

ENVIRONMENTAL performance in 2015



UPM Kaukas



Through the renewing of the bio and forest industries, UPM is building a sustainable future across six business areas: UPM Biorefining, UPM Energy, UPM Raflatac, UPM Paper Asia, UPM Paper Europe and North America and UPM Plywood. Our products are made of renewable raw materials and are recyclable. We serve our customers worldwide. The group employs around 19,600 people and its annual sales are approximately EUR 10 billion. UPM shares are listed on NASDAQ OMX Helsinki. [UPM – The Biofore Company – www.upm.fi](http://www.upm.fi)

UPM Kaukas

UPM Kaukas mills are located on the shores of Lake Saimaa in the city of Lappeenranta in South-East Finland. The mill area is home to a pulp and paper mill, a biorefinery, a sawmill, a biofuel power plant (Kaukaan Voima Oy) and UPM's Northern Europe research and development centre.

The pulp mill produces bleached softwood and birch pulp. The paper mill manufactures coated magazine paper. The Kaukas sawmill produces sawn pine and spruce timber for the construction and joinery industries. The biorefinery manufactures renewable diesel from tall oil to be used as traffic fuel.

Kaukaan Voima Oy's biofuel power plant generates heat and electricity for the Kaukas mills and the power company Lappeenrannan Energia Oy. 80% of the energy produced by Kaukaan Voima is generated using renewable biofuels.

The integrated mill site enables the efficient use of wood-based raw materials, energy production and logistics. The Kaukas mills operate under a shared environmental permit, which includes permits for wastewater treatment, waste management and landfill operations. The EMAS scheme covers the Kaukas pulp and paper mills.

Production capacity	314,000 tonnes coated magazine paper 740,000 tonnes softwood and hardwood pulp 530,000 m ³ of sawn redwood and whitewood 100,000 tonnes renewable biofuel		
Personnel	Paper mill 276 (maintenance included), pulp mill 299 (maintenance included). Approximately 1,000 employees work for the UPM mills and joint services in Lappeenranta.		
Products	Magazine papers (MWC, LWC): UPM Star UPM Valor UPM Ultra UPM Cote	Pulp UPM Betula UPM Conifer UPM Conifer Reinforcement	Sawn timber UPM Timber UPM Plus Biofuels UPM BioVerno
Certificates	EMAS – EU Eco-Management and Audit Scheme ISO 14001 – Environmental Management System Standard ETJ+ – Energy Efficiency System ISO 9001 – Quality Management System Standard PEFC™ Programme for the Endorsement of Forest Certification FSC® – Chain of Custody - Forest Stewardship Council® ISCC-EU (International Sustainability and Carbon Certification) - UPM BioVerno <i>All certificates can be found from UPM's Certificate Finder (available at www.upm.com/responsibility)</i>		
Environmental labels	UPM pulp products have the approval for use in EU Ecolabel and Nordic Ecolabel paper products. Papers are awarded with EU Ecolabel		



UPM Kaukas Environmental performance in 2015 is a supplement to the Corporate Environmental Statement of UPM's pulp and paper mills (available at www.upm.com) and provides mill-specific environmental performance data and trends for the year 2015. The annually updated mill supplements and the UPM Corporate Environmental Statement together form the joint EMAS Statement of UPM Corporation. The next Corporate Environmental Statement and also this supplement will be published in 2017.



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Environmental year 2015

In 2015, the environmental impact of the UPM Kaukas integrated mill site remained relatively unchanged, as it has been since the turn of the millennium. Most water and air emission categories were slightly lower than in the previous year. Both pulp and paper production volumes fell slightly in comparison with the previous year. A decision from the Regional State Administrative Agency of Southern Finland regarding the Kaukas integrated mill site environmental permit review was obtained in April 2015. The permit decision complied with the new environmental legislation, complete with permit regulations based on a BAT reference document. UPM did not appeal the decision. Other parties did appeal, however, and the permit decision did not become legally valid in 2015. The permit case is being processed by the Vaasa Administrative Court. The new biorefinery that manufactures renewable diesel from tall oil and was completed the previous year was started at the integrated mill site in 2015. The biorefinery has a separate environmental permit.

In 2015, the UPM Kaukas mills mostly complied with their currently valid environmental permit. Deviations from the environmental permit limits occurred in terms of odour and noise. In general, the odour situation at the integrated mill site was managed better than in the previous years and the odour issues experienced in 2015 were not caused by disturbances in the incineration of malodorous gases but from liquids with a strong odour ending up at the wastewater treatment plant due to malfunctions. The odours spread from the open pools into the environment, carried by the wind. The noise distribution model was updated in 2015. Noise at starting points was measured and modelled, and correctness of the model was studied by measuring the environmental noise. In the case of noise, residences close by and the night time noise limit pose challenges.

