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WE LEARN.



**UPM, TERVASAARI**  
ENVIRONMENTAL PERFORMANCE IN 2008

## UPM, Tervasaari

### Production capacity

- 360,000 tonnes of paper
- 240,000 tonnes of chemical pulp  
(The pulp mill was closed on  
18 December 2008)

### Personnel

- 450
- 612 (at the end of 2008)

### Products

- Label papers (Base):
  - UPM** Blue
  - UPM** Brilliant
  - UPM** Brilliant pro
  - UPM** Honey
  - UPM** Golden
  - UPM** Pasific
  - UPM** SCK
  - UPM** Topaz
  - UPM** Polar
- Envelope and MG papers:
  - UPM** Natura
  - UPM** Formula
  - UPM** Light insert
  - UPM** Cream
  - UPM** Golden
  - UPM** Shine (MG)
  - UPM** Swanshine (MG)

### Certificates

- Quality Management System ISO 9001
- Environmental Management System  
ISO 14001 and EMAS
- Chain-of-Custody Standard PEFC COC
- EU Flower, the EU Eco-label

## UPM, Tervasaari

The Tervasaari mill is located in the centre of the town of Valkeakoski, below the canal between Lakes Mallasvesi and Vanajavesi. As the mill is located right next to a populated area, careful attention must be paid to environmental issues in everyday operations.

The Tervasaari mill integrate has a power plant, three paper machines, a hydropower plant and a biological effluent treatment plant.

The heat required by the Tervasaari mill is produced by the mill's own power plant, and approximately one-fifth of the electricity needed is produced at the mill. Energy is also sold to external users in the form of district heating and steam.

The new Suikki landfill of the Tervasaari mill was in use throughout the year 2008. The closing of the old Kalattomanlahti landfill continued in 2008 according to plan.

At the end of 2008, UPM made a decision to close the Tervasaari pulp mill. The decision was based on the availability of wood at a competitive price in Finland. As a result of the closure, UPM's wood consumption was reduced by about 1,000,000 m<sup>3</sup> per year.

After the closure of the pulp mill, Tervasaari will continue as a key centre of expertise in the area of speciality papers with a strong focus on the development of existing speciality paper grades and new products.



UPM, Tervasaari Environmental Performance in 2008, together with the joint Environmental Report 2008 of the UPM pulp and paper mills, forms the mill's environmental statement. The Environmental Report of the UPM pulp and paper mills is available at [www.upm-kymmene.com](http://www.upm-kymmene.com). The Tervasaari mill's next environmental supplement will be published in the spring of 2010.

# Achievement of the environmental targets for 2008

In 2008, the output of the paper machines fell slightly short of the original targets as the market conditions deteriorated towards the end of the year. UPM's decision to close the Tervasaari pulp mill also reduced pulp production due to preparations related to the closure. The decision meant a considerable reduction in the number of employees in Tervasaari, to be implemented in stages over the course of 2009. Special attention has been paid to improving profitability and developing new practices.

In 2008, the mill's production processes and emissions to the treatment plant remained under control and below the permit limits in normal conditions. Stakeholders did not raise any significant expressions of concern about environmental management.

In July, bulking sludge was observed at the biological effluent treatment plant, which is a typical problem that occurs every now and then at treatment plants in the forest industry. In Tervasaari, reasons for the problem were studied thoroughly together with UPM's experts and the Pirkanmaa Regional Environment Centre. The status of the biological effluent treatment plant could be normalized by destroying filamentous bacteria. During the disturbance, the solids load to water bodies increased, resulting in the permit limits for oxygen-consuming material and nutrients being exceeded. The incident had no direct impacts on water bodies. Late in the year, a group of experts from the biological effluent treatment plant was called together for a problem-solving day, and a plan was drawn up to prevent the bulking sludge problem in the future.

## Continuous improvement through increased efficiency

The closure of the pulp mill will naturally affect the volume and quality of effluent directed to the Tervasaari biological treatment plant. Focus areas for 2009 include the new running mode of the treatment plant and cost optimization. In the future, discontinuing the operations of the pulp mill will reduce the mill's TRS and particle emissions into the air. Noise nuisance caused by the mill has also decreased.

The Western Finland Environmental Permit Authority issued a new environmental permit to Tervasaari on 16 March 2009. Permit limits set for the mill's effluent were tightened, but emissions will remain below the limits in normal conditions. To meet the new requirements for air emissions, the mill will have to invest in, for example, emission measurements.

UPM will also harmonize and improve the chemical and risk management model.

The envelope papers as well as white and brown MG papers produced at the Tervasaari mill have been awarded the EU Eco-label. The label shows that the product has been manufactured saving energy and water, minimizing the amount of waste and using renewable natural resources and as environmentally friendly raw materials as possible. The EU Eco-label is the only independent eco-label valid throughout Europe.



