-time.

The restructuring of our business affected a total of 1,600 employees during 2016, of whom 141 were made redundant. In total 724 employees were temporarily laid off. We provided individual support to those made redundant in finding new job opportunities.

PREPARING FOR THE MILL START-UP

When the bioproduct mill starts its operations, employees will require training. While the importance of maintenance work increases, the Mills of the Future operating format will also require changes to working practices. p. 56 To date, training has already included process knowledge, SAP, machinery and equipment and will peak as the mill gets closer to full production.

Some process owners of the existing mill have already focused on the bioproduct mill and are sharing information between the two mills. Also employees from other pulp mills have been recruited to safeguard the transition phase at Äänekoski.

"Working four days a week and spending Fridays with my two kids has a huge meaning for me emotionally."

ASTA HIRVONEN, communications specialist, Metsä Group communications

"Complicated problems at work are rewarding to solve with an experienced colleague like Heikki Karhunen. He gives me valuable professional support."

JUHO LAITINEN, key account manager, Metsä Forest

35 45 55 Retirement

WELL-BEING AT WORK

We support careers in different phases of life, and monitor well-being with different surveys. Adjusting workloads is also an example of how we increase well-being.

PROFESSIONAL DEVELOPMENT

We support career paths with continuous learning opportunities, for example job rotation.

"Job rotation in a business area gave me valuable experience and increased my professional knowledge and network."

MATTI SIMULA, HRD manager, Metsä Group human resources

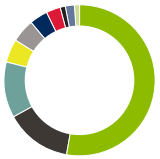
HEALTHY AND SATISFIED AT WORK

Everyone has the right to work in a safe and healthy working environment. In this respect Metsä Group is on the right track.

SINCE 2012 METSÄ GROUP'S LOST-TIME ACCIDENT FREQUENCY HAS DECLINED BY

53%.

PERSONNEL BY COUNTRY
31 DEC 2016, %



Finland	53
Sweden	14
Germany	12
United Kingdom	5
Poland	5
Russia	4
Slovakia	3
Baltic countries	1
Rest of Europe	2
Other countries	1

Well-being at work is the foundation for success, both for employees and the company. It is created by good management and supervisory work. Metsä Group promotes and maintains well-being and working capacity with a system based on preventative measures. We aim to identify threats to work capacity at an early stage and to take the appropriate measures. Well-being, organisational functionality and job satisfaction are monitored on an annual basis with an Organisation Functionality Survey and a variety of other personnel surveys.

SAFETY MANAGEMENT

Metsä Group has two sustainability targets related to safety and well-being at work. Firstly, to reduce annual lost-time accidents (LTA1) by 10% and secondly, to have a sickness absence rate below 3%. The long-term goal is zero accidents. and covers both our own personnel and sub-contractors working in our mills with everyone receiving an induction in safe working practices. However, at Metsä Forest Podporozhye in Russia, one employee was fatally injured in a traffic accident.

Good progress has been made at the mills. For example at Metsä Wood, the accident frequency rate has decreased by 69% from 2013. In December 2016, both Metsä Fibre's Joutseno mill and Metsä Board's Tako mill celebrated their first years free of accidents. In addition, Metsä Tissue's Mänttä mill warehouse has been accident free for two years. These examples show that work safety is the way of working at Metsä Group.

SAFETY AND WELL-BEING DATA	2016	2015	2014	2013	2012
Sickness absenteeism, % [1]	3.9	3.9	3.7	3.8	3.9
Work accident absenteeism, % [1]	0.14	0.20	0.22	0.25	0.22
Accident rate [2]	7.4	9.5	11.2	13.2	15.7
Registered occupational diseases, no. of cases	6	6	7	3	3
Work related fatalities, no. of cases	1	1 [3]	0	1	1

1) % of theoretical working time 2) Lost time accident 1 frequency rate. Accidents at work resulting to at least one day sickleave per million worked hours 3) External employee

KEY PERSONNEL DATA	2016	2015	2014	2013	2012
Number of employees [1]	9,300	9,599	10,410	10,741	11,447
Share of permanent employees, %	93	93.5	94.1	94.3	94.0
Average age, years	44.8	44.6	44.5	44.4	44.1
Average years served, years	16.6	16.7	16.8	16.7	16.3
Employee turnover, % [2]	8.0	7.9	7.4	9.5	12.0
Ratio between men/women, %	78/22	78/22	79/21	78/22	78/22
Share of women in management, % [3]	15.8	15.8	15.0	14.3	13.3

1) Full-time equivalent (FTE) on 31 Dec 2) The figure includes also redundancies caused by restucturing of business
3) Management includes Board of Directors, Executive Management Team and business areas' management teams

REMUNERATION DATA Compensation per production country*)	Finland	Germany	Slovakia	UK	Poland	Russia	Sweden
Ratio of annual total compensation for organisation's highest paid individuals (highest 1%) to median annual total compensation	5.2	3.3	5.1	3.9	8.6	8.7	3.1
Ratio of percentage increase of highest individual salaries (highest 1%) to average percentage increase	0.7	0.1	2.2	1.6	0.1	0.4	0.8
Ratio of basic salary and remuneration of women to men, based on comparable average job grades indexes	1.0	1.0	0.9	0.9	1.0	0.8	1.0

* Including 93% of white-collar personnel

SHARED LEADERSHIP INCREASES WELL-BEING

Both Metsä Wood and Metsä Fibre have implemented new working models to increase multi-skilling and flexibility and to share leadership. In Metsä Wood's target organisation model, team shifts rotate tasks autonomously, which encourages employees to develop their own expertise. Mills' IT systems have been updated to support the model. Mills of the Future is Metsä Fibre's way to increase staff autonomy. In practice, the teams have no supervisor, with shift staff taking independent decisions according to common objectives.

Autonomous teams maximise the versatile expertise of Metsä Group's staff in an entirely new way. Employees have a great deal of know-how and potential that can be applied to far greater effect enabling each employee to perform more responsible and diverse duties.

These approaches will help to keep the companies competitive and stay at the cutting edge of organisational progress. At Metsä Wood and Metsä Fibre, employee feedback has been very positive.

