

# UPM CORPORATE ENVIRONMENTAL AND SOCIETAL RESPONSIBILITY STATEMENT 2018

# ABOUT THIS REPORT

## EMAS reporting at UPM pulp and paper mills

All of UPM's European pulp and paper mills as well as the Fray Bentos pulp mill in Uruguay and the Changshu paper mill in China are registered with the EU Eco-Management and Audit Scheme (EMAS), a voluntary environmental management system for companies and other organisations to improve, evaluate and report on their environmental performance on an annual basis.

UPM Corporate Environmental and Societal Responsibility Statement together with the Environmental and Societal Responsibility reports of each pulp and paper mill of UPM comprise the global EMAS statement of UPM Corporate. The statement has been done according to the European Commission regulation (EC) No 1221/2009.

Since 2018 societal responsibility indicators are part of all the mill supplements. UPM considers it is important to report all the impacts generated at the mill locations, whether it is environmental or societal.

Information within the corporate part concerning the sites mentioned here as well as the information used for calculation of UPM Corporate level EMAS core indicators has been assessed and verified by the respective national EMAS auditor.

The present EMAS corporate part is fully updated and can be found with the mill supplements at [upm.com](http://upm.com). The next Corporate Environmental Statement will be published in 2020.

## Corporate responsibility reporting at UPM

At UPM, the environmental and corporate responsibility reporting is integrated with the company's annual reporting. The UPM Annual Report 2018 follows the framework and disclosures of the Global Reporting Initiative's (GRI) Sustainability Reporting Standard and meets the requirements of the Core option. For the Annual Report and GRI content index table, please order a printed copy of the report or visit [upm.com/responsibility](http://upm.com/responsibility).

## Scope of the report

This statement forms the corporate part of the environmental and societal responsibility statement, which has been verified in accordance with the EU's Eco-Management and Audit Scheme (EMAS). The following sites are included in the EMAS scope:

- UPM Augsburg
- UPM Caledonian
- UPM Changshu
- UPM Chapelle Darblay
- UPM Ettringen
- UPM Fray Bentos
- UPM Hürth
- UPM Jämsä River Mills
- UPM Kaukas
- UPM Kymi
- UPM Nordland Papier
- UPM Pietarsaari
- UPM Plattling
- UPM Rauma
- UPM Schongau
- UPM Shotton
- UPM Steyrermühl
- UPM Tervasaari

Corporate registration number: FI-000058

## Information about sites without EMAS registration

The non-European site in UPM Blandin in USA is not EMAS registered. The information concerning this site has not been assessed or verified.

## UPM

We deliver renewable and responsible solutions and innovate for a future beyond fossils across six business areas: UPM Biorefining, UPM Energy, UPM Raflatac, UPM Specialty Papers, UPM Communication Papers and UPM Plywood. We employ around 19,000 people worldwide and our annual sales are approximately EUR 10.5 billion. Our shares are listed on Nasdaq Helsinki Ltd.

[upm.com](http://upm.com)

UPM **BIOFORE-BEYOND** FOSSILS

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# UPM IN BRIEF

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UPM delivers renewable and responsible solutions and innovates for a future beyond fossils. Over the years, the company has reported the environmental impacts of its pulp and paper mills in Europe, China and Uruguay according to the EU Eco-Management and Audit Scheme (EMAS). Today the reports also provide a thorough analysis of the company's societal impact at a local level.



# UPM – The Biofore Company

We deliver renewable and responsible solutions and innovate for a future beyond fossils across six business areas: UPM Biorefining, UPM Energy, UPM Raflatac, UPM Specialty Papers, UPM Communication Papers and UPM Plywood. We employ around 19,000 people worldwide and our annual sales are approximately EUR 10.5 billion.

Corporate responsibility is an integral part of all our operations and is seen as a source of competitive advantage. UPM is strongly committed to continuous improvement in economic, social and environmental performance.

## Pulp

We have three pulp mills in Finland and one in Uruguay. UPM Pulp serves the global market annually with 3.7 million tonnes of sustainably produced eucalyptus, birch and softwood pulp grades for a variety. The pulp mills are also producing wood-based renewable energy as well as by-products and residues, which are used for innovative bio-products.

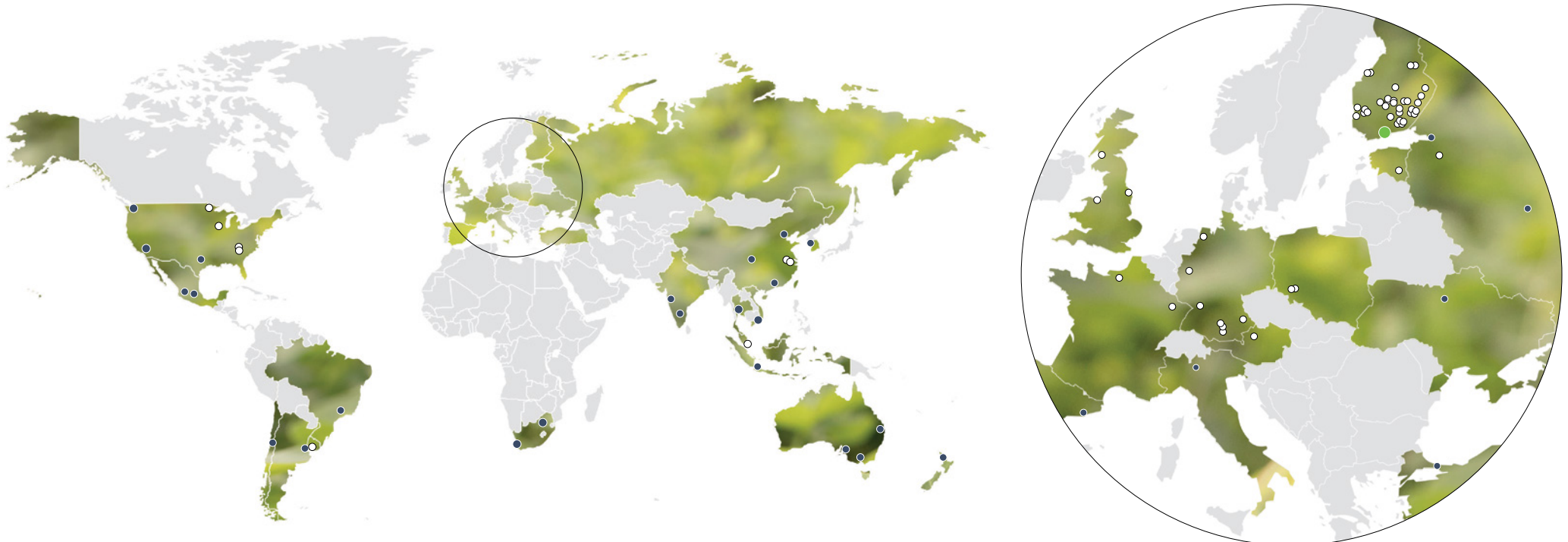
Pulp is a biodegradable raw material for numerous end-uses such as packaging materials, various papers, hygiene products, textiles as well as binders for cosmetics, pharmaceuticals, food, paints, etc.

## Paper

We have one Specialty Papers production unit in China and two units in Finland, with the combined capacity of 2 million tonnes. UPM Specialty Papers offers labelling materials and release liners, office and graphic papers as well as packaging papers.

We have 15 Communication Papers production units in Europe and in the USA, with the combined capacity of 8.2 million tonnes. UPM Communication Papers offer magazine paper, newsprint and fine papers for a wide range of end uses.

The decline in paper demand has been predictable and steady during recent years. Our focus has been on operational excellence to meet customer demand.





# Profiles of UPM pulp and paper mills

	Environmental management system		Quality management system	Health & safety system	Energy management system	Food safety management system	Paper machines	Paper grades	Chemical pulp grades	On-site pulping		Effluent treatment plant	Power plant and/or boiler	Fuels	
	ISO 14001	EMAS	ISO 9001	OHSAS 18001	ISO 50001 EES+*	ISO 22000				Mechanical pulping	Deinking			renewable	fossil
Augsburg, DE	x	x	x	x	x	–	1	LWC	–	x	x	municipal	x	–	x
Blandin, US	x	–	x	x	–	–	1	LWC	–	x	–	municipal	x	x	x
Caledonian, GB	x	x	x	x	–	–	1	LWC	–	x	–	municipal	x	x	x
Changshu, CN	x	x	x	x	x	–	3	fine (WFU, WFC), label	–	–	–	own	x	x	x
Chapelle Darblay, FR	x	x	x	x	x	–	1	newsprint	–	–	x	own	x	x	x
Ettringen, DE	x	x	x	x	x	–	1	SC	–	x	x	own	x	–	x
Fray Bentos, UY	x	x	x	x	x	x	–	–	eucalyptus pulp	–	–	own	x	x	x
Hürth, DE	x	x	x	x	x	–	1	newsprint	–	–	–	external	external	–	x
Jämsä River Mills, FI	x	x	x	x	x <sup>2)</sup>	x <sup>3)</sup>	6	SC, LWC, MFS, newsprint, label, packaging	–	x	x	own	x	x	x
Kaukas, FI	x	x	x	x	x <sup>2)</sup>	–	1	LWC	softwood and birch pulp	x	–	own	x	x	x
Kymi, FI	x	x	x	x	x <sup>2)</sup>	–	2	fine (WFU, WFC), label	softwood and birch pulp	–	–	own	x	x	x
Nordland, DE	x	x	x	x	x	–	4	fine (WFU, WFC)	–	–	–	own	x	–	x
Pietarsaari, FI	x	x	x	x	x <sup>2)</sup>	x	–	–	softwood and birch pulp	–	–	own	x	x	x
Platting, DE	x	x	x	x	x	–	3	SC, LWC	–	x	x	own	external	–	x
Rauma, FI	x	x	x	x	x <sup>2)</sup>	–	3	LWC, SC	–	x	–	own	x	x	x
Schongau, DE	x	x	x	x	x	–	3	SC, newsprint, MFS	–	x	x	own	x	x	x
Shotton, GB	x	x	x	<sup>1)</sup>	–	–	1	newsprint	–	–	x	own	x	x	x
Steyrermühl, AT	x	x	x	x	x	–	1	newsprint	–	x	x	own	x	x	x
Tervasaari, FI	x	x	x	x	x <sup>2)</sup>	x	2	label	–	–	–	own	x	x	x

<sup>1)</sup> OHSAS system in place, but not certified

<sup>2)</sup> EES+ certification

<sup>3)</sup> Label papers

\* Finnish authorities responsible for energy saving have developed Energy Efficiency System EES+. In terms of energy reviews the requirements of EES+ are consistent with the ISO 50001 standard. EES+ has been integrated with the ISO 14001 based environmental system at a mill.

LWC: light-weight coated paper  
 SC: supercalendered paper  
 WFC/WFU: woodfree coated/woodfree uncoated  
 MFS: machine-finished specialities

Numbers of personnel and capacity can be found in the mill supplements (available at [upm.com/responsibility](http://upm.com/responsibility)).

All certificates can be found from UPM's Certificate Finder (available at [upm.com/responsibility](http://upm.com/responsibility)).

# Safe, recyclable products from renewable raw materials

The main raw material for all UPM’s pulp and paper products is wood – a renewable natural resource. Paper can easily be recycled and used again. UPM uses significant amounts of recovered paper as raw material.

The choice of raw material used in paper production is based on the requirements of the end product. The production of different grades is optimised as much as possible according to the availability of raw materials in close proximity to UPM mills. Fresh wood is a natural raw material for grades made, for example, in Finland, and recycled fibre is used at the Central European mills.

## Typical end uses of UPM pulp and papers

PRODUCT GROUP	EXAMPLES OF END USES
Chemical pulp	Household and toilet papers, napkins, handkerchief tissue, consumer packages, labels, graphic papers, textiles and binders
Magazine papers	Magazines, advertising material, catalogues
Newsprint	Newspapers, newspaper inserts, supplements
Fine papers	Office papers, magazines, books, advertising material
Specialty papers	Face and release papers for self-adhesive labels, envelope papers

## Product safety

All UPM pulp products are elemental chlorine free (ECF) or total chlorine free (TCF) and UPM paper products are manufactured from elemental chlorine free (ECF) or total chlorine free (TCF) pulps.

They also fulfil the requirements of the European Packaging and Packaging Waste Directive 94/62/EC and its amendment Directive 2004/12/EC.

Product safety is the single most important responsibility related concern for UPM’s customers. To support its paper customers, UPM publishes Product Safety Profiles annually. Product Safety Profile is a tool to ensure that UPM’s customers receive all relevant product information in one concise resource. The document includes basic facts on product composition, product certificates, regulations related to product compliance and other possible measures taken to ensure that the product is safe.

The UPM Restricted Chemical Substances List (UPM RSL) was updated in 2018, and its implementation started in 2014. The UPM RSL includes nearly 6,000 substances that are either restricted or prohibited.

ISO 22000 food safety management system is used at all UPM pulp mills and at UPM Specialty Papers European mills to ensure food safety of products.

## Environmental product declarations

UPM provides environmental product declarations for pulp and paper. The data is presented as annual averages for a paper machine line or pulp mill.

Paper Profile is an environmental product declaration scheme developed and provided by leading paper producers ([paperprofile.com](http://paperprofile.com)). It covers key environmental aspects related to pulp and paper production including product composition and emissions, wood procurement and environmental management. Paper Profiles are available for all UPM paper machine lines.

Furthermore, UPM publishes detailed information about the carbon footprint of its pulp and paper products. The information is provided together with the Paper Profiles and the Pulp product declarations.

## Environmental labels

UPM pulp and paper products fulfil the criteria for most of the internationally recognised ecolabels. Thus UPM customers have the possibility of using a number of different ecolabels. Criteria for these labels can focus on one part of the supply chain only (for example FSC® and PEFC™ forest certification), or span a range of criteria from raw materials and the production process to the final product (for example the EU Ecolabel). Please see the respective mill supplement for up-to-date information about availability of environmental labels. All certificates can be found from UPM’s Certificate Finder (available at [upm.com/responsibility](http://upm.com/responsibility)).



# ENVIRONMENTAL PERFORMANCE

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All process water is treated in mechanical and biological effluent treatment plants before being released into watercourses.





# Environmental targets show direction

UPM's Biofore strategy guides us in the achievement of our responsibility targets for 2030 and in our contributions to UN Sustainability Development Goals (SDGs).

In order to guide our responsibility activities, we have established a set of responsibility focus areas with targets and key performance indicators which are reviewed every year based on a materiality analysis. We have also identified the SDGs where we have the most negative impact, and those where we can contribute most positively. Those most relevant SDGs for UPM are aligned with the responsibility focus areas.

In terms of environmental responsibility, the focus areas are sustainable products, the climate, the use of forests and water, and the reduction of waste.