The integrated mill site's environmental objectives included preparations for prohibition of depositing organic waste to a landfill, reduction of water consumption in pulp and paper production, reduction of abnormal emissions, as well as updating container and barrel chemicals' utilisation site markings and containment basins to comply with the reformed legislation. Many of these objectives are challenging, and not all of them have been met. A new waste management operating model was designed, a competitive bidding was arranged and resources were allocated in 2015. Commission-

ing and more specific instructions will be completed in 2016. The goal of placing no more organic waste in the mill's landfill as of the beginning of 2016 was reached. There was a considerable decrease year-on-year in the number of exceptional situations where the internal limits defined earlier were exceeded. However, one deviation from the permit conditions took place when liquid with a strong odour ended up at the wastewater treatment plant and the odour spread into the town. Contrary to expectations, however, water consumption increased, partly due to the discontinuous production runs. Chemicals' utilisation site markings were renewed and added, and containment basins were installed for barrel and container chemicals in 2015.

Feedback from the immediate surroundings of the integrated mill site returned to the usual level of the 2000s after a peak in feedback volume during the previous year. 11 items of feedback regarding odours were recorded. This feedback was connected to five separate exceptional situations. One of the feedback items concerned noise and another concerned a situation where dried up foam spread from the wastewater treatment plant like snow into the neighbouring residential area on a windy day.

Pulp mill

The production levels of the pulp mill were normal. A planned annual maintenance shutdown took place in the spring. The emission levels of the pulp mill are stable when the mill runs at the designed steady, unchanging speed. Exceptional situations have an impact on emission levels.

The pulp mill's air emissions reduced in terms of all the measured compounds. Water emissions reduced as well. The mill was able to manage problems with odours better than in the previous years. Disturbances in the incineration of malodorous gases did not cause any unpleasant odours as in the previous years. Some incidents involving noise took place, however. Strongly malodorous liquids ended up at the wastewater treatment plant a couple of times, which caused a pungent odour in the surrounding environment. These situations will be avoided in the future by changing the pro-

cesses and procedures. Investments in the collection of malodorous gases were made at the tall oil plant.

The amount of fossil carbon dioxide emissions was reduced by replacing some of the natural gas used as the lime kiln fuel with the biorefinery's pitch oil.

Paper mill

The paper mill's production capacity decreased as PM2 was shut down. The annual production capacity is 314,000 t.

For several years, the paper mill has had internal targets for solids emissions into the wastewater treatment plant, various types of process waste and the consumption of process water.

In 2015, the average daily volume of solids emissions into the wastewater treatment plant was 11.5 tonnes per day, down 30% year-on-year (16.6 tonnes per day in 2014). The target level of 12.6 tonnes was easily reached. Solids emissions are caused by problems with the runnability of the paper machines and discontinuous production runs. In 2015, the paper mill invested in more specific measuring of solids with modern technology.

The target value set for the consumption of process water is 15 cubic metres per tonne of paper produced. This goal was not reached, partly because the water system changed completely when PM2 was closed down.

The target level for coating colour sludge generated in the process is (6.0 t/d). Coating colour sludge volume remained below the target value by 0.3 t/d, and showed an improvement of 0.7 t/d from 2014. An investment in the recovery of coating colour sludge was made in 2015. Now, waste going into the landfill is no longer generated. Instead, all of the coating colour sludge is reused in the paper mill process.

IKEA, the world's largest furniture retailer, awarded the UPM Kaukas paper mill the Tulip Award in the sustainability category for the second year in a row. The motivation for the award was "Best performer in energy efficiency and use of renewable energy. Outstanding understanding of sustainability challenges. Best in class for sustainability reporting."



Teuvo Solismaa,
General Manager, Kaukas



Minna Maunus-Tiihonen,
Environmental Manager

Air

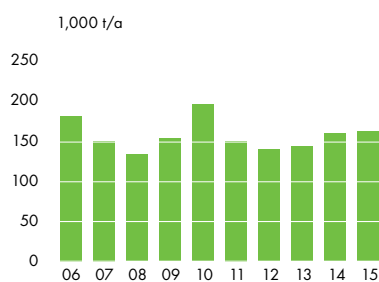
Air emissions of the Kaukas mills reduced in terms of all of the continuously measured components, which include sulphur dioxide (SO₂), nitrogen oxides (NO_x), particulates (TSP) and malodorous sulphur compounds (TRS). The emission level decreased partly because the pulp mill's production volumes were lower than in the previous year. The pulp mill's specific emissions also decreased in terms of all the parameters, however. The sulphur dioxide emissions decreased the most because there were fewer situations calling for the use of the secondary burner of the malodorous gas boiler. Most of the strong odorous gases are incinerated in the recovery boiler. Fewer TRS emissions into the air spread via the flues, there were less disturbances in the malodorous gas incineration process, and less unprocessed strong odorous gases than in the previous year were released into the air. The carbon dioxide emissions slightly decreased year-on-year. The share of fossil carbon dioxide