SAFETY AND WELL-BEING DATA BY BUSINESS AREA	Metsä Forest		Metsä Wood		Metsä Fibre		Metsä Board		Metsä Tissue		Metsä Group total	
	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015
Organisational functionality research index [1]	8.4	8.3	8.3	8.0	8.4	8.2	8.2	8.2	8.5	8.3	8.4	8.2
Organisational functionality research response rate, % [1]	90.1	90.1	89.0	76.7	79.1	84.5	87.9	80.7	85.7	79.8	86.6	81.2
Sickness absenteeism, % [2]	1.6	1.7	3.5 [4]	3.6	3.7 [4]	4.1	4.1	4.2	5.1	4.7	3.9	3.9
Work accident absenteeism, % [2]	0.2	0.0	0.2 [4]	0.2	0.1 [4]	0.2	0.2	0.2	0.1	0.2	0.1	0.2
Accident rate [3]	6.6	5.2	8.2 [4]	9.7	5.8 [4]	7.9	9.0	11.1	7.6	10.7	7.4	9.5
Registered occupational diseases, no. of cases	1	0	4	2	0	1	1	3	0	0	6	6
Work related fatalities, no. of cases	1	0	0	0	0	0	0	0	0	1 [5]	1	1

1) Organisational functionality research covered 47% of Metsä Group employees in 2016. Metsä Wood, Metsä Board and Metsä Tissue indexes calculated based on responses of white collars.
2) % of theoretical working time 3) Lost time accident 1 frequency rate. Accidents at work resulting to at least one day sickleace per million worked hours. 4) Finnish sawmills included in Metsä Wood in Jan–Oct, in Metsä Fibre Nov–Dec 5) External employee

TARGETING ZERO ACCIDENTS

To keep this important topic on everybody's mind, Metsä Board and Metsä Tissue launched projects to speed up the improvement of occupational safety at the mills.

At Metsä Board, the use of personal protective equipment was harmonised and standards defined for personal protective equipment. Metsä Tissue held safety at work training about the culture and attitude needed to prevent accidents. All employees in all countries have participated in the training.

Both Metsä Board and Metsä Tissue have highlighted information flows between mills to share practices on received safety observations and how the situations have been resolved.

TRANSPARENT ADVOCACY

Metsä Group's advocacy focuses on the development of regulatory frameworks at national, EU and international levels to promote resource-wise bioeconomy.

Metsä Group promotes resource-wise use of raw material and the sustainable production of bioenergy. Valuable Northern wood should be used primarily for high-value-added products and, at the end of the life cycle, for bioenergy. The material use of wood offers unlimited possibilities compared to one-time-only combustion. Metsä Group is a significant producer and user of bioenergy made from harvesting residues and industrial side streams, without subsidies. p. 48

2016 was a key year in shaping climate change policies and in developing the EU's and national climate and renewable energy policies. To achieve the Paris Climate Agreement commitments, various initiatives were adopted and advanced. These included the Effort Sharing Decision to bind greenhouse gas emissions of the member states for the building, agriculture, waste management and transport sectors; a Proposal on the Land Use Sector and Carbon Sink (LULUCF) that links to the 2030 climate and energy framework; a Clean Energy Package for energy efficiency, renewable and bioenergy, internal market; and on the Finnish policy agenda the National Proposal on Energy and Climate Strategy for 2030 with ambitious renewable energy and biofuel targets.

FOR BIO- AND CIRCULAR ECONOMY

Circular economy has been high on the EU and national agenda, but the role of bioeconomy within it has received less attention. We have engaged in multi-stakeholder discussions to promote the role of bioeconomy in a circular economy. This has included hosting visits, participation in events and roundtables. Here Metsä Group's bioproduct mill investment is a viable example by maximising its side treams and creating an industrial ecosystem. It has created interest in the EU and internationally.

Metsä Group's parent company Metsäliitto Cooperative is registered in the EU's Transparency Register, operated by the European Parliament and the European Commission, and has signed the Transparency Register Code of Conduct.

WE PROMOTE

- Sustainable forest management and wood mobilisation
- Climate change mitigation
- Resource-wise bioeconomy and use of raw materials
- Level playing field for different uses of wood
- The role of bioeconomy in the circular economy
- Efficient utilisation of industrial side streams and waste
- The important role of fresh fibre in the fibre circulation
- Wood construction

PURE NATURE AT HAND

Members of the European Parliament visited Finland in May to learn about bioeconomy and sustainable forest management. During the visit to the Metsäliitto Cooperative's owner-members' forest, a memorable moment was drinking water from a small natural spring deep in the forest.

MAIN MEMBESHIPS IN ORGANISATIONS

- National forest industry federations: Finnish Forest Industry Federation (FFIF), The Swedish Forest Industries (SK) and German Verband Deutscher Papierfabriken (VDP)
- Confederation of European Paper Industries (CEPI)
- Business Europe's Corporate Advisory and Support Group
- Bio-based Industries Consortium (BIC)
- European Policy Centre (EPC)
- World Business Council for Sustainable Development (WBCSD)
- Programme for the Endorsement of Forest Certification (PEFC)
- Forest Stewardship Council (FSC®)
  (Licence Code FSC-C014476)

SHARING VIEWS WITH STAKEHOLDERS

Metsä Group continued with the bioeconomy roundtables about growth from bioeconomy and the sustainability of natural resources, attended by representatives of the Finnish ministries, research institutions and nature conservation associations, environmental non-governmental organisations and Members of the European Parliament. The brief introductions as well as the constructive discussions on e.g. biodiversity were valued by the attendees.

CIRCULAR DIALOGUES

The European Policy Centre (EPC), supported by Metsä Group, organised a policy dialogue on the role of bioeconomy in the circular economy. The representatives of the European Commission, Europabio, Fern and Metsä Group discussed the bioeconomy's contribution to the transition toward a more circular, resource-efficient and sustainable economy.

UN GLOBAL COMPACT

WE SUPPORT

Metsä Group has been committed to the UN Global Compact corporate responsibility initiative and its principles in the areas of human rights, labour, the environment and anti-corruption since 2003. The Group's Sustainability Principles are based on these guidelines. We also acknowledge the UN Sustainable Development Goals (SDGs) and work to develop our operations in close link to them.