UPM's environmental focus areas, key performance indicators and current Group-level performance in relation to the relevant targets can be seen in the table below. The annual target-setting of UPM's pulp and paper mills is published in the mill supplements. The mill-level targets reflect UPM's long-term targets at a local level. In addition, the mill-level targets focus on the specific local development areas.

ENVIRONMENTAL <sup>1)</sup>		
<b>Product stewardship</b> Taking care of the entire life cycle	<ul style="list-style-type: none"> <li>Environmental Management Systems in 100% use (continuous)</li> <li>Environmental Product Declarations for all products (continuous) <sup>2)</sup></li> <li>All applicable products eligible for ecolabelling by 2030</li> </ul>	<ul style="list-style-type: none"> <li>100% of production sites have a certified environmental management system</li> <li>Environmental declarations are available for all relevant UPM products</li> <li>85% (85%) of UPM sales were eligible for ecolabelling</li> </ul>
<b>Waste</b> Promoting material efficiency and circular economy – reduce, reuse and recycle	<ul style="list-style-type: none"> <li>No process waste sent to landfills or to incineration without energy recovery by 2030</li> </ul>	<ul style="list-style-type: none"> <li>90% (89%) of UPM's total process waste was recovered or recycled. The total amount of waste to landfills decreased by 2% compared to 2017.</li> </ul>
<b>Climate</b> Creating climate solutions and working towards carbon neutrality	<ul style="list-style-type: none"> <li>Fossil CO<sub>2</sub> emissions from its own combustion and purchased electricity (Scope 1 and 2) reduced by 30% by 2030</li> <li>Maximise the business benefits of greenhouse gas claims (continuous)</li> <li>Improve energy efficiency annually by 1% (continuous)</li> <li>70% share of renewable fuels (continuous)</li> <li>Acidifying flue gases (NO<sub>x</sub>/SO<sub>2</sub>) reduced 20% by 2030 <sup>3)</sup></li> </ul>	<ul style="list-style-type: none"> <li>Fossil CO<sub>2</sub> emissions reduced by 4% compared to 2017. Without sales of greenhouse gas claims of energy used by UPM, the reported emissions (Scope 1 and 2) would have been over 7% lower <sup>4)</sup></li> <li>UPM sold greenhouse gas claims worth nearly 1.1 million CO<sub>2</sub> tonnes</li> <li>Energy efficiency target was not achieved</li> <li>Level of 70% (69%) reached in the use of renewable fuels</li> <li>29% reduction achieved since 2008 for the UPM average product</li> </ul>
<b>Water</b> Using water responsibly	<ul style="list-style-type: none"> <li>Effluent load (COD) reduced by 40% by 2030 <sup>3)</sup></li> <li>Wastewater volume reduced by 30% by 2030 <sup>3)</sup></li> <li>100% of nutrients used at effluent treatment from recycled sources by 2030 <sup>3)</sup></li> </ul>	<ul style="list-style-type: none"> <li>29% reduction in effluent load achieved since 2008 for the UPM average product</li> <li>14% reduction in wastewater volume achieved since 2008 for the UPM average product</li> <li>22% (17%) of nutrients from recycled resources</li> </ul>
<b>Forests and biodiversity</b> Ensuring sustainable land use and keeping forests full of life	<ul style="list-style-type: none"> <li>100% coverage of chains of custody (continuous)</li> <li>All fibre certified by 2030 <sup>4)</sup></li> <li>Positive impact on biodiversity (continuous): implementing biodiversity programme and developing monitoring system <sup>5)</sup></li> </ul>	<ul style="list-style-type: none"> <li>Coverage is 100%</li> <li>81% (85%) of all wood used by UPM is sourced from certified forests</li> <li>Target was launched end of 2018</li> </ul>

<sup>1)</sup> Environmental targets: from 2008 levels

<sup>2)</sup> Includes paper, timber, plywood, pulp and label

<sup>3)</sup> Numerical targets relevant for pulp and paper production

<sup>4)</sup> Forest management certification

<sup>5)</sup> Covers UPM own forests in Finland

<sup>6)</sup> Scope 2 emissions 2017 were corrected due to sold claims that were not reported

# Environmental development – Pulp

Our annual pulp production capacity of 3.7 million tonnes is produced in Finland and in Uruguay. In May 2018, UPM concluded its latest focused growth investment to improve the efficiency and competitiveness of the UPM Kaukas pulp mill in Finland. The annual production capacity of the mill increased by 30,000 tonnes to 770,000 tonnes. In 2018 UPM continued studying the potential of building a new world-class pulp mill near the city of Paso de los Toros in central Uruguay. The possible pulp mill would have an annual capacity of approximately 2 million tonnes of eucalyptus market pulp.

## Fibre sources

In 2018, 86% of wood used in pulp production was from FSC® and/or PEFC™ certified forests with the remainder coming from controlled sources.

## Energy

UPM's pulp mills are more than self-sufficient in energy usage, providing surplus heat and electricity for the integrated paper mill or to external parties. The share of renewable energy remained on a good level at 93%. Fossil fuels are needed mainly for start-up of the boilers.

## Air

Over the last years, air emissions stayed on a quite stable level. However, in 2018 a slight increase in air emissions was reported.

## Water

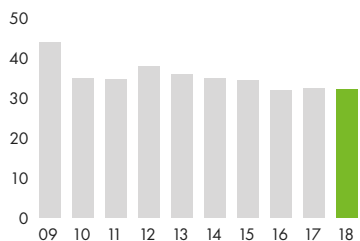
The waste water volume per tonne of chemical pulp decreased by 27% over the last ten years and slightly also in 2018. Parameters for the effluent load, like COD and AOX also decreased significantly over the last ten years by 39%, and 57% respectively, and slightly also in 2018.

## Waste

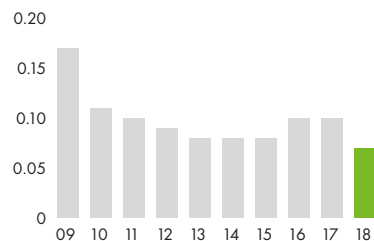
The total waste per tonne of chemical pulp decreased from 44 kg to 43 kg in 2018. Also the waste recycling rate increased to 63% in 2018 from 62% in 2017. Green liquor dregs are one of the most challenging side streams of UPM's pulp production. For several decades, efforts have been made to find a cost-efficient and sustainable alternative to landfill disposal. A new product innovation is currently being tested together with partners, and initial results have been promising. A possible breakthrough would significantly reduce the amount of waste from pulp mills in Finland in the near future.

Read more at [upmpulp.com](http://upmpulp.com)

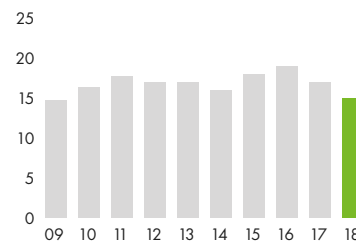
Process waste water volumes per tonne of chemical pulp m<sup>3</sup>/t



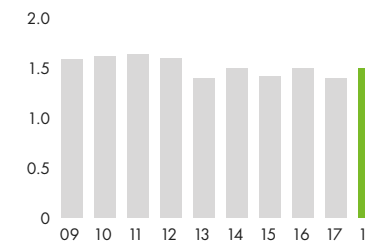
AOX load per tonne of bleached chemical pulp kg/t



Landfill waste per tonne of chemical pulp kg/t



NO<sub>x</sub> per tonne of chemical pulp kg/t



# Environmental development – Paper

In 2018, we announced three new focused growth investments. At UPM Jämsänkoski in Finland, we completed rebuilding a calender with 40,000 tonnes additional finishing capacity in 2018.

At UPM Nordland in Germany, we are converting PM2 for release liner production, with 110,000 tonnes annual impact, and at UPM Changshu in China, we are investing in PM3 release liner expansion, with an additional capacity of 40,000 tonnes. These two investments will be finished in 2019 and 2020.

In addition, in December 2018, we completed the new cut-size line at UPM Changshu in China. The capacity increase serves growing demand in Asia Pacific.

## Fibre

In 2018, 29% of all fibre used in UPM’s paper production was recycled fibre. In 2018, 89% of the fibres used in paper production was from FSC® and/or PEFC™ certified sources, the remainder came from controlled sources.

## Water

During the last ten years, the COD load (chemical oxygen demand) per tonne of paper has decreased by 9%, and process waste water volume per tonne of paper by 10%. As the waste water volume and COD load are already on a rather low level, further improvements of the volumes per tonne of product are getting more and more challenging. However, a slight improvement was achieved compared to 2017 in waste water volume, while COD and TSS (total suspended solids) stayed on a stable level.

## Air

In 2018, emissions of NO<sub>x</sub> and SO<sub>2</sub> per tonne of paper slightly increased compared to 2017. Emissions of fossil CO<sub>2</sub> per tonne of paper decreased from 301 kg in 2017 to 288 kg in 2018 due to increased share of biomass-based fuels.

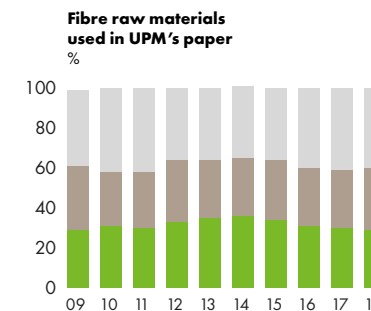
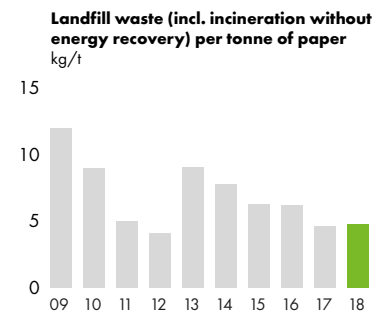
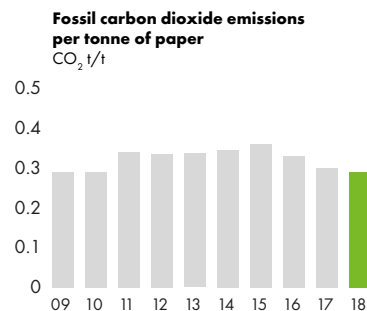
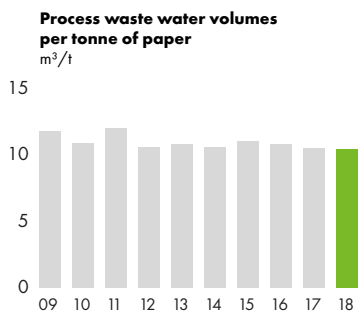
## Energy

The electricity consumption per tonne of paper remained rather stable compared to 2017, but has decreased by 4% during the last ten years due to continuous improvement of energy efficiency.

## Waste

During the last ten years the amount of landfilled waste per tonne of paper has decreased by 46%. However, in 2018 the amount of landfilled waste per tonne of paper increased by 4% in comparison to 2017. From 2012 to 2013 the amount of landfilled waste increased significantly. The reason was that former recycling possibilities for ash ceased at UPM Shotton. Starting from 2014, new methods of recycling were established, with further options still being investigated. Ash results from energy generation and is the biggest waste fraction for UPM’s paper mills. Overall for UPM’s paper mills in 2018, over 90% of waste was recycled or recovered.

Read more at [upmpaper.com](http://upmpaper.com)



■ Chemical pulp  
■ Mechanical pulp  
■ Recycled fibre (deinked pulp)

# Environmental development

## – Common topics for pulp and paper

### Supplier assessments and requirements

UPM requires its suppliers and third party intermediaries such as agents, consultants, advisers and joint venture partners to apply the principles of UPM's Code of Conduct and to fulfil the criteria concerning social and environmental responsibility. These requirements are defined in the UPM Supplier and Third Party Code, and suppliers are qualified against these requirements.

UPM's supplier risk assessment covers financial, quality, environmental, social, economic and delivery related risks. The human rights-related risk assessment of suppliers has been enhanced continuously. Based on the risk assessments, UPM selects the suppliers whose performance is assessed in more detail. UPM uses tools such as annual questionnaires, joint development plans and also supplier audits which are initiated based on identified risks or gaps in supplier performance.

### Clean Run

Clean Run aims to improve the environmental impact of all UPM operations. The goal is to significantly improve the current level of environmental performance and awareness, including better risk management.

The campaign has been visible in the pulp and paper mills since 2011, and has become a proactive way of managing environmental operations at the mills. Systematic reporting and follow-up of environmental deviations, including reporting of environmental observations, are in active use at all pulp and paper mills. Company-wide guidelines for producing reports according to five defined categories have been implemented. The five categories range from 1 (minor) to 5 (severe). Together with improved information sharing, Clean Run audits have helped to identify development issues and related best practices. With all of the actions taken, the "Clean Run Way of Thinking" is today part of daily routines.

In 2018, no serious environmental incidents occurred at UPM's pulp and paper mills. However, 26 (2017: 33; 2016: 33) minor temporary deviations from permit limits did occur. Those were immediately reported to authorities and corrective measures were taken to prevent similar situations from occurring again.

### Best Available Techniques (BAT)

The European IPPC Bureau has developed industry-specific reference documents. The document for the pulp and paper industry has been updated, and the conclusions were published by the EU Commission in September 2014. The BAT conclusions are now the reference for setting permit conditions for installations covered by the EU's Industrial Emissions Directive. The implementation period is four years. UPM is annually benchmarking its production lines against the BAT values.