among the total CO₂ emissions decreased. Some of the natural gas used as the lime kiln fuel was replaced with pitch oil, a residue from the biorefinery.

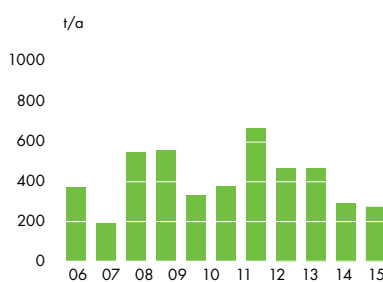
Malodorous gases were recovered and burnt 99% (weak malodorous gases) and 100% (strong malodorous gases) of the time. UPM Kaukas' total annual air emissions from pulp and energy production are presented in the following graphs. UPM's percentage of Kaukaan Voima's total emissions is also included in these figures.

In 2015, all emissions to air from the pulp mill were within the reference values of the BAT document published in autumn 2014.

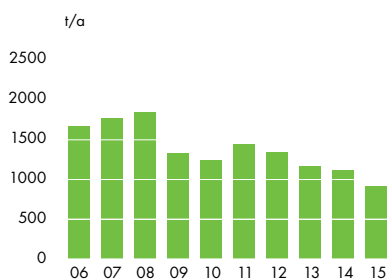
FOSSIL CARBON DIOXIDE, CO₂



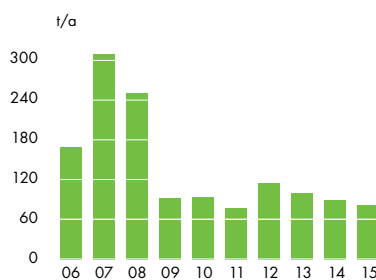
SULPHUR DIOXIDE, SO₂



NITROGEN OXIDES, NO_x



PARTICULATES



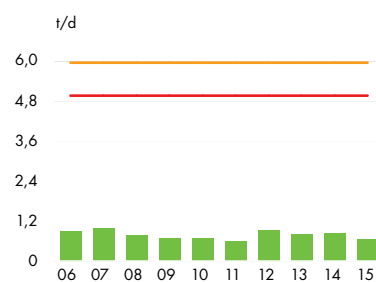
Water

The Kaukas mill used a total of 79 million cubic metres of water in the manufacture of pulp and paper in 2015. 48% of this was process water, which was treated at the biological effluent treatment plant before discharge. The water consumption at the mill site decreased year-on-year. The water consumption decreased mostly due to the lower production volume than in the previous year.

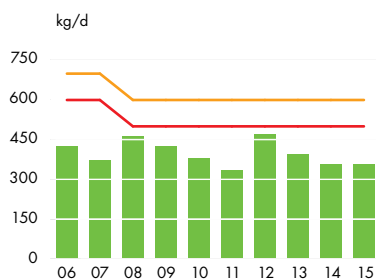
Effluent load to the lake remained unchanged from the previous year in terms of biological oxygen demand (BOD), chemical oxygen demand (COD), halogenated organic compounds (AOX), solids and nitrogen (N) of the nutrient emissions. Phosphorus (P) load in the lake increased during the summer months. The effluent loads of both pulp and paper production remained within the limits specified in the BAT document published in the autumn.

Performance of the biological treatment plant was good. The treatment plant's load has stabilised during the past few years

BIOLOGICAL OXYGEN DEMAND, BOD,



NITROGEN, N



UPM's percentage of Kaukaan Voima's total emissions is included in air emission figures.

— Permit — Monthly limit

Waste

Around 37,500 tonnes of process waste (as dry matter) was generated at Kaukas in 2015. In addition, around 1000 tonnes of other waste was generated. This figure also includes UPM's share of Kaukaan Voima's process waste. 5582 tonnes of waste was deposited at the Tuosa landfill for final disposal – down 17% from the previous year. The remainder was reused or stored to be utilised later. Green liquor dregs form the biggest waste category deposited at the landfill. Green liquor dregs are a by-product of the chemical circulation of the pulp mill, and as the production volume of pulp fluctuates, the amount of green liquor dregs fluctuates as well. Only a few reuse applications exist for green liquor dregs, but some of it could be mixed with ash and used in earth construction (field base) as in the previous years.