ETHICS SUPPORT GROWTH

Our targets, principles and Code of Conduct all support responsible leadership and decision-making

Metsä Group's Code of Conduct, sustainability principles and eight sustainability targets support responsible leadership and guide our operations. By implementing Code of Conduct we ensure that doing the right thing is everyone's priority. Metsä Group's aim is to train all employees in its Code of Conduct; in 2016 the share of trained personnel was 92% (87; 72). Metsä Group offers also a wide range of e-learning and face-to-face training.

In December 2016, the Board of Directors of Metsäliitto Cooperative and Metsä Board approved principles of diversity for the Board of Directors. The successful management of these tasks require a diverse composition, competence and experience. FS p. 91

Preventative measures in areas where we have identified a higher non-compliance risk were continued. In 2016, sustainability of the main logistic flows was of high interest. p. 38

REPORTING CONCERNS

We encourage an open culture and early detection of possible ethical concerns. Employees can ask for guidance and report ethical concerns such as conflicts of interest by contacting their line manager, the Group general counsel, the compliance officer or alternatively they can email Metsä Group's compliance channel. All notifications are investigated and appropriate corrective, disciplinary or other actions are taken when necessary. All significant investigations are escalated to Metsä Group's compliance committee. In 2016 the topics registered varied from external fraud attempts and gifts and hospitality concerns to privacy-related questions. No confirmed incidents of corruption were detected within the Group or in relation to our business partners.

COMMITTEE FOR COMPLIANCE

Metsä Group established a compliance committee to steer compliance development and to ensure systematic handling of non-compliance investigations. The committee assesses the major compliance risks Metsä Group faces, evaluates proposed mitigating actions and monitors the effectiveness of the chosen methods. Members of the committee are the Group's general counsel, SVP of internal audit, and compliance officer.

2016 was an exceptional year in EU-wide regulatory compliance initiatives. The most significant were the Market Abuse Regulation (MAR) and EU General Data Protection Regulation (GDPR). Metsäliitto Cooperative and Metsä Board Corporation have each updated their insider and disclosure policies and guidelines to comply with MAR. FS p. 94
To ensure GDPR compliance, entering into force in 2018, we established a data protection project. It is an example of a compliance initiative having a Group-wide impact.

TRANSPARENT TAX MANAGEMENT

All tax decisions made within the Group are legal and in accordance with laws and regulations. The decisions are based on sound commercial reasons and proactively support the goals of the Group's business activities. Corporate structures and other arrangements created only for tax reasons are not implemented, and all decisions and other actions affecting taxation are properly documented.

SUSTAINABILITY GOVERNANCE STRUCTURE

METSÄLIITTO COOPERATIVE BOARD OF DIRECTORS is the highest body approving policies and guidelines for sustainability. The Sustainability Report is presented to the Board.

METSÄ GROUP EXECUTIVE MANAGEMENT TEAM prepares guiding policies, monitors performance and annually revises sustainability targets. It sets the key advocacy topics and monitors their progress. Sustainability and Corporate Affairs are also represented.

SUSTAINABILITY STEERING TEAM steers sustainability at an operational level, identifies opportunities, risks, trends and topics in the global market relevant to our business areas. It identifies training needs for personnel and helps to implement sustainability. The team supports the use of the Group-wide environmental data system and approves the sustainability report. The team has representatives from all business areas as well as from the relevant Group services.

SUSTAINABILITY AND CORPORATE AFFAIRS FUNCTION supports Metsä Group's businesses in gaining competitive advantage and by guiding, advocating, reporting and communicating the Group's sustainable development. The function promotes sustainable bioeconomy operations throughout the value network.

GOVERNANCE CASES

The most significant on-going litigations and disputes are summarised in Financial Statements. → **FS p. 10**

SUSTAINABILITY DATA BY UNIT

METSÄ FOREST

Country	Personnel				Wood procurement	Management systems		Chain of Custody	
	Number of employees [1]	Accident rate [2]	Sickness absenteeism % [3]	Organisational functionality index	1,000 m³	ISO 9001	ISO 14001	PEFC™	FSC®
Estonia	28	0.0	2.5	8.9	1,491	x	x	x	x
Finland	573	8.0	1.5	8.3	23,527	x	x	x	x
Latvia	45	0.0	1.4	8.8	1,165	x	x	x	x
Russia, St. Petersburg	19	0.0	1.1	8.8		x [4]	x [5]	x	x
Russia, Podporozhye	183	5.7	1.9	9.2	2,253 [6]	x [4]	x	x	x
Sweden	2	-	-	-	1,992	x	x	x	x
Others					66 [7]				
Total	**855**	**6.6**	**1.6**	**8.4**	**30,495**				

- Not reported
1) Full-time equivalent on 31 Dec 2016 2) Lost-time accident 1 frequency rate. Accidents at work resulting to at least one day sickleave per million worked hours. 3) % of theoretical working time
4) Included in Metsäliitto Cooperative's quality systems (ISO 9001). 5) Included in Metsäliitto Cooperative's environmental systems (ISO 14001).
6) Includes all wood procurement from Russia. 7) Includes wood from Lithuania.