# Environmental core indicators 2018

UPM PAPER MILLS				
Production	Scope: all UPM paper mills 9,060,000 t		Scope: EMAS-registered mills 8,840,000 t	
	Total amount per year	Indicator per tonne of paper	Total amount per year	Indicator per tonne of paper
<b>Energy efficiency</b>				
Electricity consumption	11,900 GWh	1,300 kWh/t	11,400 GWh	1,300 kWh/t
Steam consumption	10,800 GWh	1,200 kWh/t	10,300 GWh	1,200 kWh/t
Own energy generation	37 % renewable share		37 % renewable share	
Purchased energy	20 % renewable share		19 % renewable share	
<b>Material efficiency</b>				
Chemical pulp	2,490,000 t	280 kg/t	2,450,000 t	280 kg/t
Mechanical pulp	1,950,000 t	220 kg/t	1,840,000 t	210 kg/t
Recycled fibre pulp	1,850,000 t	200 kg/t	1,850,000 t	210 kg/t
Minerals	2,150,000 t	240 kg/t	2,090,000 t	240 kg/t
Binder	257,000 t	28 kg/t	248,000 t	28 kg/t
<b>Water</b>				
Water intake	222,000,000 m <sup>3</sup>	25 m <sup>3</sup> /t	199,000,000 m <sup>3</sup>	23 m <sup>3</sup> /t
Process waste water	96,600,000 m <sup>3</sup>	11 m <sup>3</sup> /t	90,700,000 m <sup>3</sup>	10 m <sup>3</sup> /t
COD	27,400 t	3 kg/t	26,600 t	3 kg/t
TSS	2,700 t	0.3 kg/t	2,700 t	0.3 kg/t
<b>Side-products<sup>1)</sup></b>				
Ash	183,000 t	20 kg/t	183,000 t	21 kg/t
Wood residues	117,000 t	13 kg/t	117,000 t	13 kg/t
Others	62,300 t	7 kg/t	62,300 t	7 kg/t
Others	3,900 t	0.4 kg/t	3,900 t	0.4 kg/t
<b>Waste, non-hazardous<sup>1)</sup></b>				
	553,000 t	61 kg/t	536,000 t	61 kg/t
<b>Recycling, energy recovery, composting</b>				
Ash <sup>2)</sup>	500,000 t	55 kg/t	498,000 t	56 kg/t
Sludges	241,000 t	27 kg/t	241,000 t	27 kg/t
Others	200,000 t	22 kg/t	200,000 t	23 kg/t
Others	60,300 t	7 kg/t	57,600 t	7 kg/t
<b>Intermediate storage</b>				
Ash	8,800 t	1 kg/t	8,800 t	1 kg/t
Others	8,700 t	1 kg/t	8,700 t	1 kg/t
Others	20 t	0 kg/t	20 t	0 kg/t
<b>Landfill, incineration without energy recovery</b>				
Ash <sup>2)</sup>	43,600 t	5 kg/t	29,500 t	3 kg/t
Sludges and pulper rejects	17,000 t	2 kg/t	16,400 t	2 kg/t
Others	22,700 t	3 kg/t	9,800 t	1 kg/t
Others	4,000 t	0.4 kg/t	3,400 t	0.4 kg/t
<b>Recycling rate</b>				
	91 %		93 %	
<b>Hazardous waste</b>				
	2,800 t	0.3 kg/t	2 700 t	0.3 kg/t
<b>Emissions</b>				
CO <sub>2</sub> fossil	2,630,000 t	300 kg/t	2,525,000 t	300 kg/t
NO <sub>x</sub> , as NO <sub>2</sub>	3,800 t	0.4 kg/t	3,400 t	0.4 kg/t
SO <sub>2</sub>	740 t	0.1 kg/t	670 t	0.1 kg/t
Particulates	69 t	0.01 kg/t	58 t	0.01 kg/t

<sup>1)</sup> Reported in dry tonnes

<sup>2)</sup> Including ash, which is considered as hazardous waste in the UK

<sup>3)</sup> Main chemicals used: oxygen gas, sodium hydroxide, sodium chlorite or chlorate, sulphuric acid, limestone, hydrogen peroxide

UPM CHEMICAL PULP MILLS		
Production	Scope: all UPM pulp mills 3,510,000 t	
	Total amount per year	Indicator per tonne of chemical pulp
<b>Energy efficiency</b>		
Electricity consumption	2,300 GWh	650 kWh/t
Steam consumption	10,700 GWh	3,100 kWh/t
Own energy generation	93% renewable share	
Purchased energy	94% of energy is generated internally	
<b>Material efficiency</b>		
Wood	16,000,000 m <sup>3</sup>	5 m <sup>3</sup> /t
Process chemicals <sup>3)</sup>	409,000 t	120 kg/t
<b>Water</b>		
Water intake	220,000,000 m <sup>3</sup>	63 m <sup>3</sup> /t
Process waste water	113,000,000 m <sup>3</sup>	32 m <sup>3</sup> /t
COD	35,100 t	10 kg/t
TSS	1,300 t	0.4 kg/t
AOX	250 t	0.07 kg/t
<b>Side-products<sup>1)</sup></b>		
Green liquor dregs	3,100 t	1 kg/t
Lime	2,800 t	1 kg/t
Lime	310 t	0.1 kg/t
<b>Waste, non-hazardous<sup>1)</sup></b>		
	150,000 t	43 kg/t
<b>Recycling, energy recovery, composting</b>		
Sludges	94,900 t	27 kg/t
Bark and wood waste	15,400 t	4 kg/t
Others	65,800 t	19 kg/t
Others	13,700 t	4 kg/t
<b>Intermediate storage</b>		
Bark and wood waste	1,900 t	1 kg/t
Lime	1,300 t	0.4 kg/t
Lime	260 t	0.1 kg/t
Construction waste	300 t	0.1 kg/t
Others	110 t	0.3 kg/t
<b>Landfill</b>		
Green liquor dregs	52,800 t	15 kg/t
Sludges	36,600 t	10 kg/t
Sludges	7,000 t	2 kg/t
Lime	6,300 t	2 kg/t
Others	2,900 t	1 kg/t
<b>Recycling rate</b>		
	63 %	
<b>Hazardous waste</b>		
	770 t	0.2 kg/t
<b>Emissions</b>		
CO <sub>2</sub> fossil	323,000 t	92 kg/t
NO <sub>x</sub> , as NO <sub>2</sub>	5,200 t	2 kg/t
SO <sub>2</sub>	240 t	0.1 kg/t
Particulates	740 t	0.2 kg/t
TRS	86 t	0.02 kg/t



# SOCIETAL PERFORMANCE

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Volunteers at the UPM Changshu Mill in China spread green awareness and social wellbeing through youth-driven projects. Wang Feng has been regularly visiting local schools to educate kids about low-carbon living and energy saving as part of the UPM Green Future project.



# UPM plays a significant role in contributing to societal development

Transparent reporting on all the aspects of responsibility, including environmental, social and economic is very important in UPM. In 2017 we expanded our EMAS reports to cover local societal impacts in addition to the traditionally reported environmental performance. With “societal” we refer both to the socio and economic impacts.

Each mill presents its most important societal impacts in its mill supplement. Many issues are similar to all the mills. The mill supplements provide e.g. information on our contribution to employment, health and safety of employees, tax income and purchasing power, responsible sourcing as well as co-operation with the communities.

## Employment

EMAS mills employed directly around 10,000 people in 2018. In addition, significant indirect employment impacts are generated by use of raw materials and services. We have been able to calculate the indirect employment effects for Finnish EMAS mills using a mathematical model developed by the Research Institute of the Finnish Economy (Etlä). The model is based on input-output statistics from Statistics Finland. Those statistics show how companies from different industries buy goods and services from each other. The six EMAS production units in Finland generated around 3,920 direct jobs and around 3,860 indirect jobs in the region in 2018.

## Health and safety

Our goal in UPM is to be the industry leader in health and safety. Our employees, as well as business partners and their employees, are required to adopt safe work practices and to comply with the rules and standards we have established.

In 2018, in the entire UPM, lost-time accident frequency (LTAF, the number of lost-time work accidents per one million hours of work) was 2.7 (3.3 in 2017). The total recordable injury frequency (TRIF) improved, reaching 6.9 (8.2). The TRIF includes LTA cases as well as cases of modified duties and accidents requiring medical treatment. A similar positive

development was achieved in contractor safety. The frequency of accidents involving UPM’s contractors was 2.9 (LTAF) and 6.6 (TRIF) in 2018. The mill specific safety figures can be found in the mill supplements.

We are working closely with employees and external occupational health organisations to support the wellbeing of our personnel. Our aim is to support the continuous improvement of employees’ health, quality of life and ability to perform. Our quarterly global health and safety themes focused on e.g. how to stay vigilant and alert at work, how to take care of your personal mental and physical recovery, and how to avoid accidents at home and during your free time. Based on local need, we also launched several health and wellbeing initiatives at various UPM sites and in various businesses, with positive results.

UPM’s economic impact spreads not just on the corporate or country level but also in the local communities.



### Purchasing power

Effects on the consumption generated by the Finnish mills were also calculated by the earlier mentioned Etlä's model. Consumption impacts are generated by employees working at the mill and employees working at the value chain of the mill, typically working in other industries. That presents direct and indirect employees' private consumption of commodities through net income. Consumption impact generated by the six EMAS sites in Finland in 2018 was around EUR 180 million locally and EUR 340 million nationally.

### Tax impact

Tax income generated by our business operations is an essential part of our societal impact as the tax income strengthens the vitality of the local community and supports public services. UPM pays corporate income taxes in the countries where added value is created and profit is generated. Based on UPM's corporate and operational structure, UPM reports and pays its corporate income taxes mainly in countries where production activity takes place and where innovations are developed. In 2018, entire UPM's corporate income taxes paid and property taxes were approximately EUR 283 million in total (EUR 251 million in 2017).

In addition to the taxes on income, UPM's various production inputs and outputs are also subject to taxation, which is either paid by UPM (e.g. energy taxes and real estate/property taxes) or collected by UPM (e.g. VAT, payroll taxes and social security contributions). Taxes are paid in accordance with the local tax legislation and regulations of the country in question.

The mills' operations benefit the local community in many ways. Municipal share of corporate income taxes and real estate taxes paid by UPM support the economy of the local community. In addition, the income taxes on salaries and social security contributions paid by UPM employees have also a significant local impact. Local tax impact figures are presented in the EMAS mill supplement for France, China, Austria, Uruguay and Finland. Those ten EMAS mills in their respective municipalities/countries generated in total approximately EUR 220 million local tax impact (when including e.g. the above mentioned local taxes). EMAS mills in the UK and Germany have not published their local tax footprint in 2018 mill supplements, but in Germany, the 6 EMAS mills generated in total around EUR 120 million local tax impact including income taxes on salaries and social security contributions, municipal trade taxes and real estate taxes.

### Co-operation with communities

We are committed to developing the vitality of the communities close to our operations through active co-operation and open dialogue with local stakeholders as well as, for example, through sponsorships and employee volunteering under the umbrella of our Biofore Share and Care programme. The four focus areas of UPM's Biofore Share and Care programme are: Reading & learning, engaging with communities, responsible water use and boosting bioinnovations.

The mills' engagement with the local communities are for example cases in which support has been given to the local educational institutions and associations or community consultation via regular roundtables with local stakeholders. Details about the mills' engagement activities can be found from the mill supplements.

### Responsible sourcing

UPM is committed to responsible sourcing practices throughout the entire supply chain. We work closely with our suppliers to ensure that our suppliers understand and meet all of the company's requirements. UPM requires its suppliers to comply with the UPM Supplier and Third Party Code that defines suppliers' minimum requirements in terms of responsibility with regard to matters such as environmental impact, human rights, labour practices, health and safety, product safety, corruption and bribery.

UPM's target is to have 100% of raw material spend and 80% of all spend qualified against UPM Supplier and Third Party Code by 2030 (Qualified spend). In 2018, 94% of UPM's raw material spend and 83% of all spend was qualified against the UPM Supplier and Third Party Code.



# ENVIRONMENTAL MANAGEMENT

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UPM Forestal Oriental's employees working at the nursery located in Paysandú, Uruguay. This modern nursery specialises in *Eucalyptus dunnii*.



# Environmental management based on continuous improvement

At UPM, environmental management is guided by UPM's Biofore strategy – as well as by our Code of Conduct<sup>1)</sup> and Environmental Rules<sup>2)</sup>.

## Integrated management systems

The mills' certified management systems are the practical tools used for environmental management. These systems embrace the principles of continuous improvement by target setting and monitoring of the implementation. All mills work with integrated management systems. All mills have certification to ISO standard 14001 for environmental management system. Additionally, quality, health and safety issues as well as energy are included in the mills' management systems and at many mills such systems are certified to the ISO 9001 standard and OHSAS 18001 specification and ISO 50001 standard or Energy Efficiency System+ (in Finland). All UPM pulp mills and mills in the UPM Specialty Papers business area in Finland have also Food Safety management system, ISO 22000, in place. The Chain of Custody system for monitoring the origin of wood is also part of the mills' integrated management systems.

Competencies, responsibilities and procedures relating to quality, environment or occupational health and safety are described in the mills' management manual and the accompanying process and work instructions documentation. Internal audits and management review are carried out at the mills in accordance with the requirements of the standards. Existing warning and protection systems, compliance with relevant legal and statutory requirements and the control of measuring equipment are all firmly integrated in the mills' management systems.

## Organisation

The mills are responsible for ensuring that external obligations are met and that targets established internally are reached. The mills' environmental managers or management appointee act as experts and handle practical aspects, development, co-ordination of environmental matters and reporting. The VP, UPM Responsibility, is responsible for Group-wide environmental issues.

Environmental issues are part of the day-to-day work of the entire personnel. Environmental competence is essential and respective training is organised with, for example, regular training for chemical handling, safety and risk management or general introduction for new employees.

Indirect environmental impact arising, for example, from raw material procurement and transportation are also taken into consideration. The mills co-operate with the global functions responsible for these issues within the Group.

<sup>1)</sup> Read more at [upm.com/responsibility](https://www.upm.com/responsibility)

<sup>2)</sup> See more on page 39



Guillermo Ponte from UPM Fray Bentos pulp mill having a regular fire brigade training with his team.



### Continuous improvement

Environmental management is based on continuous identification of the factors influencing the environmental impact of the operations. Environmental impact is the starting point for annual target-setting and development of detailed environmental programmes with measures, schedules and responsibilities. Attainment of the targets is monitored regularly.

In addition to the specific targets outlined by the individual mills, the Group sets common long-term goals that apply to all sites, such as increasing the proportion of certified wood, decreasing water consumption and increasing the reuse of waste (see page 9).

### Management of environmental risks

All mills take specific actions to prevent environmental hazards. Environmental risk assessments have been carried out to identify potential risks. The most significant risks at the pulp and paper mills relate to process malfunctions and to the transportation, storage and handling of chemicals at the mills. The results of the risk assessments are documented at the mills. This data is updated if any changes are made to the process. To reduce the identified risks, the mills provide guidance and training and carry out process modifications and investments when needed.

In the event of accidents or emergencies, the mills take precautions to prevent or mitigate the harmful environmental impact. Most mill sites have their own fire department or fire crews who are trained in such a way that they are also able to intervene in case of chemical accidents.

The mills' effluent treatment plants are equipped with a containment basin to deal with process malfunctions and chemical accidents. The water contained in these basins, can be cleaned in a controlled manner without jeopardising the treatment plant's operation.

### Environmental communication

In accordance with our corporate values, UPM informs stakeholders about its environmental activities openly and actively.

The aim is to ensure a rapid and accurate flow of information to the Group's personnel, residents in the mill locations and other stakeholders. Separate guidelines have been drawn up for exceptional situations.

Fire crisis situations are regularly trained in every UPM unit. In this picture the team Gerardo Cardozo (left), Patricia Aboal and Julio Sanchez practise their skills at UPM Fray Bentos pulp mill in Uruguay.



# MANUFACTURE OF PULP AND PAPER

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120 years old UPM Griffin is the oldest company logo in Finland. UPM Griffin is also displayed on the first sheet of each pulp bale that leaves UPM Kymi pulp mill. In the picture Jyri Kylmä, the General Manager of UPM Kymi mill checks the cover sheet and logo.



# From wood fibres to pulp and paper

The raw materials used in papermaking are mechanical and chemical pulp made from fresh wood fibre and recycled fibre pulp. In addition to fibre raw materials, the process requires water, and some paper grades require mineral fillers, coating pigments and binders. Different process chemicals are used during pulp processing and to improve the paper's runnability on the paper machine and the quality of the end products.