In 2015, a total of around 33,300 tonnes of process waste was reused or stored for reuse. Around 8600 tonnes of process waste was taken into intermediate storage to be reused later. Reuse applications included energy production (sludge from wastewater treatment plant and fibre sludge), replacement of virgin materials with process waste in landfill closure work (coating colour sludge), earth construction (bottom ash, fly ash and green liquor dregs), compost raw material and aeration material (debarking reject sand) and soil conditioner (lime sludge and lime). Collaboration with third parties to find new reuse applications was continued.

and, even in exceptional situations, the abnormal emissions are directed to the treatment plant in a more controlled way than they were previously. Two changes in the load status took place in 2015. Neither of them had a major impact on the treatment plant's performance.

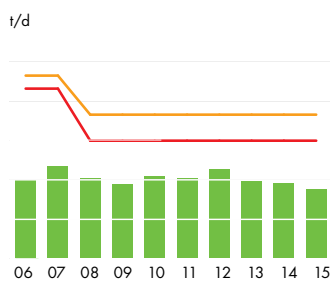
The first change was the start-up of the biorefinery at the beginning of the year. The biorefinery's effluent is also treated at the integrated mill site's shared wastewater treatment plant. The refinery effluent is pre-processed at the refinery. It amounts to around one percent of the treatment plant's total load.

The second change took place in March when one of the Kaukas paper machines was closed down. This change influenced the treatment plant's sludge balance. The sludge treatment model was changed in the autumn to make sure that enough of the treatment plant's biosludge will be removed from the process. The treatment plant's operation

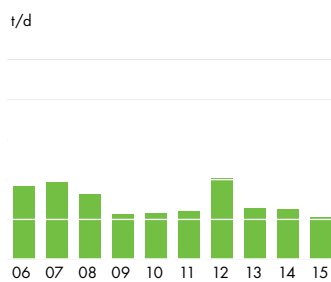
is reported in terms of its treatment efficiency on various substances. This is called reduction. The plant's treatment efficiency and chemical (COD) and biological oxygen demand (BOD) have been stable over the past few years. Its BOD reduction value was 99%, while the COD reduction value was 83%. The solids reduction rate was 97%.

Water consumption targets remained elusive: water consumption increased in both pulp and paper production. The paper mill's water consumption has been improved in the previous years, but the benefits of the improvements made for a mill containing two paper machines were lost when one of the machines was closed down, and specific consumption of water in paper production increased. The change at the pulp mill from the previous year was not substantial. In the long run, the goal is to keep reducing water consumption. Achieving significant changes in consumption levels will, however, require new investments.

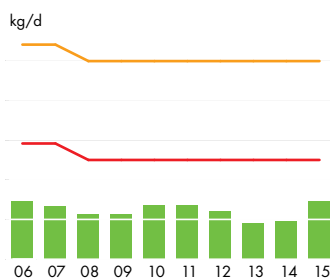
CHEMICAL OXYGEN DEMAND, COD



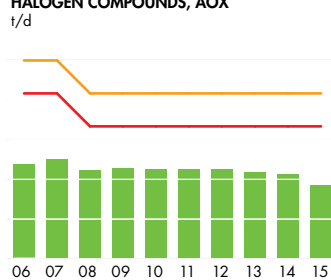
TOTAL SUSPENDED SOLIDS, TSS



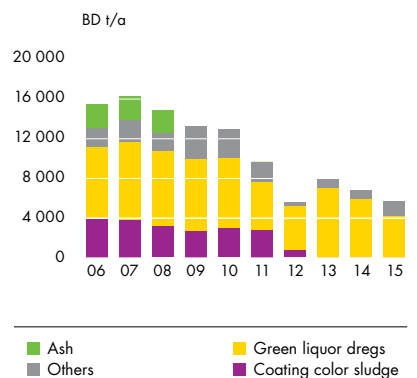
PHOSPHORUS, P



ADSORBABLE ORGANIC HALOGEN COMPOUNDS, AOX



WASTE TO TUOSA LANDFILL



The weights included in the figure are dry weights.



Environmental parameters 2015

The figures related to production as well as raw material and energy consumption are published as aggregated figures on group level in the UPM Corporate Environmental Statement.