METSÄ WOOD

Mill	Country	Personnel				Production (1,000 m³)		Management systems			Chain of Custody			
		Number of employees [1]	Accident rate [2]	Sickness absenteeism % [3]	Organisational functionality index [4]	Wood products		ISO 9001	ISO 14001 [5]	OHSAS 18001	PEFC™	FSC®	CO_2 bio	CO_2 fossil
Lohja [7]	Finland	119	8.8	3.5	8.8	Kerto® LVL	88	x	x		x	x	30,157	723
Punkaharju [7]	Finland	427	10.0	4.5	8.1	Kerto® LVL and plywood	177	x	x	x [6]	x	x	79,269	416
Suolahti [7]	Finland	429	7.2	4.0	8.5	plywood	187	x	x	x	x	x	103,487	314
Boston	Great Britain	275	7.5	3.5		further processing	220	x	x	x	x	x	0	47
King's Lynn	Great Britain	39	26.4	1.1		further processing	112	x	x	x	x	x	0	143
Widnes	Great Britain	82	5.9	1.4		further processing	50	x	x	x	x	x	0	46
Others [8]		150												
Total		**1,521**	**8.2** [9]	**3.5** [9]	**8.3**		**835**						**212,913**	**1,688**

1) Full-time equivalent on 31 Dec 2016 2) Lost-time accident 1 frequency rate. Accidents at work resulting to at least one day sickleave per million worked hours. 3) % of theoretical working time
4) Organisational functionality indexes of Metsä Wood mills are calculated based on responses of white collars. UK mills not measured in 2016.
5) ISO 14001 standard includes the Energy Efficiency System (EES). 6) OHSAS concerns only plywood production.
7) Emissions, water use and wastes: Lohja includes 46% of Lohjan Biolämpö, Punkaharju includes 100% of Punkavoima and Suolahti includes 100% of Kumpuniemen Voima.
8) Includes personnel from sales operations and management. Personnel figures of Others are included in Metsä Wood's total figures. 9) Includes Finnish sawmills Jan–Oct 2016.

Metsä Wood's discharges to the water occur only in plywood production processes.

METSÄ FIBRE

Mill	Country	Personnel				Production		Management systems					Chain of Custody		
		Number of employees [1]	Accident rate [2]	Sickness absenteeism % [3]	Organisational functionality index [4]	Chemical pulp (1,000 t)	Sawn timber (1,000 m³)	ISO 9001	ISO 14001	ISO 50001	OHSAS 18001	ISO 22000	PEFC™	FSC®	CO_2 bio
Joutseno	Finland	135	0.0	3.9	8.3	619		x	x	x	x	x	x	x	1,288,946
Kemi	Finland	160	3.6	4.7	8.3	604		x	x	x	x	x	x	x	1,365,950
Rauma	Finland	119	0.0	4.6	8.0	585		x	x	x	x	x	x	x	1,166,712
Äänekoski	Finland	193	13.2	4.6	8.5	510		x	x	x	x	x	x	x	931,218
Eskola	Finland	11	0.0	1.2			49	x	x [5]		x		x	x	0
Kyrö	Finland	69	25.6	2.3			219	x	x [5]		x		x	x	23,212
Lappeenranta	Finland	59	9.5	4.6			234	x	x [5]		x		x	x	25,356
Merikarvia	Finland	74	7.9	6.0			227	x	x [5]		x		x	x	22,511
Renko	Finland	55	9.8	2.4			322	x	x [5]		x		x	x	32,184
Vilppula	Finland	76	11.5	3.3			481	x	x [5]		x		x	x	59,810
Svir	Russia	114	9.2	1.9			263	x	x [5]		x		x	x	18,653
Others [6]		166													
Total		**1,231**	**5.8** [7]	**3.7** [7]	**8.4**	**2,317**	**1,795**								**4,934,553**

1) Full-time equivalent on 31 Dec 2016 2) Lost-time accident 1 frequency rate. Accidents at work resulting to at least one day sickleave per million worked hours. Includes Finnish sawmills in Nov–Dec 2016.
3) % of theoretical working time. Includes Finnish sawmills in Nov–Dec 2016. 4) Organisational functionality indexes of Metsä Fibre mills are calculated based on responses of production personnel. Svir and Finnish sawmills not measured in 2016. 5) ISO 14001 standard includes the Energy Efficiency System (EES). 6) Includes personnel from sales operations, a subsidiary and management. Personnel figures of Others are included in Metsä Fibre's total figures. 7) Includes Finnish sawmills in Nov–Dec 2016.

At Metsä Fibre sawmills in Finland, waste water is treated in clarification basins, the volumes are very small and measurements of discharges to watercourse are not required.

FSC Licence Code FSC-C014476

Emissions to air (t)				Discharges to water (t)					Water use (1,000 m³)		Waste (t)			Mill
	Sulphur as SO_2	Nitrogen oxides as NO_2	Particles	COD	BOD	Total phosphorus	Total nitrogen	Total suspended solids	Water sourcing	Waste water flow	Utilised	Landfill	Hazardous	
	0.84	13	3.1	2.0	0.30	0.0050	0.042	0.33	99	60	222	0	105	Lohja
	2.8	70	0	40	24	0.010	0.090	0	38	3.8	244	66	127	Punkaharju
	0.11	150	57	31	55	0.68	0.70	23	1,168	60	349	82	53	Suolahti [7]
	0	0.080	0	0	0	0	0	0	0	0	2,912	0	34	Boston
	0.010	0.19	0.020	0	0	0	0	0	4.2	0	2,516	0	24	King's Lynn
	0	0.083	0	0	0	0	0	0	0	0	729	7	64	Widnes
														Others [8]
	3.8	**234**	**60**	**74**	**79**	**0.70**	**0.83**	**23**	**1,308**	**124**	**6,971**	**156**	**407**	**Total**

Emissions to air (t)				Discharges to water (t)						Water use (1,000 m³)		Waste (t)			Mill
CO_2 fossil	Sulphur as SO_2	Nitrogen oxides as NO_2	Particles	AOX	COD	BOD	Total phosphorus	Total nitrogen	Total suspended solids	Water sourcing	Waste water flow	Utilised	Landfill	Hazardous	
43,148	120	851	127	112	6,616	144	5.3	115	294	78,177	17,113	14,929	9,332	45	Joutseno
57,664	205	1,133	144	64	7,842	166	6.6	109	404	39,843	14,171	55,418	10,453	64	Kemi
75,083	81	871	120	71	8,714	122	4.3	53	292	18,948	14,720	467	13,930	157	Rauma
64,393	291	942	383	63	3,652	107	6.1	82	419	39,583	12,614	716	11,982	38	Äänekoski
0	0	0	0	0	0	0	0	0	0	0.037	0.037	3.0	3.0	0.010	Eskola
417	2.9	25	20	0	0	0	0	0	0	9.7	7.3	48	0	6.9	Kyrö
13	0.0010	29	31	0	0	0	0	0	0	168	2.1	678	7.8	0.75	Lappeenranta
563	0.041	23	23	0	0	0	0	0	0	13	8.5	3,734	83	4.7	Merikarvia
553	0.040	28	9.7	0	0	0	0	0	0	27	5.3	118	15	8.2	Renko
6,021	19	59	59	0	0	0	0	0	0	23	54	132	35	24	Vilppula
141	0.10	19	10	0	17	7.0	0.028	0.31	9.2	228	276	11,395	59	0.30	Svir
															Others [6]
247,996	**720**	**3,980**	**927**	**310**	**26,840**	**546**	**22**	**359**	**1,418**	**177,022**	**58,971**	**87,638**	**45,900**	**349**	**Total**