The process flowchart and descriptions on the following pages present the main stages of pulp and paper manufacture.

## MANUFACTURE OF MECHANICAL PULP

### Debarking

Mechanical pulp is produced from fresh spruce logs. The logs are passed through a debarking drum; the bark is burned in a bark boiler to produce electricity and heat, or otherwise reused. Chips produced as by-products at sawmills are also used.

### Manufacture of mechanical pulp

Wood fibres are separated from each other by mechanical pressure. Frictional forces transform the mechanical effort into heat, which softens the lignin acting as a binder between the wood fibres and thus breaks the inter fibre bonds.

In the manufacturing process of refiner mechanical pulp, wood is chipped and the chips are refined into pulp in refiners. In thermomechanical pulping (TMP), pressure and heat are used to speed up the separation of the fibres, and part of the heat generated is recovered and used for paper drying.

In the manufacture of groundwood pulp, entire spruce logs are pressed against a rotating grindstone. Pressure and heat may be used to boost the grinding process.

As lignin is still present in the finished mechanical pulp, wood pulp yield in mechanical pulp production is twice the yield obtained in the chemical pulping process. However, mechanical pulp production requires a lot of electricity.

### Bleaching

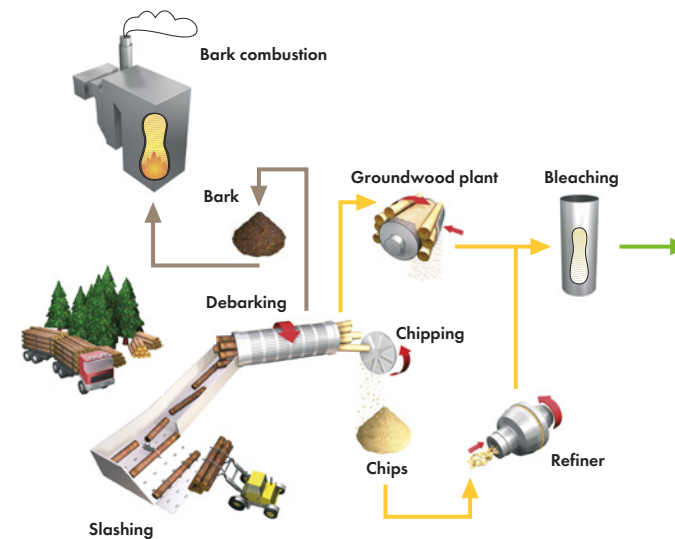
Mechanical pulps are bleached using hydrogen peroxide or dithionite. Furthermore, auxiliary chemicals are used in bleaching to regulate the acidity of the process and to ensure the desired effect of the bleaching chemicals.

### Properties of mechanical pulp

Mechanical pulp is used in the manufacture of printing papers on account of its economic advantages and its optical characteristics. It is used in products that are not archived, because the lignin, i.e. the binder contained in the pulp, turns yellow due to the effect of UV light.



Pine, spruce, birch and eucalyptus are the raw materials used for the production of sulphate pulp. The debarked wood is chipped and screened before the pulp cooking process. The picture shows the pine, spruce and birch chip stores at the UPM Kymi pulp mill in Finland.



## MANUFACTURE OF CHEMICAL PULP

Pulps prepared from different tree species have different properties. Long fibre softwood pulp is used to increase the paper's strength and to improve its runnability on the paper machine. Short fibre hardwood pulp improves the paper's printing properties. Bleached chemical pulp preserves its properties and its brightness even when printed products are archived for a long period.

### Debarking

Pine, spruce, birch and eucalyptus are the raw materials used for the production of sulphate pulp. The pulp preparation process begins with the debarking of the logs in the debarking drum. The bark is burned in a bark boiler to produce electricity and heat.

### Chipping

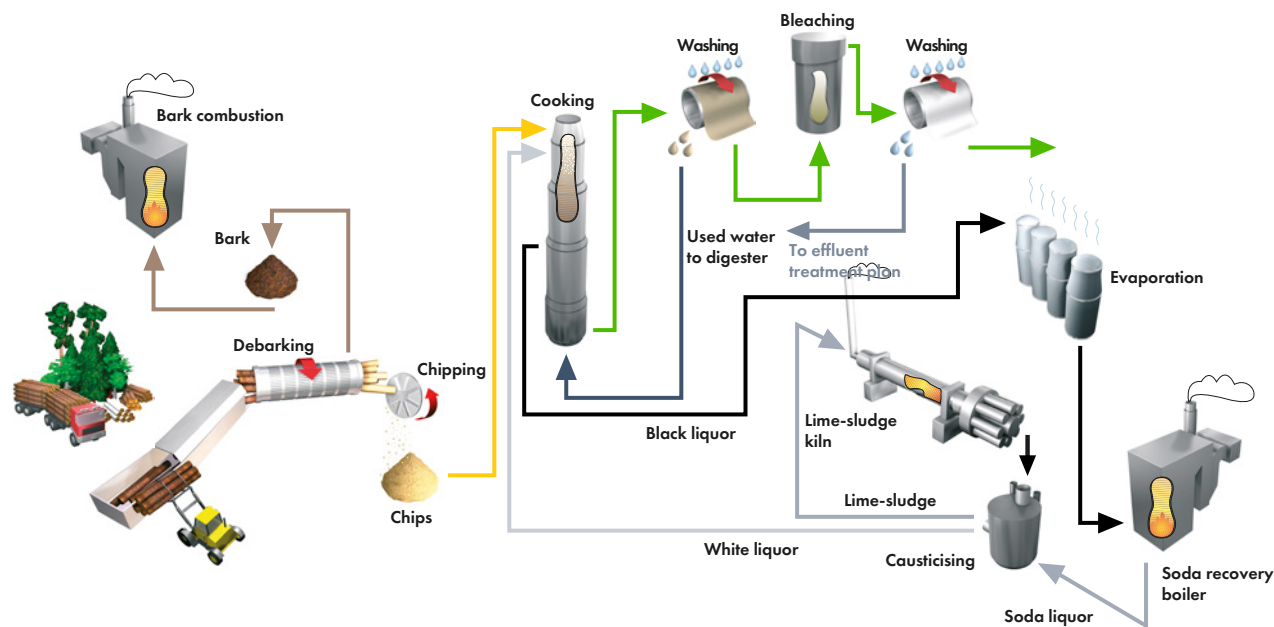
The debarked wood is chipped and screened. Additionally, chips produced from slabs and sticks and created as sawmill by-products are used.

### Cooking

In the manufacture of chemical pulp, wood fibres are separated from each other by dissolving the lignin, i.e. the substance acting as a binder between fibres, by means of chemicals and heat. In the sulphate process, chips are cooked in a liquor containing sodium hydroxide and sodium sulphate as chemical agents. This mixture is called white liquor. During the cooking, about half of the wood raw material is dissolved in the cooking liquor. For this reason, the yield is only about half of that obtained in mechanical pulping.

### Washing

The cooked pulp is washed with hot water. The used waters are directed in a counterflow direction to the digester to be used as washing waters. The washing water leaves the digester in the form of diluted black liquor containing the dissolved wood and the used cooking chemicals and enters the evaporation stage.



### Bleaching

After cooking, sulphate pulp is brown. It is then bleached in a multistage process. The bleaching agents used at UPM's mills are oxygen, hydrogen peroxide, chlorine dioxide and ozone. The washing waters from the bleaching stages, after the oxygen stage, are pumped to the effluent treatment plant.

### Evaporation

In evaporation, water is removed from the black liquor in several stages, so that the resulting high concentration black liquor contains only about one-fifth water.

### Soda recovery boiler

Black liquor is burned in the soda recovery boiler to recover energy in the form of heat and electricity. The chemical pulp mill produces energy not only for its own needs but also for the paper mills or external parties. From the soda recovery boiler, the cooking chemicals are recovered as soda liquor.

### Causticising

In causticising, the sodium carbonate contained in the soda liquor is reconverted into sodium hydroxide by means of burned lime. In this way, the soda liquor is reconverted into white liquor. Causticising transforms the burned lime into calcium carbonate, i.e. lime-sludge.

### Lime-sludge kiln

The lime-sludge is separated from the white liquor and washed and reconverted into burned lime in the lime-sludge kiln.



## MANUFACTURE OF RECYCLED FIBRE PULP

### Pulping

The production of recycled fibre pulp begins by processing the recovered paper in a drum pulper, in which the stock is diluted to form a pulp-water slurry. Plastic, metal and other impurities contained in recovered paper are removed by screening and reused when possible or taken to a landfill. When using old corrugated cardboard for the production of specialty papers no further process steps are needed. When using recovered graphic paper for the production of new graphic paper the following process steps are needed to produce so-called deinked pulp.

### Flotation

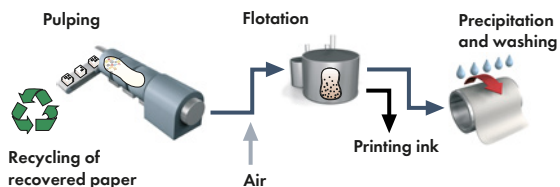
In flotation, soap is added and air is blown into the pulp/water mixture to remove the printing ink. The hydrophobic printing ink particles adhere to the ascending air bubbles, and the foam formed on the surface is removed.

### Screening and washing

After the flotation, the pulp is screened to remove any remaining impurities. Finally the pulp is washed.

### Deinking residues

About 70–80% of the recovered paper delivered to the mills can be used to produce new paper. Losses are mainly so-called deinking sludge from the flotation process (too short and brittle fibres, pigments and printing inks). The fibrous sludge generated is dried and burned at the mill's power plants to produce electricity and heat, or dispatched to be used in other applications.



## MANUFACTURE OF PAPER

### Paper stock

Fibres (mechanical, chemical and/or deinked pulp), fillers and additives are mixed to form a slurry consisting of more than 99% water.

### Wire section

The pulp slurry is spread on the wire, i.e. the plastic fabric on which the paper web is formed as the water drains away through it by means of suction. A dry matter content of about 20% is achieved at the wire section.

### Press section

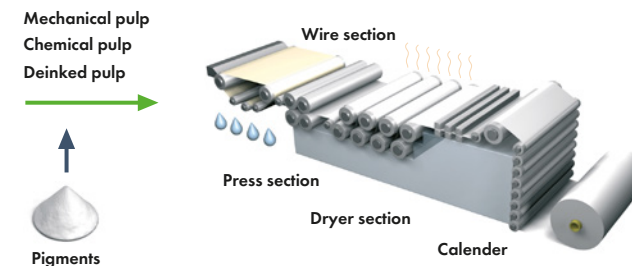
The wet paper web is pressed between felts and rolls to obtain a dry matter content of some 45%.

### Dryer section

In final drying, a dry matter content of 90–95% is achieved by dewatering the web through evaporation using hot cylinders. The heat used for drying is recovered and the water vapour is discharged into the air. The "plume" emitted from the exhaust stacks of a paper mill consists of this water vapour.

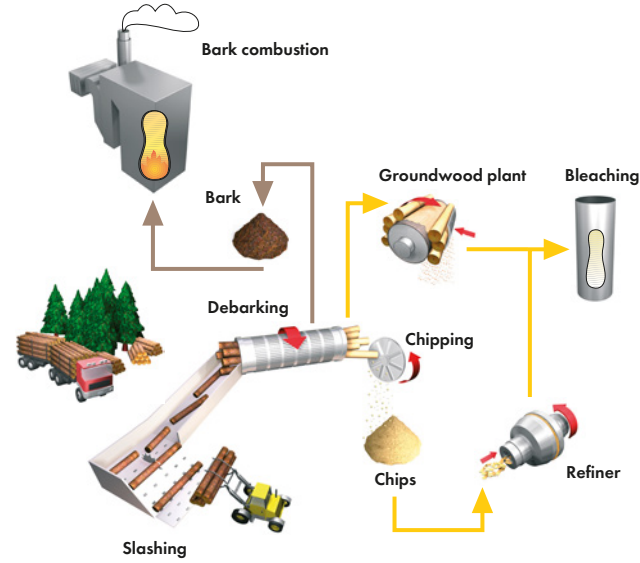
### Coating, calendering and finishing

The quality and properties of paper can be finished on a calender placed either on or off the machine and/or by coating the paper. The calender smooths the surface of the paper by passing it once or several times through a series of nips. Paper can be coated several times. The coater unit is used for applying a coating colour, after which the paper web is dried. The machine or parent reel is cut into smaller rolls that are more suitable for further processing, or into sheets.

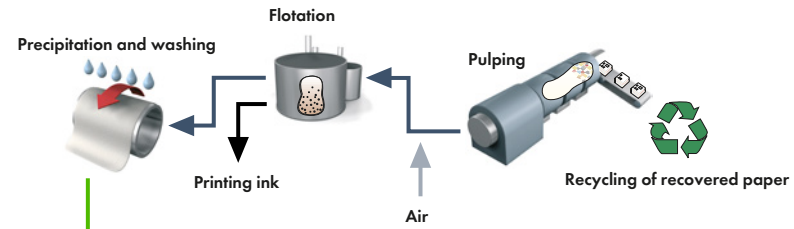




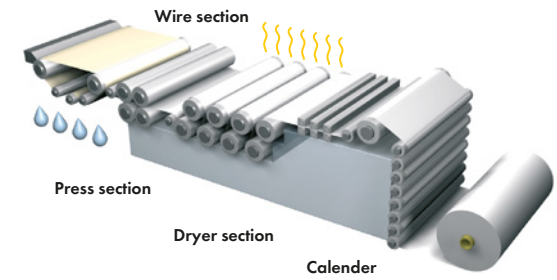
Manufacture of mechanical pulp



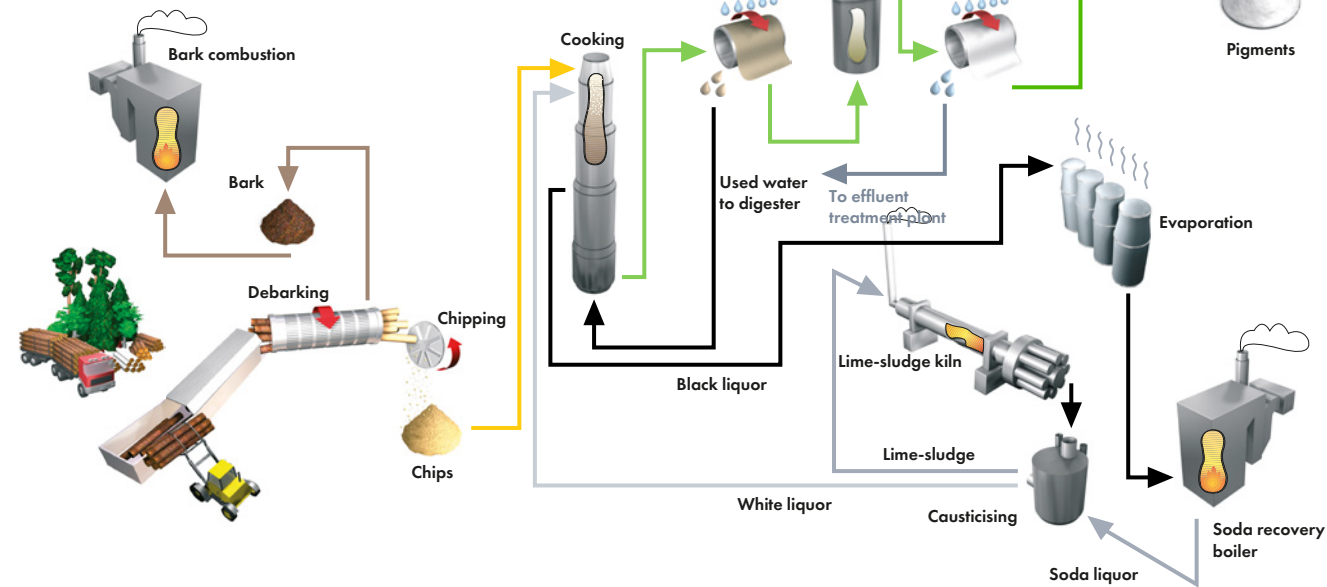
Manufacture of recycled fibre pulp



Manufacture of paper



Manufacture of chemical pulp



## EFFLUENT TREATMENT PRINCIPLE AT AN ACTIVATED SLUDGE TREATMENT PLANT

### Incoming waste water

The substances present in pulp and paper mill effluents are mainly derived from wood (including lignin, starch, alcohols and nutrients). Additionally, the effluents contain different process chemicals and adjvants (coating pigments, fillers and binders). Some of these substances are in a solid state, others in a colloidal or diluted form. Only small amounts of nutrients (nitrogen and phosphorus) are present in the mills' effluents compared to, for example, municipal effluents.