Production capacity	Magazine paper	610,000 t until March 31st 314,000 t since April 1st
	Pulp	750,000 t
	- Softwood pulp	420,000 t
	- Hardwood pulp	330,000 t
Raw materials	Wood, cooking chemicals, bleaching chemicals, filler and coating pigments, pigments in paper	See UPM Corporate Environmental Statement for more information
Energy	Biofuels	86%
	Fossil fuels	14%
	Purchased electricity	See UPM Corporate Environmental Statement for more information
Päästöt ilmaan, sis. UPM:n osuuden Kaukaan Voiman päästöistä	fFossil carbon dioxide, CO ₂	162,330 t
	Nitrogen oxides, NO _x	910 t
	Sulphur dioxide, SO ₂	198 t
	Dust particles	83 t
	Total reduced sulphur, TRS	48 t
Water consumption	Process and cooling water	78,9 million cubic metres
Emissions to water	Effluent	37.7 million cubic metres
	BOD ₇	236 t
	COD	9,698 t
	Solids	456 t
	Phosphorus, P	6.4 t
	Nitrogen, N	129 t
	Adsorbable organic halogen compounds, AOX	82 t
Waste*	Waste to landfill	5,582 t
	- Green liquor dregs	4,131 t
	- Mixed waste	276 t
	- Sludge from effluent treatment plants drainage basin	1,175 t
		24,330 t
	Reused waste	1,083 t
	- Cleaned wood waste	4,938 t
	- Green liquor dregs and lime	1,333 t
	- Coating colour sludge	9,059 t
	- Fibre sludge	6,752 t
	- Sludge from effluent treatment plant	302 t
	- Lime kiln ash	663 t
	- Fly ash and bottom ash	200 t
	- Recyclable carbon and paper	8,632 t
	- Metals	3 t
	- Other	496 t
	Intermediate storage	480 t
	- Fibre sludge	3,734 t
	- Lime kiln ash	3,920 t
	- Sludge from effluent treatment plant	
- Coating color sludge		
- Ash		
Hazardous waste		87 t
Mill area		200 ha

The figures include the calculated share of Kaukas biofuel power plant emissions.

* Dry weight

Performance against targets in 2015

TARGETS	ACHIEVED	COMMENTS
Reduction of abnormal emissions - Categories 3–5: 0 cases	No	One category 3 deviation occurred: strong odour of dirty condensate spread wide into the surrounding environment during one day. The number of abnormal odour emissions decreased year-on-year, however.
Preparations for prohibition of depositing organic waste to landfill - Instructions, markings at waste management points and proper monitoring system for the sorting of waste	Partly	This goal was not fully reached. A new operating model was designed, a decision was made on it, and an agreement with a partner was prepared. Instructions, training and updating of waste management point markings will be completed in 2016. However, no organic waste has been taken to the landfill as of the beginning of 2016. This part of the objective was reached.
Reduction of process water consumption - Paper mill's goal 15 m ³ /t - Pulp mill's goal 40 m ³ /t	No	Water consumption continued to increase; the goal was not met. Specific consumption of water at the paper mill increased as one of the paper machines was shut down.
Changing markings at points where container and barrel chemicals are used and containment basins to comply with regulations	Partly	Containment basins and utilisation site markings have been added. There is still room for improvement.

Environmental targets 2016

TARGETS AND INDICATORS	SCHEDULE	RESPONSIBILITIES BY DEPARTMENT
New waste management model in use - 0 tonnes of organic waste to the landfill - Less solid waste than in 2015 to the landfill - Paper fibre waste goal < 9.5 t/d - Paper coating colour sludge waste goal < 1.0 t/d	2016	Centralised training and instructions. Departments carry the responsibility for the sorting of waste and its monitoring.
Verifying that operations comply with the new environmental permit and complying with the new permit as it becomes legally valid.	2016	Centralised training and changes in reporting. Verifying that all departments comply with the permit.
Reducing the amount of effluents	2016	Pulp: -10% from the actual level of 2015
Reducing fossil carbon dioxide emissions	2016	Pulp: reducing consumption of natural gas
Improving energy efficiency	2016	Pulp: verifying energy self-sufficiency Paper: reducing specific consumption of energy



VALIDATION STATEMENT:

As an accredited environmental verifier (FI-V-0001), Inspecta Sertifiointi Oy has examined the environmental management system and the information of UPM Kaukas Environmental Performance 2015 report and of UPM Corporate Environmental statement 2015. On the basis of this examination, the environmental verifier has herewith confirmed on 2016-04-01 that the environmental management system, this UPM Kaukas Environmental Performance report and the information concerning UPM Kaukas of UPM Corporate Environmental statement are in compliance with the requirements of the EMAS Regulation (EC) No 1221/2009.

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