SUSTAINABILITY DATA BY UNIT

METSÄ BOARD

Mill	Country	Personnel				Production (1,000 t)		Management systems					Chain of Custody		
		Number of employees [1]	Accident rate [2]	Sickness absenteeism % [3]	Organisational functionality index [4]	Chemical pulp and CTMP	Board and paper	ISO 9001	ISO 14001	ISO 50001	OHSAS 18001	ISO 22000	PEFC™	FSC®	CO_2 bio
Joutseno	Finland	52	21.9	3.3		311		x	x	x	x	x	x	x	0
Kaskinen	Finland	80	7.2	3.1	8.6	327		x	x	x	x	x	x	x	130,715
Kemi	Finland	86	13.3	2.8	8.3		411	x	x	x	x	x	x	x	0
Kyro	Finland	217	12.9	4.5	8.3		227	x	x	x	x	x	x	x	0
Simpele	Finland	252	8.7	3.7	7.8		266	x	x	x	x	x	x	x	108,143
Tako	Finland	200	0.0	6.1	8.7		207	x	x	x	x	x	x	x	0
Äänekoski	Finland	173	3.4	4.4	8.5		219	x	x	x	x	x	x	x	140,350
Husum	Sweden	725	9.0	4.0	8.0	598	401	x	x	x		x	x	x	1,472,580
Others [5]		681													29,452
Total		**2,466**	**9.0**	**4.1**	**8.2**	**1,236**	**1,731**								**1,881,238**

1) Full-time equivalent on 31 Dec 2016
2) Lost-time accident 1 frequency rate. Accidents at work resulting to at least one day sickleave per million worked hours.
3) % of theoretical working time
4) Organisational functionality indexes of Metsä Board mills are calculated based on responses of white collars. Joutseno mill under 5 respondents.
5) Includes personnel from sales and logistics operations, management and subsidiaries. Production, emissions and waste originate from Äänevoima's production of energy sold for external use. Personnel figures of Others are included in Metsä Board's total figures.
6) Husum mill's BOD not measured.

METSÄ TISSUE

Mill	Country	Personnel				Production (1,000 t)		Management systems					Chain of Custody		
		Number of employees [1]	Accident rate [2]	Sickness absenteeism % [3]	Organisational functionality index [4]	Cooking papers	Tissue papers	ISO 9001	ISO 14001	ISO 50001	OHSAS 18001	ISO 22000 or BRC	PEFC™	FSC®	CO_2 bio
Mänttä	Finland	417	2.8	4.4	8.2	17	94	x	x	x		ISO 22000	x	x	0
Düren	Germany	108	5.0	6.2	8.5	26		x	x	x	x	BRC	x	x	0
Kreuzau	Germany	391	12.7	7.1	9.1		145	x	x	x	x	BRC	x	x	8,481
Raubach	Germany	280	2.2	5.2	9.0		50	x	x	x	x	BRC	x	x	0
Stotzheim	Germany	260	7.0	7.6	8.1		23	x	x	x	x	BRC	x	x	0
Krapkowice	Poland	355	6.3	4.7	8.6		74	x	x [5]		x	BRC	x	x	0
Žilina	Slovakia	315	0.0	3.0	8.6		78	x	x [5]		x	BRC	x	x	0
Katrinefors	Sweden	365	18.4	5.1	8.1		75	x	x	x			x	x	51,086
Nyboholm [6]	Sweden						29	x	x	x			x	x	7,647
Pauliström	Sweden	175	16.9	3.4	8.8		24	x	x	x			x	x	9,895
Others [7]		75													
Total		**2,741**	**7.6**	**5.1**	**8.5**	**43**	**591**								**77,109**

1) Full-time equivalent on 31 Dec 2016
2) Lost-time accident 1 frequency rate. Accidents at work resulting to at least one day sickleave per million worked hours.
3) % of theoretical working time
4) Organisational functionality indexes of Metsä Tissue mills are calculated based on responses of white collars.
5) ISO 14001 standard includes the Energy Efficiency System (EES).
6) Nyboholm mill's personnel figures are included in Pauliström mill's figures.
7) Includes personnel of others than mill locations. Personnel figures of Others are included in Metsä Tissue's total figures.

FSC Licence Code FSC-C014476

Emissions to air (t)				Discharges to water (t)						Water use (1,000 m³)		Waste (t)			Mill
CO_2 fossil	Sulphur as SO_2	Nitrogen oxides as NO_2	Particles	AOX	COD	BOD	Total phosphorus	Total nitrogen	Total suspended solids	Water sourcing	Waste water flow	Utilised	Landfill	Hazardous	
27,360	0	8.4	30	0	655	4.1	0.16	2.8	10	6,588	559	11,109	9.0	13	Joutseno
4,189	74	266	5.5	0	1,578	96	2.3	14	239	12,637	5,111	15,523	839	37	Kaskinen
6,432	0	2.8	0	0	308	42	1.1	31	106	9,556	7,379	7,386	897	10	Kemi
5,931	0	3.1	0	0	216	33	0.59	13	88	5,565	4,062	21,735	20	32	Kyro
85,966	113	135	3.0	0	390	21	1.4	12	45	25,332	5,631	10,205	25	121	Simpele
74,787	0.038	75	0	0	191	61	1.1	0.79	33	3,718	2,408	3,503	131	54	Tako
667	1.1	63	1.7	0	708	278	1.2	13	179	3,144	4,142	5,599	0	4.0	Äänekoski
63,013	271	1,218	98	45	7,511	-[6]	16	103	1,226	40,402	40,242	52,637	242	390	Husum
10,380	18	21	0.48	0	0	0	0	0	0	0	0	4,026	1.0	1.1	Others[5]
278,725	**477**	**1,792**	**139**	**45**	**11,557**	**534**	**24**	**190**	**1,925**	**106,942**	**69,533**	**131,723**	**2,164**	**662**	**Total**