### Primary clarification

At the preclarification stage, solid particles settle to the bottom of the basin, from where they are removed. At this stage, the effluent solid content decreases by 60–95%.

### Nutrients

To function properly, the microbes in the aeration basin need nutrients, especially nitrogen (N) and phosphorus (P). This is why urea and phosphoric acid are added to the water.

### Neutralisation

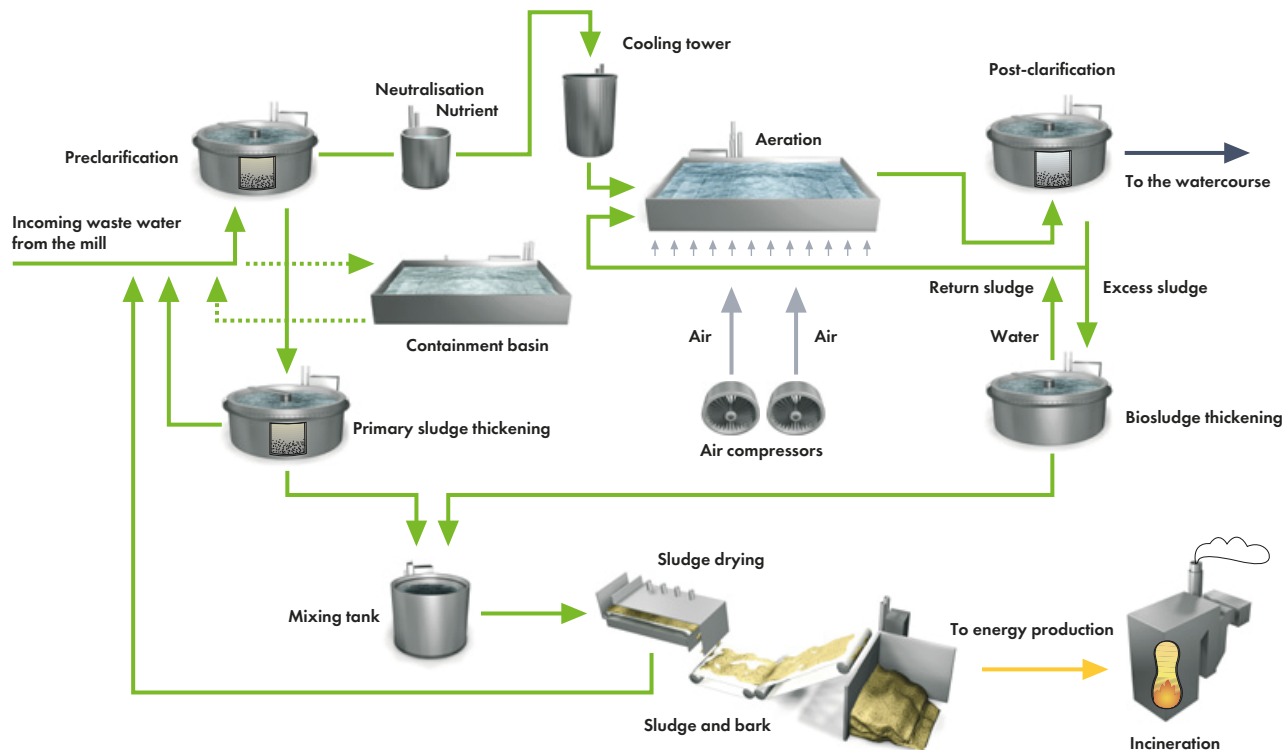
Before entering the aeration basin, the effluent is neutralised. For this, the water's pH level is adjusted to a level ranging from 6 to 8 by adding lime, sulphuric acid or sodium hydroxide when needed.

### Cooling

The aeration basin's microbes work best at temperatures ranging from 35 to 37°C. If the water temperature is any higher, cooling is required.

### Aeration

In the aeration basin of a biological treatment plant, nature's own microbes and protozoa feed on the organic matter dissolved in the effluent.



As a result, the amount of biomass increases. This process requires oxygen, which is pumped into the aeration basin using compressors.

### Secondary clarification

At the post-clarification stage, the biosludge settles to the bottom of the basin. Most of this sludge is returned to the aeration basin. The excess sludge is pumped to the biosludge thickener and the treated water is discharged into the watercourse.

### Excess sludge

The excess sludge thickens in the biosludge thickener, from where it is pumped to sludge dewatering presses. The water from the biosludge thickener is returned to the aeration basin.

### Containment basin

In exceptional situations, preclarified wastewater can be directed to a separate containment basin and pumped back for treatment after normal conditions have been restored.

### Sludge drying

The primary sludge from preclarification and the excess sludge from postclarification are mixed in a mixing tank and the mixture is pressed as dry as possible with the help of screw or belt filter presses. The dried sludge is then incinerated at the power plant.

# RAW MATERIALS, ENERGY AND LOGISTICS

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UPM verifies that all wood raw material supplied to its mills is sustainably sourced, legally logged and procured in accordance with the requirements of international forest certification schemes.





# Knowing that wood originates from a sustainable source

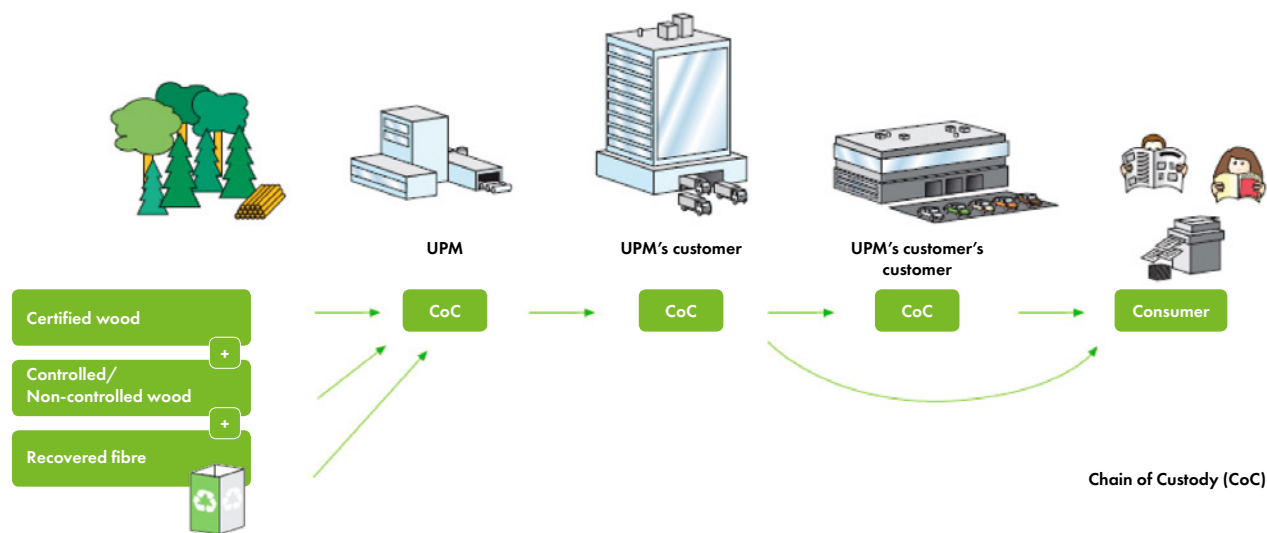
Wood is UPM's most important raw material. UPM is committed to sustainable forest management and monitors the origin of wood to ensure it is sustainably and legally sourced. Certified chain of custody systems have been implemented in all UPM's mills.

At UPM pulp and paper mills, wood is used for the manufacture of chemical and mechanical pulp. UPM's Wood Sourcing and Forestry is responsible for the supply of wood to these mills. UPM is committed to forest management and harvesting practices based on the internationally accepted principles of sustainable forest management.

UPM's wood fibre is sourced mainly from private forests and company-owned forests and plantations in Northern Europe, USA and Uruguay. Forest certification, chain of custody, origin of wood tracking systems and UPM's global biodiversity programme are just some of the many tools UPM uses to safeguard sustainable and legal wood sourcing.

## Origin of wood

UPM monitors the origin of wood it receives and has set strict requirements on its suppliers for the delivery of sustainable and legal wood fibre. These requirements are implemented through a variety of tools. Two good examples are the chain of custody systems and the tracing system for wood in Russia and the Baltic countries, which requires that all deliveries be accompanied by a statement of origin showing a map grid reference for the location of the logging area. UPM carries out supplier audits and logging site checks to ensure that suppliers' operations meet UPM's requirements.



## Forest certification

All of UPM's forests are certified according to a credible, internationally recognised forest certification scheme, namely PEFC™ or FSC®. The certificate provides independent third-party verification of the quality of forest management in relation to the criteria of a local sustainable forest management standard.

## Chain of custody

All UPM's wood sourcing organisations and pulp and paper mills have third-party verified chain of custody systems according to the two main international standards – PEFC™ and/or FSC®. Chain of custody is a tool that enables the monitoring and reporting of the volumes of certified wood supplied to the mills. This information along with product labelling is a valuable tool for verifying sustainable and legal forestry practices to customers and other stakeholders. Chain of custody requirements also ensure that non-certified wood originates from controlled sources.

## Biodiversity

UPM has had a biodiversity strategy in place for 20 years already. Its main focus is on integrating biodiversity protection into our planning and harvesting. In 2018, UPM made a commitment to have a positive impact on biodiversity in company forests in Finland. This target is included in company's responsibility targets for 2030.

UPM's biodiversity programme guides sustainable forest management in company forests. The programme aims at safeguarding forest biodiversity and promoting best practices in sustainable forestry. The programme identifies key elements important for biodiversity: native tree species, deadwood, valuable habitats and forest structure. Targets for each key element are set and implemented through country level targets and local action plans.

Learn more about sustainable forestry at [upm.com/responsibility](http://upm.com/responsibility) and [upmforestlife.com](http://upmforestlife.com)

# A balance between fresh wood and recovered paper

The basic raw material for paper is wood, a renewable resource. The finished product is recyclable; fibres in paper products can be reused several times to make new paper. In fact, approximately 30% of UPM's fibre raw material is recycled fibre. UPM is the world's largest user of recovered paper for graphic papers.

Papermaking starts with fibres – either fresh wood fibres in the form of chemical and mechanical pulp or recycled fibres obtained from recovered paper. The availability of raw material and paper's quality requirements largely determines the type and proportions of the different fibres used.

## Fresh wood

UPM procures fresh wood for the production of mechanical and chemical pulp. Mechanical pulp – refined or groundwood – is usually produced at the respective paper mill site. Sawmill residues and small diameter logs, e.g. from forest thinnings, are used for mechanical pulp processing. All of UPM's pulp mills in Finland and Uruguay produce chemical pulp.

Chemical pulp is also sourced from external pulp suppliers. All chemical pulp suppliers are required to comply with UPM's pulp supplier requirements including tracing the origin of wood and sustainable forestry. Pulp suppliers also have to supply information on the environmental performance of their operations on a yearly basis. In addition, UPM regularly monitors and audits its pulp suppliers.

## Recovered paper

UPM is the world's largest user of recovered paper for the production of graphic papers, consuming about 2.5 million tonnes of recovered paper annually.

UPM uses recovered paper at its European mills, which are located in highly populated regions. This ensures that recovered paper is available in sufficient amounts close to the paper mills. Due to transportation distances, a high level of recovered paper use is not economically and ecologically favourable in regions with small populations. For example, UPM's Finnish paper mill Kaipola is already using almost all the recovered graphic paper available in Finland.

Wood fibres can be reused several times before they are no longer suitable for paper production. UPM utilises mainly graphic recovered paper from household collections, e.g. newspapers, magazines, catalogues and advertising supplements.

Handling and storage of loose paper for recycling. We use recovered paper at our European mills that are located in highly populated regions. The qualities of the product being produced and the location of the mill determine the use of recycled fibre.





# Additives and chemicals used in pulp and paper production

Mineral fillers, coating pigments and binders are important raw materials for paper. Furthermore, chemicals are needed in stock preparation and bleaching as well as in process management.

All stages of the papermaking process require certain additives – from raw material preparation to the formation of the paper web to the coating of the finished paper sheet. In chemical pulping, chips are cooked in a liquor containing sodium hydroxide and sodium sulphide as chemical agents. The bleaching agents used at UPM's mills are oxygen, hydrogen peroxide, chlorine dioxide and ozone.

It is an ongoing task to fully optimise the use of chemicals. UPM requires its suppliers of raw materials, goods and services to comply with the UPM Supplier and Third Party Code that defines suppliers' minimum requirements in terms of responsibility with regard to matters such as environmental impact, human rights, labour practices, health and safety, product safety, corruption and bribery. These issues are carefully assessed during the supplier selection process.

UPM has launched the UPM Restricted Chemical Substances List (UPM RSL) to ensure that our products are safe and clean. The UPM RSL was updated in 2018. UPM RSL includes nearly 6,000 substances that are either restricted or prohibited. EU enhances the safe use of biocides by implementing a Biocidal Products Regulation (BPR). Existing active biocide substances are evaluated under BPR. Only approved biocides or biocides included in the review programme can be placed on the market in the EU.