Emissions to air (t)				Discharges to water (t)					Water use (1,000 m³)		Waste (t)			Mill
CO_2 fossil	Sulphur as SO_2	Nitrogen oxides as NO_2	Particles	COD	BOD	Total phosphorus	Total nitrogen	Total suspended solids	Water sourcing	Waste water flow	Utilised	Landfill	Hazardous	
13,674	0	5.8	0	332	39	0.75	15	45	3,062	4,588	17,493	1.1	14	Mänttä
23,514	0	13	0	34	4.4	0.22	0	4.4	746	441	444	0	159	Düren
87,486	0.33	90	0.21	418	19	0.93	0	19	2,677	1,854	104,395	6,739	40.6	Kreuzau
21,420	0.0085	12	0	185	4.9	0.25	0	4.9	446	490	37,026	0	37	Raubach
10,207	0.017	6.4	0	11	2.3	0.12	0	2.3	251	235	4,215	64	197	Stotzheim
31,452	0.30	13	31	49	3.9	0.55	5.4	4.3	840	635	5,951	3,399	0	Krapkowice
11,874	0.055	10	0.46	119	8.4	0.42	0	8.4	965	838	2,019	2,227	29	Žilina
12,988	7.9	122	1.3	51	29	0.29	13	50	1,858	1,868	35,648	0	29	Katrinefors
11,919	2.3	19	7.7	24	5.0	0.044	0.71	5.9	543	540	1,397	0	5.1	Nyboholm[6]
7,070	0.44	21	8.6	51	23	0.051	0.76	5.8	375	331	1,294	0	9	Pauliström
														Others[7]
231,604	**11**	**314**	**49**	**1,275**	**138**	**3.6**	**35**	**150**	**11,764**	**11,820**	**209,881**	**12,429**	**519**	**Total**

SCOPE OF THE REPORT

Metsä Group comprises Metsä Forest, Metsä Wood, Metsä Fibre, Metsä Board and Metsä Tissue, and our reporting covers the whole Group, including production, warehousing and sales units. Sustainability reporting follows the same principles of consolidation as our Financial Statements. Metsä Wood's sawmills were transferred to Metsä Fibre in 2016. Following this, sawmills are reported in Metsä Fibre figures.

Metsä Group reports its sustainability performance at the Group, business area and product levels. The Sustainability Report 2016 has been prepared according to the Global Reporting Initiative (GRI) guidelines (Standards). We have selected indicators most relevant to our operations, products and stakeholders based on an assessment of the most significant sustainability issues for the company and its stakeholders. The report covers major permit violations, claims, compensations and topics related to the Group that have gained public attention or may have caused a reputation risk in environmental or human resource management, or ethical business practices.

The Sustainability Report 2016 presents Metsä Group's approach to sustainability management and detailed performance indicators. The Annual Brochure 2016 includes a summary of the Group's sustainability work. The Group's subsidiaries Metsä Board and Metsä Fibre publish individual annual reports with brief presentations on sustainability work.

The sustainability performance data in this report and claims based on the data have been externally assured by an independent third party, Mitopro Oy → p. 67

MEASUREMENT TECHNIQUES FOR ENVIRONMENTAL DATA

The calculation coverage of the environmental parameters follows that of the financial accounting with the following amendments:

- Only material flows to and from industrial sites are included.
- Discharges to water through external wastewater treatment plants (typically municipal) are taken into account assuming an 85% reduction for COD. Emissions of BOD, phosphorus and suspended solids are calculated according to the flow with the following residual concentrations: BOD 10 mg/l; total phosphorus 0.5 mg/l; and total suspended solids 10 mg/l. The total nitrogen emission is regarded as zero because there is surplus nitrogen in municipal wastewaters and the reduction of our BOD binds nitrogen to biomass thus reducing the plant's total nitrogen emission.
- The emissions of external wastewaters treated at our wastewater treatment plants are excluded. The allocation of emissions between internal and external inflows is carried out assuming theoretical COD reductions for each inflow, which are then corrected according to the real COD reduction for the whole plant. Other emissions are allocated according to the flow.

Total energy consumption is expressed as primary fuel consumption and calculated assuming 40% energy efficiency for purchased electricity production and 85% energy efficiency for purchased heat production.

Environmental impacts, acidification and eutrophication are calculated by multiplying impact-causing emissions by coefficients. Acidification is expressed as sulphur dioxide equivalents. The coefficient for sulphur is 1 and for NOX 0.7. Eutrophication is expressed as phosphorus equivalents. The coefficient for total phosphorus is 1; for BOD 0.0088; for total nitrogen 0.14; and for NOX 0.0041. The greenhouse effect only consists of carbon dioxide emissions and has a coefficient of 1. The biogenic CO_2 emission coefficient for wood based fuels of 364 tonnes CO_2/GWh has been used.

In unit-specific data, discharges from wastewater plants serving several mills are allocated to units using the methodology explained above. Emissions from power plants separate to mill units are allocated to mills using the energy. In this allocation, the use of 1 MWh of electricity is double the value compared to the use of 1 MWh of heat.

The figures for BOD emissions do not include Husum mill as the measurement is not required by the authorities.

Waste volumes are reported including moisture. The use of temporary waste storage before final disposal at some mills gives some variations to the waste figures depending on how much waste is channelled to temporary storage and how much is taken from there on each year. Waste figures include volumes to final disposal (incl. material/ energy recovery, landfill, and hazardous waste disposal). Part of this volume comes straight from the mill process and a part is from the temporary storage. Waste volumes from mill process to temporary storage are not included.

TECHNIQUES IN MEASURING HR DATA

The data coverage follows that of the financial accounting with the following amendments:

- The coverage of the employee data was 99%. Employee data excludes statistics from Hangö Stevedoring.
- However the number of employees, sickness absenteeism, work accident absenteeism and lost time accident frequency rate (LTA1 fr) cover 100% of the employees. The number of employees is reported as full-time equivalent (FTE). The sickness absenteeism % and work accident absenteeism % are calculated per theoretical working hours. The lost time accident frequency rate (LTA1 fr) includes all accidents at work that have resulted in at least one disability day. The LTA1 fr is calculated as: accidents at work per million worked hours. Only accidents involving Metsä Group's personnel are included in the LTA1 fr indicator.
- The organisation functionality index is based on organisation functionality study results. These reflect the 26 defined Group-level topics that affect functionality of the organisation. Here, the overall level of organisation functionality is calculated for each company on a scale of 4–10. The organisational functionality research covered 47% of the employees.
- The registered occupational disease data covers 100% of employees.
- The share of women in management includes women in the Board of Directors, the Executive Management Team and the business area's management teams at the end of the year.
- New entries only include new permanent employees. Leavers only include permanent employees who left Metsä Group. Employee turnover includes all permanent leavers and redundancies as a result of the restructuring of the businesses, and is calculated against the average permanent head count. Calculation for retention rate is headcount of permanent employees subtracted with voluntary turnover divided by headcount of permanent employees.

INDEPENDENT ASSURANCE STATEMENT

To the management and stakeholders of Metsä Group

SCOPE AND OBJECTIVES

The Management of Metsäliitto Cooperative commissioned us to perform a limited assurance engagement on Metsä Group's Sustainability Report 2016 ("the Report"). The assurance engagement was conducted in accordance with the AA1000 Assurance Standard (2008) and as a type 2 engagement. We have duly performed an independent external assurance, the objective of which was to evaluate:

- Metsä Group's adherence to the AA1000 Accountability Principles of inclusivity, materiality and responsiveness;
- the reliability of performance information presented in the Report according to the Principles for defining report quality defined the Global Reporting Initiative Standard GRI 101 Foundation (2016);
- the compliance with the Global Reporting Initiative Standards in accordance criteria at the Comprehensive level.

RESPONSIBILITIES

Metsä Group's Management is responsible for the preparation of the Report and the performance data and statements presented therein, which the Board of Directors of Metsäliitto Cooperative has approved. Our responsibility as assurance providers is to express a conclusion based on our work performed. The criteria used for our assessment include the Global Reporting Initiative Standards (2016) and Metsä Group's own internal reporting guidelines.

THE PROVIDER'S INDEPENDENCE AND COMPETENCE

We have conducted our assessment as independent and impartial from the reporting organisation. We were not committed to any assignments for Metsä Group that would conflict with our independence, nor were we involved in the preparation of the Report. Our team consists of competent and experienced sustainability reporting experts, who have the necessary skills to perform an assurance process.

BASIS OF OUR OPINION

Assurance providers are obliged to plan and perform the assurance process so as to ensure that they collect adequate evidence for the necessary conclusions to be drawn. The procedures selected depend on the assurance provider's judgement, including their assessment of the risk of material misstatement adhering to the reporting criteria.

Our opinion is based on the following procedures performed:

- Interviews with 13 senior management representatives from Metsä Group and business areas to gain an understanding of the major impacts, risks and opportunities related to Metsä Group's sustainability agenda.
- Assessment of the procedures Metsä Group has in place to ensure the inclusivity of stakeholder engagement processes, the identification of material stakeholder expectations and the responsiveness to stakeholder concerns.
- Interviews with Metsä Group specialists responsible for sustainability performance data collection at Group-level and in selected sites.
- Review of Group-level systems and procedures to generate, collect and report sustainability performance data for the Report.
- Review of data sources, data generation and reporting procedures at Metsä Board Simpele mill in Finland, Metsä Tissue Zilina mill in Slovakia and Metsä Wood Suolahti mill in Finland.

CONCLUSIONS

Adherence to AA1000 Accountability Principles

Metsä Group has made a commitment to active stakeholder dialogue. Metsä Group has stakeholder engagement processes in place in order to understand stakeholder expectations and to response stakeholder concerns. The material topics presented in the Report correspond to stakeholder interests and major economic, environmental and social impacts in Metsä Group's value chain. It is our opinion that the Report gives a fair and balanced view on the material topics and stakeholder interests; and that Metsä Group adheres in its sustainability practices to the AA1000 Accountability Principles of inclusivity, materiality and responsiveness.

Sustainability performance data

We have reviewed the basis of the sustainability information provided in the Report. It is our opinion that the Report provides adequate information of Metsä Group's sustainability performance and the information is presented in accordance with the reporting criteria.

GRI in accordance criteria

The Report complies with the GRI Standards: Comprehensive option.

OBSERVATIONS AND RECOMMENDATIONS

Based on our review, we present the following observations and recommendations, which do not affect the conclusions presented above.

- Metsä Group has a widely-recognised role in progressing circular and bioeconomy. In 2016 Metsä Group continued stakeholder dialogue on the growth of bioeconomy and sustainable use of natural resources. We recommend that this dialogue will be further deepened to better understand different stakeholder views and to build sustainable solutions and initiatives for circular economy.
- Metsä Group has made good progress towards the Group-level sustainability targets. In 2016 goal-oriented work on sustainability continued and Metsä Group enhanced commitment to large-scale global sustainability targets represented by Sustainable Development Goals (SDGs). We encourage Metsä Group to continue this approach and seek possibilities to set even more challenging targets for its sustainability agenda.
- Metsä Group is well positioned to enhance sustainability and value creation in its value chain. In 2016 Metsä Group continued the work to better understand the company's total impact on society. We encourage Metsä Group to deploy this opportunity extensively to ensure both economic and societal value creation through sustainability.