## PIGMENTS AND ADDITIVES USED AT UPM PULP AND PAPER MILLS

CATEGORY	PRODUCTS	USE
<b>Pigments</b>	Kaolin, ground calcium carbonate (GCC), talc, precipitated calcium carbonate (PCC) produced from lime and carbon dioxide	<ul style="list-style-type: none"> <li>As mineral fillers to fill the cavities between the individual fibres in order to improve printability and to reduce the amount of fibre needed</li> <li>As coating pigments applied to the surface of the paper web in order to improve printability and the paper's optical properties</li> <li>Part of the pigments in paper are recovered together with the fibres</li> </ul>
<b>Binders</b>	Starch derived from cereals or potato, synthetic latex	<ul style="list-style-type: none"> <li>Make the coating pigment adhere to the paper surface</li> <li>Keep the surface strength of the paper</li> </ul>
<b>Chemical pulping agents</b>	Cooking chemicals: sodium hydroxide, sodium sulphide bleaching chemicals: oxygen, hydrogen peroxide, chlorine dioxide and ozone	<ul style="list-style-type: none"> <li>Sodium hydroxide and sodium sulphide are recovered and reused in the process</li> <li>No chlorine gas is used at UPM</li> </ul>
<b>Deinking agents</b>	Fatty acid, caustic soda and water glass	<ul style="list-style-type: none"> <li>Used for deinking recovered paper</li> </ul>
<b>Bleaching agents</b>	Hydrogen peroxide and sodium dithionite or hydrosulphite	<ul style="list-style-type: none"> <li>Used for bleaching mechanical and recycled fibre pulp</li> </ul>
<b>Further additives</b>	Alum	<ul style="list-style-type: none"> <li>To prevent impurities from forming deposits</li> <li>To make fibres and pigments bond together</li> </ul>
	Retention, fixing and anti-foaming agents	<ul style="list-style-type: none"> <li>To keep the process clean</li> <li>To ensure runnability and dewatering</li> <li>To help web formation (support fibres and fines to be retained on the wire)</li> </ul>
	Slime control agents, e.g. biocides	<ul style="list-style-type: none"> <li>Necessary for the nearly closed-loop water circuits</li> <li>To prevent microbial growth in pipes and tanks, to improve runnability and paper quality</li> </ul>
	Optical brighteners, dyes and chelating agents	<ul style="list-style-type: none"> <li>Product quality critical chemicals</li> <li>Used only at ppm level</li> </ul>

Read more about product safety at [upm.com/responsibility](https://upm.com/responsibility)

## Focus on energy efficiency and renewable biomass-based fuels

UPM is a major energy generator. Most of the electrical and thermal energy is used for mechanical pulp and paper production. UPM favours the use of renewable and other fossil CO<sub>2</sub>-free energy sources as well as of natural gas and strives to improve its energy efficiency.

UPM's pulp and paper mills use electrical and thermal energy. Mill operations that require the most electricity are those involved in the manufacture of mechanical pulp, paper machines and water and stock pumping. Thermal energy is needed to maintain process temperatures and to dry the paper.

At all pulp and almost all paper mills, steam and electricity are generated simultaneously by combined heat and power (CHP) plants. At some mills, all or part of the energy is produced by external power plant companies. In the case of Finnish mills, UPM is a shareholder in these power plant companies. Electricity is also obtained from the company's own hydropower plants and, additionally, in Finland from associated companies. The balance of the electricity needed is procured from regional electricity markets.

Power generation methods vary from country to country. The UPM portfolio includes mill site CHP, wind power, hydro, nuclear and thermal sources. UPM is a shareholder in a power company that has a stake in nuclear power plants in Finland.

### Low-carbon energy sources dominate

Thanks to a high self-sufficiency rate in energy, UPM has been able to focus on energy solutions that produce less fossil carbon dioxide. Where possible, fossil fuels are substituted by renewable fuels. Where fossil fuels are needed, natural gas is the first choice, dependent upon availability in the region. More than half of the fuels used by UPM are fossil CO<sub>2</sub>-free biomass-based fuels. In 2004, the EU directive for CO<sub>2</sub> emissions trading came into force in the EU. All European mills belonging to UPM have the relevant permit as granted by national authorities for the 2013–2020 period. UPM business areas are responsible for their EU CO<sub>2</sub> allowances and UPM Energy is assisting in operations of emissions trading.

CHP plants burn renewable fuels like bark, forest residues, fibre residues and solid residues from deinking and effluent treatment plants. Additionally, fossil fuels like natural gas or light fuel oil are used at CHP plants and steam boilers. Coal is used as an energy source only in mills where there is no other alternative fuel source. Chemical pulp mills combust biomass-based waste liquor – black liquor – that is formed during the pulping process.

Part of the heat resulting from production processes is recovered by means of heat exchangers and reused. At the mills producing thermomechanical pulp (TMP), part of the electricity needed can be recovered as steam and this covers a large part of the mill's steam needs.

The multi-fuel boilers are mostly modern and efficient fluidised bed boilers that are particularly well suited for burning wood-based fuels. The high pressure and temperature at the boilers ensure efficient energy production. The modern combustion and cleaning technologies result in low specific emissions.

At UPM's pulp and paper mills, internal technical energy audits have been carried out to improve energy efficiency. The mills have identified areas where energy could be saved and used more effectively. Many measures have been implemented, but major changes are usually made in connection with other investments, such as paper machine line modernisations.



Fossil carbon-free energy sources make up most of UPM's energy portfolio.

## Global logistics operations

The transportation of raw materials and finished products places a load on the environment. The impacts can be reduced through sensible routing and planning as well as by favouring rail and sea transportation and low-emission fuels.

Each year UPM's mills receive several million tonnes of raw materials, additives and operational supplies. Delivering end-products to customers also results in a high traffic volume. Furthermore, solid waste needs to be transported to recovery and disposal facilities. UPM uses road, rail or sea transport – depending on distance, connection and delivery time.

Logistics' sub-contractors are required to comply with UPM's Cargo Handling Manual which includes instructions for cargo handling, storage, transportation and occupational health and safety.

Most of UPM's haulage is handled by long-term contract partners. Emissions arising from transportation can be influenced through the choice of fuel and by switching to rail and sea transport as much as possible. Our sea transport development projects focus on the use of low emission fuels and technologies that reduce fuel consumption. The ongoing development projects with the port operators also have an impact on fuel consumption and emissions through streamlining and optimising operations. Total emissions can also be reduced by ensuring that capacity is fully utilised and by balancing outbound and inbound deliveries.

Eugen Margraf from Nortrans Speditionsgesellschaft mbH is loading paper rolls which are leaving from UPM Nordland paper mill in Germany. All our logistics partners are required to comply with UPM's Cargo Handling manual, including instructions for cargo handling, storage, transportation and occupational health and safety.





# ENVIRONMENTAL IMPACT

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UPM Schongau paper mill is located on a bend on the Lech river in the Southern German town of Schongau. Today, UPM Schongau produces printing paper for newspapers, newspaper supplements, advertisers, brochures, magazines and catalogues.



# Operations affect the environment in numerous ways

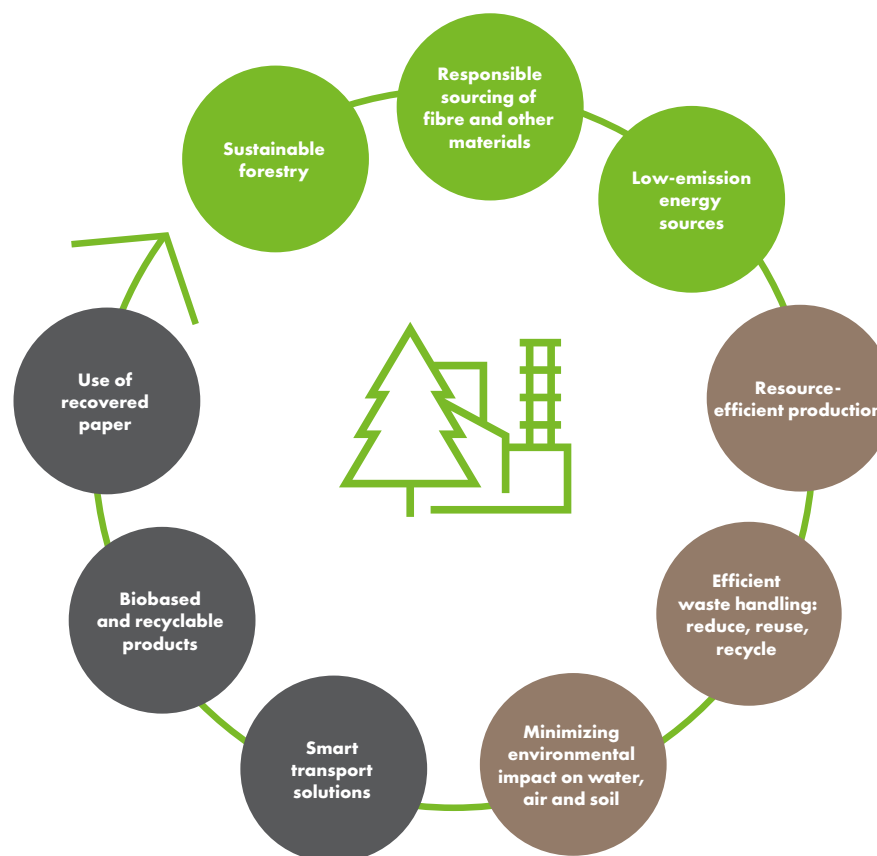
All UPM's operations impact the environment both directly and indirectly. Forest management influences landscape, forest structure and biodiversity. Production processes release emissions into watercourses and into the air. Solid waste is generated at the production facilities and noise and odour need to be managed. Indirect impacts arise mainly from transportation and the procurement of raw materials, chemicals, fuels and power.

The main environmental load from paper and pulp manufacture is to air and water.

UPM's mills have successfully implemented measures to reduce air and water emissions. Improved effluent treatment has enhanced the quality of cleaned waste water. Airborne emissions have been reduced by the use of low-sulphur fuels, changes in energy generation methods and environmental investments.

Environmental impact assessments are carried out at each site. An overview about key environmental aspects and their environmental impact can be seen in the following table. UPM regards all environmental aspects as substantial. At the mill sites, special emphasis is placed on the environmental aspects of water, air, energy, waste and local phenomena such as noise or odour. Emergency situations, for which crisis management procedures are in place, are also taken into consideration. The mills' environmental targets cover all areas where there is currently need for action or potential for improvement.

## LIFE CYCLE THINKING – OUR APPROACH TO SUSTAINABILITY





KEY ENVIRONMENTAL ASPECT	MAIN ENVIRONMENTAL IMPACT	MEASURES
<b>Wood raw materials</b>	Use of the forest ecosystem (biodiversity, products and services from forest ecosystems, land use aspects); Indirect environmental impact by chemical pulp suppliers	Use of wood from certified sustainable forestry (chain-of-custody verification); assessment of chemical pulp suppliers
<b>Chemicals</b>	Indirect environmental impact by suppliers; pollution due to inappropriate handling or storage	Supplier qualification, supplier audits; requirement for certified environmental management systems; choice of environmentally sound products; UPM's restricted chemical substances list
<b>Fossil fuels and purchased electricity</b>	Use of finite resources; climate change	Co-generation of heat and power; maximise use of renewable fuels and other CO <sub>2</sub> neutral energy sources; efficient energy use
<b>Airborne emissions from power plants</b>	Acidification of the soil (NO <sub>x</sub> , SO <sub>2</sub> ); air pollution (particles); climate change (from CO <sub>2</sub> from fossil fuels)	Compliance with limit values*; continuous improvement; use of renewable fuels and natural gas; emission trading
<b>Emissions to water</b>	Eutrophication (nitrogen, phosphorus); oxygen demand (COD, BOD); adsorbable organic compounds (AOX) for chemical pulp mills	Compliance with limit values*; continuous improvement; modern elementary chlorine-free chemical pulp production
<b>Waste</b>	Use of landfill sites and municipal waste incineration plants. Indirect environmental impact by third-parties for waste recycling and recovery, e.g. pollution due to inappropriate handling and storage.	Increase or maintain high recovery quota by following the principle "reduce, reuse and recycle". Third-party/supplier qualification, audits.
<b>Noise</b>	Adverse effects on personnel and local area	Compliance with limit values*; continuous improvement
<b>Odours</b>	Adverse effects on local area	Optimised operation of production facilities and effluent treatment plants
<b>Transport</b>	Indirect environmental impact (energy consumption; airborne emissions; noise)	Use of appropriate means of transport; dual-purpose transport; electric forklift trucks
<b>Products</b>	Environmentally sound disposal after use	Recycling (recovered paper processing)
<b>Soil</b>	Acidification of the soil by airborne and water emissions; risk of pollution by landfill sites or by chemicals and oilcontaining equipment	Best practices for the storage and handling of chemicals; compliance with landfill permits and legislation (landfill insulation; gas collection and treatment, leachate water treatment)

\* The purpose of limits for waste water load, airborne emissions and noise specified in the operation permits is to prevent any significant environmental impact

# Air emissions stem from energy generation

The majority of airborne emissions from pulp and paper mills result from energy generation. The choice of fuels, combustion technology and flue gas purification are ways to reduce these emissions.

UPM's versatile set-up of cost-competitive, low-emission energy includes, among others, hydropower generation. The major part of electricity generated by UPM is free of CO<sub>2</sub> emissions from fossil fuel.



Quantity and quality of air emissions depend on the amount of steam produced at power plants or boilers, on the operating rate of the paper machines and the fuels used. More than 65% of fuels used by UPM's power plants are biomass-based fuels that are free from fossil CO<sub>2</sub> emissions. Boilers using biomass-based fuels, oil and coal are equipped with filter systems. Compliance with permit limits is continually measured at all power plants and the reliability of these measurements is verified by a third party. Results and emission calculations are reported to the relevant authorities. Possible TRS (total reduced sulphur) emissions from chemical pulp mills are usually caused by shutdowns and start-ups.

POSSIBLE AIR EMISSIONS	SOURCE	REDUCTION MEASURE
<b>Carbon dioxide, sulphur dioxide, nitrogen oxides, small amounts of particles and organic compounds</b>	Energy generation at power plants; emission parameter depends on used fuels	<ul style="list-style-type: none"> <li>• Minimised by efficient purification, by the choice of fuels and by controlling the combustion conditions in the boilers</li> </ul>
<b>Odour from malodorous sulphur compounds TRS (total reduced sulphur)</b>	Chemical pulp production	<ul style="list-style-type: none"> <li>• Reduced by collecting and burning</li> </ul>
<b>Odour from decomposing of organic substances</b>	Closed-circuit water systems (e.g. through high temperature and anaerobic conditions)	<ul style="list-style-type: none"> <li>• Measures taken at mill sites when needed</li> </ul>
<b>Noise</b>	Production facilities, e.g. wood handling, debarking, suction pumps	<ul style="list-style-type: none"> <li>• Controlled at the source or along its propagation</li> <li>• Minimised at the stage when new equipment is being acquired and new facilities constructed</li> <li>• Older plants systematically refitted with sound insulation systems</li> </ul>

## Responsible use of water

Only a small portion of the water used in production leaves the process as effluent and has to be replaced with fresh water. All effluents are cleaned before being released into watercourses.

Water is an essential resource for pulp and paper production and is also needed for cooling machinery. In production it is used as a diluting agent and transport medium. Fibres, fillers and additives have to be strongly diluted in order to form a smooth sheet of high quality paper. Compounds from wood fibres dissolve during manufacturing and a small proportion of the chemicals and other raw materials used in the process remain in the water. Cooling water is not contaminated at all and can be discharged directly into the river or used in production.

Water reduction is an ongoing target for all UPM mills. Using less water also means using less electricity, chemicals and thermal energy. Process water is used several times and only a small portion of the water ends up as effluent, which has to be replaced with fresh water. The fresh water is purified water from rivers and lakes or groundwater taken from wells. A small quantity of water is used for steam production at the power plants and purified in order to meet stringent purity requirements.

### Improving waste water treatment plants

All waste water is treated in mechanical and biological effluent treatment plants before being released into watercourses. Most mills have their own effluent treatment plants or the waste water is led to a municipal or external effluent treatment plant. The biological treatment stage is an excellent controller of waste water quality, because the organisms in the biological treatment stage are sensitive to harmful compounds. Biological treatment also removes harmful compounds from waste water.

Emission levels in waste waters are regularly monitored and reviewed, both internally and by relevant authorities. In some regions, the potential harmful effects of effluent on fish and other aquatic organisms are also assessed by conducting comprehensive receiving water studies.

Learn more about water management at [upm.com/responsibility](https://upm.com/responsibility)



In China, UPM has been recognised as a Water Efficiency Frontrunner in Jiangsu Province and China at large. As a frontrunner, UPM Changshu paper mill will serve as a benchmark for the industry and lead the promotion of water efficiency in China. The More with Biofore in China program is aiming to ultimately eliminate the direct waste water discharge from the Changshu mill. Lisheng Jin (third from the left) surrounded by the More with Biofore in China project team; Cheng Yao, Gu Yueming, He Zhenxian, Liu Haihong and Wang Feng.

# Yesterday's waste is today's raw material

Reducing the amount of solid waste and increasing reuse are key objectives at all UPM mills.

All UPM's mills have made efforts to reduce the volume of solid waste and to improve handling by sorting the waste at source. A large part of the process waste is utilised either as raw material or in energy generation. The volume of solid waste taken to landfill sites has decreased significantly over the past years as a result of higher efficiency in production processes and increased opportunities for reuse. UPM has a target to become a Zero Solid Waste to Landfill company globally by 2030. This means that UPM will not deposit any process waste at landfill sites, and no process waste will be incinerated without energy recovery.

Landfill sites for depositing solid waste account for the most significant environmental impact in waste management. The environmental impacts of UPM landfill sites are being monitored in accordance with permits and regulations issued by the relevant authorities.

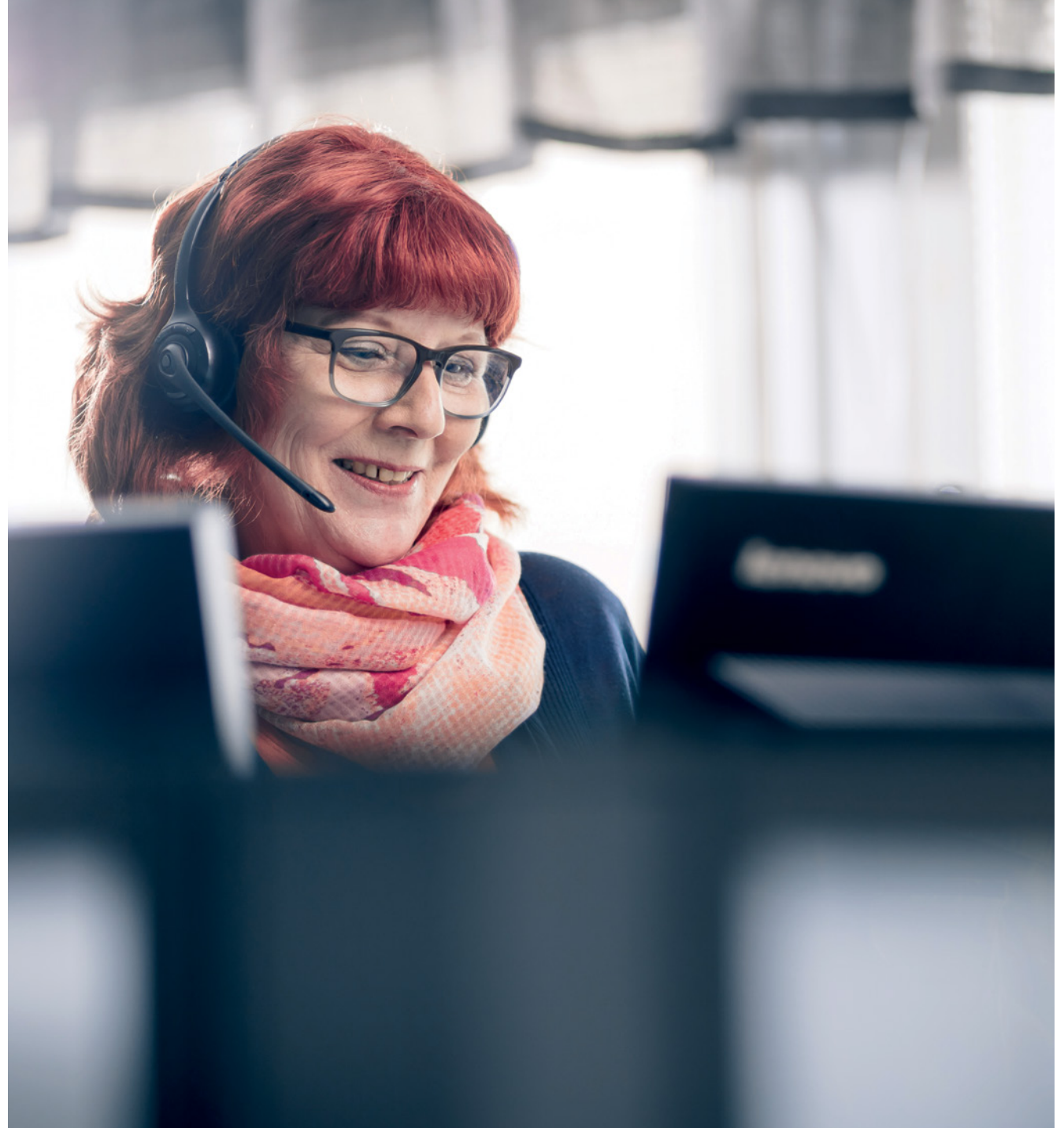
Materials that have been sorted from co-mingled waste at the UPM Shotton paper mill's Materials Recovery Facility (MRF) in the UK, including mixed paper and cardboard, which shows that excellent quality can be achieved by the MRF.



MAIN WASTE FRACTIONS	SOURCE	USAGE OR DISPOSAL
<b>Ash</b>	Power plants	<ul style="list-style-type: none"> <li>• Most of the ash utilised in the cement and building blocks industry, in earthwork operations or as a fertiliser</li> <li>• The remainder is taken to landfills</li> </ul>
<b>Organic process waste such as bark and fibre residues and fibre sludge</b>	Wood and recovered paper processing, effluent treatment	<ul style="list-style-type: none"> <li>• Mainly used as fuel by mill power plants</li> <li>• Fibrous residues which are not incinerated are reused, for example, used in soil construction, for brick industry or composted.</li> </ul>
<b>Other process waste such as coating colour waste and green liquor dregs</b>	Coating of paper, chemical pulping	<ul style="list-style-type: none"> <li>• Large proportion reused, e.g. in the construction industry and in soil improvement</li> <li>• The rest is mainly landfilled</li> </ul>
<b>Other solid waste</b>	Recovered paper processing, packaging of incoming materials (mainly metal, board or plastic waste)	<ul style="list-style-type: none"> <li>• Sorted and utilised whenever possible</li> <li>• Non-usable waste fractions taken to landfill sites or municipal waste incineration plants</li> </ul>
<b>Hazardous wastes</b>	Maintenance (mainly oil or oil contaminated equipment)	<ul style="list-style-type: none"> <li>• Forwarded to licensed hazardous waste treatment facilities</li> <li>• Compliance with relevant statutory requirements documented</li> </ul>

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Our committed professionals make sure that our stakeholders have accurate and compliant information available at the right time for the needed purpose.



# Environmental rules

## UPM COMMUNICATION PAPERS

### UPM and its context

UPM complies with applicable environmental laws and recognises its impacts on air, water, land and biodiversity. UPM aims to minimise adverse effects of its operations. Both the direct and indirect environmental loads and impacts of UPM operations shall be measured and assessed continuously.

Everyone is requested to be mindful of environmental issues as part of the day-to-day work. To accomplish this, everyone is expected to act responsibly, share best practices and promote the use of advanced technologies. All actions that may adversely affect humans and nature shall be cautiously considered.

Employees shall manage UPM's environmental loads systematically in accordance with the principle of continuous improvement as guided by internationally recognised environmental management systems.

UPM strives towards product stewardship that takes into account the entire product life cycle. It is everyone's responsibility to take product safety seriously.

### Sustainable sourcing

UPM is committed to responsible sourcing practices and expects its suppliers to comply with applicable laws and to share the principles outlined in this Code of Conduct. UPM sets requirements and expects its suppliers to promote them further in their supply chain. These requirements relate, for example, to the origin of raw materials, fair working conditions and prohibition of child and forced labour.

Everyone shall look after the best interests of UPM when selecting and operating with suppliers. Suppliers shall be assessed systematically and regularly from an economic, social and environmental perspective. In all purchasing practices the UPM's Rules for Forestry and Wood Sourcing Activities, UPM Pulp Supplier Requirements and UPM Supplier and Third Party Code shall be complied with.

UPM is a frontrunner in implementation of methods for tracing the origin of wood and accepts only legally and sustainably sourced wood fibre. UPM does not source wood

from protected areas where harvesting is prohibited by the authorities, or from any other area harvested contrary to the authorities' instructions. UPM expects suppliers to demonstrate a commitment to promoting biodiversity.

UPM promotes good forest practices through forest certification and recognises and utilises all credible forest certification schemes as described in UPM Forest Certification Rules.

UPM procures chemical pulp from its own mills, partially-owned mills and external pulp mills. Partially-owned and external mills shall meet the same principles concerning wood procurement and production processes as the company's own operations. Only elemental-chlorine-free and totally-chlorine-free bleached chemical pulp are produced and used at UPM mills.

UPM promotes the use of recovered paper and shall take into account the quality, environmental and economic aspects of fibre use. Both primary fibre and recycled fibre are essential raw materials for UPM papers.

### Energy efficiency

UPM aims to reduce its impact on climate in energy production, procurement and use. This shall be ensured by promoting and investing in energy efficiency to reduce our carbon footprint. Internal energy audits are conducted regularly in all UPM pulp and paper mills, to identify opportunities for improved energy efficiency, to benchmark performance, and to provide information for mill and company target-setting. The mills shall take corrective measures and implement targets based on the audit results.

### Environmental protection

One of the key focus areas of all the mills is production efficiency improvements by reducing the waste and energy to produce high quality paper. Minimising the environmental impacts of production shall be achieved by reducing emissions to air and water, reducing process water use and total amount of process waste generated, as well as reducing the amount of waste to landfill. A life cycle approach is used to assess the environmental impacts of UPM paper products.

All pulp and paper mills report key environmental parameters on a regular basis. Deviations from environmental permit limit values are reported on a monthly basis. The environmental performance of the pulp and paper mills is benchmarked annually and compared to the performance levels defined in the European BAT Reference Document. The results of benchmarking as well as the regulatory conditions are the basis for annual target setting and also for environmental technology investment decisions. All the mills must have an environmental management system certified to ISO 14001.

### **Environmental quality of products**

All UPM paper grades are recyclable and non-toxic to the environment and human health. UPM strives to continually reduce the environmental impacts of its paper products and of the overall value chain over the life cycle.

### **Controlling the impacts of logistics**

The environmental impacts of logistics shall be controlled by encouraging the use of eco-efficient modes of transport and by careful planning of routes and optimizing capacity utilization. Only reliable logistics partners are chosen. UPM Supplier and Third Party Code shall be complied with by all UPM units and functions involved.

### **Environmental communication**

UPM has positioned itself as the Biofore Company which leads the integration of bio and forest industries into a new, sustainable and innovation-driven future. Biofore stands for sustainable solutions and excellent environmental performance. UPM's Code of Conduct and corporate values (trust and be trusted, achieve together, and renew with courage) are applied in all our operations including external and internal communications. Stakeholders and the public must promptly receive accurate information on UPM's environmental performance.

### **Organisation for environmental matters**

Environment shall be an integral part of everyday operations in the mills, functions and sales companies. Environmental

performance and continuous improvement are recognized as competitive factors and are key elements in the divisions' strategy, target-setting and action plans.

The management personnel of UPM Communication Papers take an active stand on environmental performance and support the mills towards advanced environmental management. The mills shall implement the UPM Environmental Strategy by means of environmental management systems. Environmental target-setting is done both at the Group and the mill levels. UPM Environmental team gives input to target-setting and decision-making at the corporate and mill level, and gives operational network support to mills, functions and sales companies.

Managers at UPM must ensure that all relevant employees are trained in environmental matters and are able to assess the environmental load of various work tasks and develop a sense of responsibility for the environment.

## **UPM SPECIALTY PAPERS**

### **UPM and its context**

UPM complies with applicable environmental laws and recognises its impacts on air, water, land and biodiversity. UPM aims to minimise adverse effects of its operations. Both the direct and indirect environmental loads and impacts of UPM operations shall be measured, assessed, and managed continuously.

Everyone is requested to be mindful of environmental issues as part of the day-to-day work. To accomplish this, everyone is expected to act responsibly, share best practices and promote the use of advanced technologies. All actions that may adversely affect humans and nature shall be cautiously considered.

Employees shall manage UPM's environmental loads systematically in accordance with the principle of continuous improvement as guided by internationally recognised environmental management systems.

UPM strives towards product stewardship that take into accounts the entire product life cycle. Product safety needs to be taken into account by everyone involved from raw material sourcing, production to delivery.