Helsinki, 21 February 2017
Mitopro Oy

Mikael Niskala
Independent sustainability expert

Tomi Pajunen
Independent sustainability expert

GRI CONTENT INDEX – SHORT VERSION

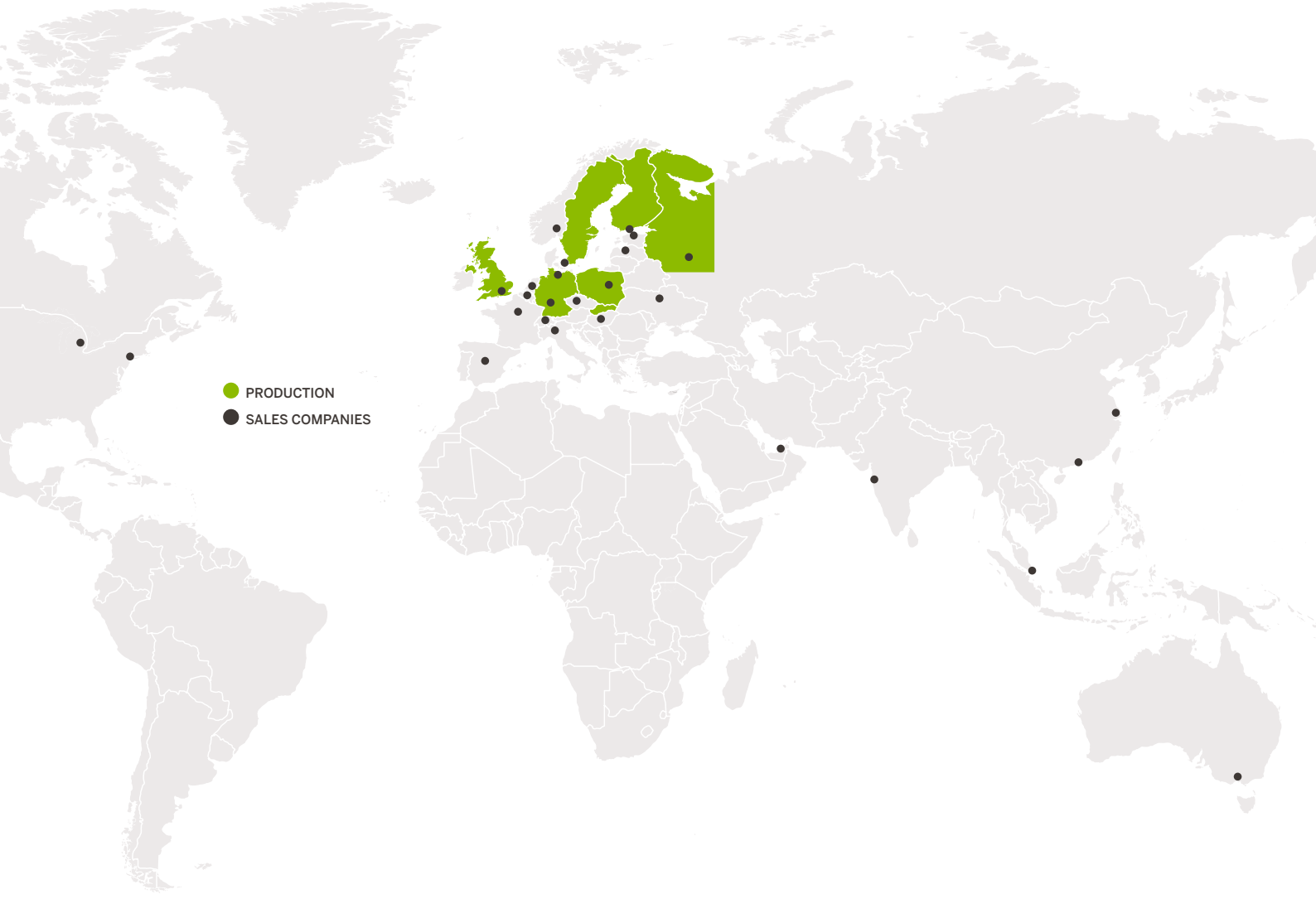
This table specifies the most relevant links between Metsä Group's material themes and GRI aspects. The aspects are based on Metsä Group's materiality analysis. GRI content focuses on the most significant impacts in Metsä Group's value network. For full GRI Content Index, please go to www.metsagroup.com/CSR.

METSÄ GROUP'S SUSTAINABILITY THEMES	METSÄ GROUP'S ASPECTS AND MATERIALITY	MATERIAL GRI TOPICS
WE OFFER SUSTAINABLE CHOICES	**Product and process innovation** p. 4, 12–15, 18–19, 22–23, 26–27	
	Product safety p. 24–25	Customer health and safety Marketing and labelling Customer privacy
	New bioproducts p. 16–19, 22–23	Materials
WE BRING THE FOREST TO YOU	**Sustainable forest management** p. 28–35	Biodiversity
	Sustainable supply chain p. 36–39	Procurement Supplier environmental assessment Supplier social assessment
WE WORK FOR A BETTER CLIMATE AND THE ENVIRONMENT	**Material and energy efficiency** p. 16–21, 40–41	Materials Energy
	Bioenergy p. 42–43, 48–49	Energy
	Emissions to water and air p. 40–41, 44–47	Emissions Effluents and waste Environmental compliance
	Water use p. 40–41, 44–45	Water
WE CREATE WELL-BEING	**Safety at work** p. 54–57	Occupational health and safety Training and education
	Supporting local livelihoods and society p. 50–54	Economic performance Indirect economic impacts Local communities
	Circular economy p. 6–7	Materials
OUR WAY OF WORKING	**Customer collaboration and partnerships** p. 14–26	Stakeholder engagement
	Responsible management and ethical business practices p. 60–61	Ethics and integrity Anti-corruption and bribery Anti-competitive behavior Employment Labor/management relations Diversity and equal opportunity Non-dicrimination Human rights assessment Public policy
	Open communication p. 2–11, 58–65	Socio-economic compliance

INTERNATIONAL METSÄ GROUP

Metsä Group is a Finnish forest industry group that operates on the international market. We have 35 production units in 7 European countries.

Sales companies, retailers and agents sell our products around the world. In addition, over 300 forest specialists serve forest owners in approximately 100 locations throughout Finland.



Make the most of Metsä

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