### **Sustainable Sourcing**

UPM is committed to responsible sourcing practices and expects its suppliers to comply with applicable laws and to share the principles outlined in the UPM Code of Conduct. UPM sets requirements and expects its suppliers to promote them further in their supply chain. These requirements relate, for example, to the origin of raw materials, fair working conditions and prohibition of child and forced labour.

Everyone shall look after the best interests of UPM when selecting and operating with suppliers. Suppliers shall be assessed systematically and regularly from an economic, social and environmental perspective. In all purchasing practises the UPM's Rules for Forestry and Wood Sourcing Activities, UPM Pulp Supplier Requirements, and UPM Supplier and Third Party Code shall be complied with.

UPM is a frontrunner in implementation of methods for tracing the origin of wood and accepts only legally and sustainably sourced wood fibre. UPM does not source wood from protected areas where harvesting is prohibited by the authorities, or from any other area harvested contrary to the authorities' instructions. UPM expects suppliers to demonstrate a commitment to promoting biodiversity.

UPM promotes good forest practices through forest certification and recognises and utilises all credible forest certification schemes as described in UPM Forest Certification Rules.

UPM procures chemical pulp from its own mills, partially owned mills and external pulp mills. Partially owned and external mills shall meet the same principles concerning wood procurement and production processes as the company's own operations. Only elemental chlorine-free and totally chlorine-free bleached chemical pulp are produced and used at UPM mills. UPM promotes the use of recovered paper and shall take into account the quality, environmental and economic aspects of fibre use. Both primary fibre and recycled fibre are essential raw materials for UPM papers.

### **Energy efficiency**

UPM aims to reduce its impact on climate change in energy production, procurement and use. This shall be ensured by

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### **Environmental protection**

One of the key focus areas of all the mills and R&D is production efficiency improvements by reducing the waste and energy to produce high quality paper. Minimising the environmental impacts of production shall be achieved by reducing emissions to air and water, reducing process water use and total amount of process waste generated, as well as reducing the amount of waste to landfill. A life cycle approach is used to assess the environmental impacts of UPM paper products.

All pulp and paper mills report key environmental parameters on a regular basis. Deviations from environmental permit limit values are reported on a monthly basis. The environmental performance of the pulp and paper mills is benchmarked annually and compared to the performance levels defined in the European BAT Reference Document. The results of benchmarking as well as the regulatory conditions are the basis for annual target setting and also for environmental technology investment decisions, and for long-term sustainability goals. All the mills must have an environmental management system certified to ISO 14001. The EU Eco-Management and Audit Scheme (EMAS) shall be implemented in the mills.

### **Environmental quality of products**

All UPM paper grades are recyclable and non-toxic to the environment and human health. UPM strives to continually reduce the environmental impacts of its paper products and of the overall value chain over the life cycle.

### **Controlling the impacts of logistics**

The environmental impacts of logistics shall be controlled by encouraging the use of eco-efficient modes of transport and by careful planning of routes and optimizing capacity utilization.

Only reliable logistics partners are chosen. The UPM Supplier and Third Party Code shall be complied with by all UPM units and functions involved.

### **Environmental communication**

UPM has positioned itself as the Biofore Company which leads the integration of bio and forest industries into a new, sustainable and innovationdriven future. Biofore stands for sustainable solutions and excellent environmental performance. UPM's Code of Conduct and corporate values (trust and be trusted, achieve together, and renew with courage) are applied in all our operations including external and internal communications. Stakeholders and the public must promptly receive accurate information on UPM's environmental performance.

### **Organisation for environmental matters**

Environment shall be an integral part of everyday operations in the mills, functions and sales companies. Environmental performance and continuous improvement are recognized as competitive factors and are key elements in the divisions' strategy, target-setting and action plans.

The management personnel of UPM Specialty Papers take an active stand on environmental performance and support the mills towards advanced environmental management. The mills shall implement the UPM Environmental Strategy by means of environmental management systems. Environmental target-setting is done both at the Group and the mill levels.

UPM Environmental team gives input to target-setting and decisionmaking at the corporate and mill level, and gives operational network support to mills, functions and sales companies.

Managers at UPM must ensure that all relevant employees are trained in environmental matters and are able to assess the environmental load of various work tasks and develop a sense of responsibility for the environment.

## **UPM PULP**

The UPM Code of Conduct sets forth baseline standards for all company operations and the behaviour expected of every individual at UPM. It also recognises environmental practices as an important focus area for long-term sustainable business. The Code is supplemented as needed by more detailed rules and guidelines. These UPM Pulp Environmental Rules must be observed by all UPM Pulp Business units and their employees. They shall also apply to all new investments and production units acquired in the future.

All UPM Pulp Business units shall carry out their business in compliance with all applicable legal requirements and other guidelines as a minimum standard, consistently implementing best environmental practices. UPM's environmental responsibility agenda is based on key areas of responsibility set forth in UPM's Environmental Principles.

### **Sustainable Sourcing**

UPM requires its suppliers to comply with local legislation and statutory regulations. All suppliers are expected to implement a policy of continuous improvement in environmental performance. All environmentally significant suppliers shall be systematically audited for environmental responsibility by UPM. Environmental risks shall be evaluated and corrective actions taken as deemed necessary. In all purchasing, UPM Wood Sourcing and Forestry Rules and UPM Supplier and Third Party Code shall be complied with.

UPM is strict in its policy of accepting only legally and sustainably sourced wood fibre. UPM promotes good forest practices through forest certification. The company recognises and applies all authenticated forest certification schemes, as described in UPM Forest Certification Guidelines.

### **Energy efficiency**

UPM aims to reduce its impact on climate in energy production and consumption. This shall be ensured by promoting and investing in energy efficiency. Internal energy audits shall be conducted regularly at all UPM mills to identify opportunities for improving energy efficiency, to benchmark performance,

and to provide information for mill-specific and companywide target-setting. Individual mills shall take corrective action and revise their targets based on the audit results.

### **Minimising the environmental loads and impacts of production**

As defined by UPM's Environmental Principles and related targets, all mills shall focus on improving their production efficiency and minimising the impacts of production. This shall be achieved by reducing emissions and effluents, reducing process water consumption and the total volume of process waste generated, as well as reducing the amount of landfill. A life cycle approach is used to analyse the environmental impacts of UPM pulp products. The pulp produced at UPM mills consists exclusively of elemental chlorine-free and totally chlorine-free bleached chemical pulps.

All pulp mills shall report their key environmental parameters on a regular basis. Any deviations from environmental permit limit values are to be reported on a monthly basis. The environmental performance of each mill is benchmarked annually and compared to levels defined in the European BAT Reference Document. The results of this benchmarking as well as regulatory frameworks and UPM Pulp Business environmental targets shall together form the basis for each mill's annual target setting. All mills shall have an ISO 14001 and EMAS-certified environmental management system in place.

### **Environmental quality of products**

All UPM pulp grades are recyclable and non-toxic to the environment and human health. The chemical composition of the products shall be monitored on a regular basis in order to ensure that there are no hazardous substances exceeding the established limit values. This evaluation can also be performed based on reliable certificates from suppliers, where available.

### **Controlling the impacts of logistics**

The environmental impacts of logistics shall be controlled by encouraging the use of eco-efficient modes of transport, by careful planning of routes, and by optimising capacity utilisation. Only reliable logistics partners are to be chosen. The UPM Supplier and Third Party Code shall be complied with.

### **Organisation of environmental affairs**

Environmental affairs shall be an integral part of everyday operations. Environmental performance and continuous improvement are recognised as competitive factors and key elements in the strategy, target-setting and action plans of UPM Pulp Business.

The managers of UPM Pulp Business shall take an active stand on environmental performance and support the mills in advancing their environmental management. The mills shall implement the UPM Environmental Strategy by maintaining an efficient environmental management system. Environmental targets shall be defined both for the entire Pulp Business and for individual mills.

The UPM Environment & Responsibility organisation provides input in target-setting and decision-making at the Pulp Business and mill level, and gives operational network support to individual mills. Managers at UPM shall ensure that all relevant employees are trained to develop a sense of responsibility in environmental affairs and be able to assess the environmental load of various work tasks.

# Glossary

## **Activated sludge process**

A three-stage biological effluent treatment method.

## **AOX, Adsorbable organic halogen compounds**

AOX represents the total amount of chlorine bound to organic compounds in waste water. Such compounds occur naturally, but are also formed in conjunction with the bleaching of chemical pulp. AOX should be limited to a level where it has minimum environmental impacts.

## **BAT, Best available techniques**

The best available technology that allows for solutions that are technically, economically and environmentally the most efficient and advanced.

## **BOD, Biological oxygen demand**

### **COD, Chemical oxygen demand**

The effluent, or waste water of pulp and paper mills includes organic substances which consume oxygen during biodegradation. Low oxygen content in fresh and sea water can have an adverse effect on plant and animal life. BOD refers to the amount of oxygen consumed in the biological decomposition of organic compounds. COD refers to the amount of oxygen consumed in the complete chemical oxidation of organic compounds.

## **CO<sub>2</sub>, Carbon dioxide**

Combustion product of carbon. Fossil carbon dioxide emissions arise from fossil fuels like coal, oil and petrol.

## **CHP, Combined heat and power technology**

Combined heat and power (CHP) production (or cogeneration) is when both electricity and heat are produced at a thermal power plant. The heat is used, for example, in industry or district heating, or as process steam.

## **Chain of Custody (COC)**

An unbroken trail of documentation to guarantee the identity and integrity of the data used as, for example, in demonstrating the origin of wood.

## **Chemical pulp**

Generic name for wood-based fibres separated from each other by "cooking" wood chips or plants in hot alkaline or acidic solutions of various chemicals.

## **Consumption impact**

Consumption through net income generated by employees working at the plant and employees working at the value chain of the plant (typically working in other industries). Calculated using a model build by The Research Institute of the Finnish Economy (Etlä).

## **Deinking**

The process whereby the ink and impurities are removed from recovered paper. Deinked pulp: see recycled fibre pulp.

## **EMAS, Eco-Management and Audit Scheme**

Voluntary environmental management system for companies and other organisations to improve, evaluate and report on their environmental performance on an annual basis. The environmental review is approved by a third-party accredited EMAS verifier.

## **Forest certification**

An independent review process that determines whether a forest is managed in a responsible manner. There are two global forest certification schemes: FSC® (Forest Stewardship Council®) and PEFC™ (Programme for the Endorsement of Forest Certification).

## **Graphic recovered paper**

Mainly white paper collected from households, e.g. newspapers, magazines, catalogues and copy paper.

## **ISO 9001**

Quality management system standard published by the International Organisation for Standardisation (ISO). This is a voluntary, international and third-party certified system.



**ISO 14001**

Environmental management system standard published by the International Organisation for Standardisation (ISO). This is a voluntary, international and third-party certified system.

**ISO 50001**

Energy management system standard published by the International Organisation for Standardisation (ISO). This is a voluntary, international and third-party certified system.

**ISO 22001**

Food Safety management system standard published by the International Organisation for Standardisation (ISO). This is a voluntary, international and third-party certified system.

**Lost-time accident frequency (LTAF)**

Lost-time accidents per million hours worked. Calculation is as follows: (The number of accidents at work resulting in absence or disability one or more days)/(Actual hours worked)\* 1,000,000. Lost time accident type excludes modified duties, medical treatments and first aid cases, but includes fatal accidents. UPM reports separately for workforce (including UPM employees and supervised workers) and contractors.

**Mechanical pulp**

Generic name for wood-based fibres separated from each other mechanically.

**N, Nitrogen****P, Phosphorus**

N and P are chemical elements essential for plant and animal life. Both substances occur naturally in wood and are often added as a nutrient in biological treatment plants. Excessive levels released into watercourses can cause nutrient enrichment, i.e., eutrophication, which accelerates the growth of algae and other vegetation.

**NO<sub>x</sub>, Nitrogen oxides**

These gases are produced during combustion. In moist air, nitrogen oxides can form nitric acid which, in turn, is precipitated as "acid rain". This nitrogen-containing rain also has a fertilising effect, i.e. eutrophication.

**OHSAS 18001**

Specifications for an Occupational Health and Safety Management System.

**Recycled fibre pulp**

Fibres and fillers retrieved from recovered paper. If the recovered paper is deinked, the processed pulp is also called deinked pulp.

**SO<sub>2</sub>, Sulphur dioxide**

This gas is generated by burning sulphur-containing fuels. On contact with moist air, SO<sub>2</sub> forms sulphuric acid, which contributes to "acid rain" and acidification.

**Supplier Qualification**

UPM suppliers are qualified against the UPM Supplier and Third Party Code that defines suppliers' minimum compliance requirements in terms of responsibility with regard to matters such as environmental impact, human rights, labour practices, health and safety, and product safety. Supplier spend in EMAS mill supplements covers all UPM business-to-business spend excluding wood and wood-based biomass sourcing. Wood sourcing figures are not currently available for each mills, but only for regions.

**Sustainable forest management**

In the longterm, a sustainably managed forest means that it is not harvested more than it grows. Sustainably managed forests maintain their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil (now and in the future), relevant ecological, economic and social functions, at local, national and global levels without damaging other ecosystems.

**Total Recordable Injury Frequency (TRIF)**

Recordable injuries per million hours worked. Calculation is as follows: ('LTA at work excluding contractors (number of LTAs which are one or more days)'+ 'Modified duty'+ 'Medical treatment')/ 'Actual hours worked (UPM)' \* 1,000,000. Total Recordable Injury type excludes first aid cases. UPM reports separately for workforce (including UPM employees and supervised workers) and contractors.

**TRS, Total reduced sulphur**

Reduced sulphur compounds that usually cause odour problems and that are released, for example, during chemical pulp production.

**TSS**

TSS are solid materials, including organic and inorganic, that are suspended in the water.

# Validation statement



As accredited or licensed environmental verifiers,

- BSI (UK-V-0002) for Caledonian and Shotton
- Inspecta Sertifiointi Oy (FI-V-0001) for Changshu, Fray Bentos, Chapelle Darblay, Jämsä River Mills, Kaukas, Kymi, Pietarsaari, Rauma and Tervasaari
- Quality Austria (AT-V-0004) for Steyrermühl
- TÜV NORD CERT Umweltgutachter GmbH (DE-V-0263) for Augsburg, Ettringen, Hürth, Nordland, Plattling, Schongau

have examined the environmental management system of each mill mentioned above, the information contained in the Environmental and Societal Responsibility 2018 reports, the information in the corporate part as far as it concerns the respective mill as well as the information used for calculation of the UPM Corporate level EMAS core indicators.

Following these examinations and examination of the UPM Corporate Environmental and Societal Responsibility Statement 2018 on 12/08/2019 Inspecta Sertifiointi Oy, as coordinating environmental verifier of this common EMAS validation, herewith confirms, that the environmental management systems and this UPM Corporate Environmental and Societal Responsibility Statement 2018 together with the Environmental and Societal Responsibility 2018 reports comply with the requirements of the EU's EMAS regulation (EC) No. 1221/2009.

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