Juha Kääriäinen  
General Manager

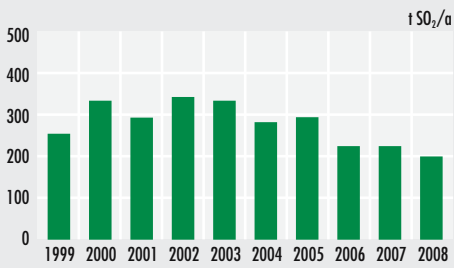


Harri Hiltunen  
Manager, Environment and Safety

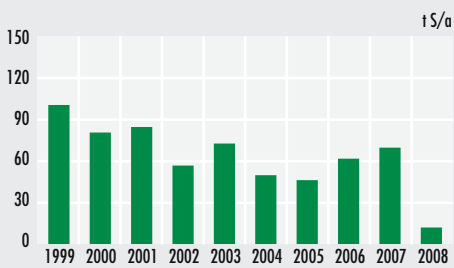


## EMISSIONS INTO THE AIR

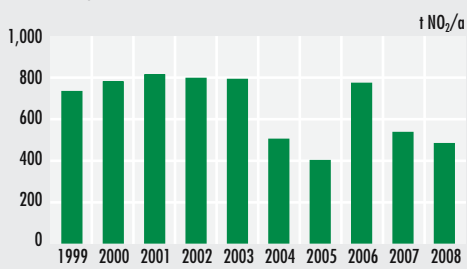
### Sulphur dioxide, SO<sub>2</sub>



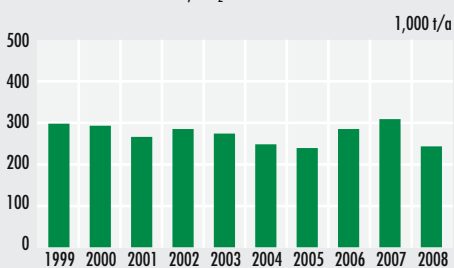
### Malodorous sulphur compounds, TRS



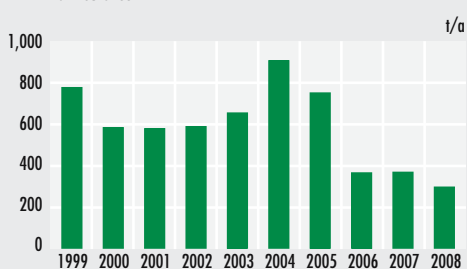
### Nitrogen oxides, NO<sub>x</sub>



### Fossil carbon dioxide, CO<sub>2</sub>



### Particulates



## Air

The monitoring of the quality of city air continued, similar to previous years, in co-operation with the town of Valkeakoski and other industrial plants in the region. The summary report for 2008 was not available at the time of writing this report.

The monthly reports show that the recommended daily limit for malodorous sulphur compounds was not exceeded at the Sorrila measurement point. At the health centre measurement point, the daily limit, 10 µg/m<sup>3</sup>, was exceeded twice in April.

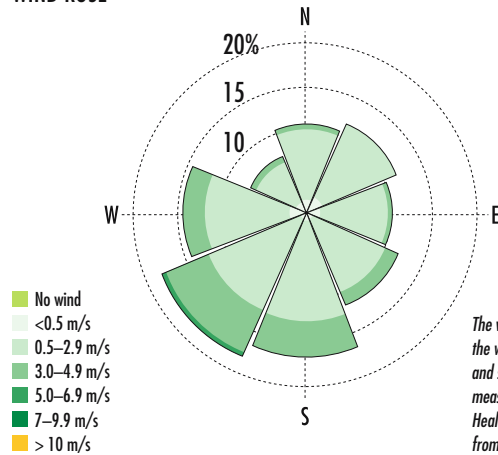
The recommended daily values for nitrogen oxide were not exceeded.

The concentrations of inhalable particles are highest in spring due to street dust. The recommended value, 70 µg/m<sup>3</sup>, was exceeded on two days in April.

In the incineration of malodorous gases, one of Tervasaari's environmental targets for 2008 was not to have disturbances more than two times a month. This target was not achieved because of safety reasons, the back-up system had to be used about eight times a month on average due to the uncertain operation of the auxiliary burner (torch).

Tervasaari records all environmental feedback coming from outside the mill. In 2008, the mill recorded three pieces of feedback provided by inhabitants regarding odour and caused by various disturbances at the pulp mill.

### WIND ROSE



The wind rose shows the direction of the wind. In 2008, wind directions and speeds were measured at the measurement point of the Valkeakoski Health Centre, located some 0.5 km from the mill.



# Waste and waste management

Tervasaari aims to reduce the amount of waste taken to landfill by minimizing waste generated in production and improving waste sorting. In 2008, the volume of cleaning waste transported to landfill was lower than in previous years but still exceeded the target level. Fibre sludge generated at the effluent treatment plant could not be burnt during the shut-downs of fluidized bed boilers, but had to be taken to landfill. The process changes implemented at the pulp mill in late 2007 also increased the amount of waste disposed of at landfills in 2008.

Tervasaari has been involved in the local UUMA project in the Tampere Region, associated with the Sustainable Community programme launched by the Ministry of the Environment and organized by the Finnish Funding Agency for Technology and Innovation (Tekes). The project focuses on promoting the reuse of fly ash and fibre clay from the forest industry in the structural layers of roads, streets and pedestrian and cycle routes.

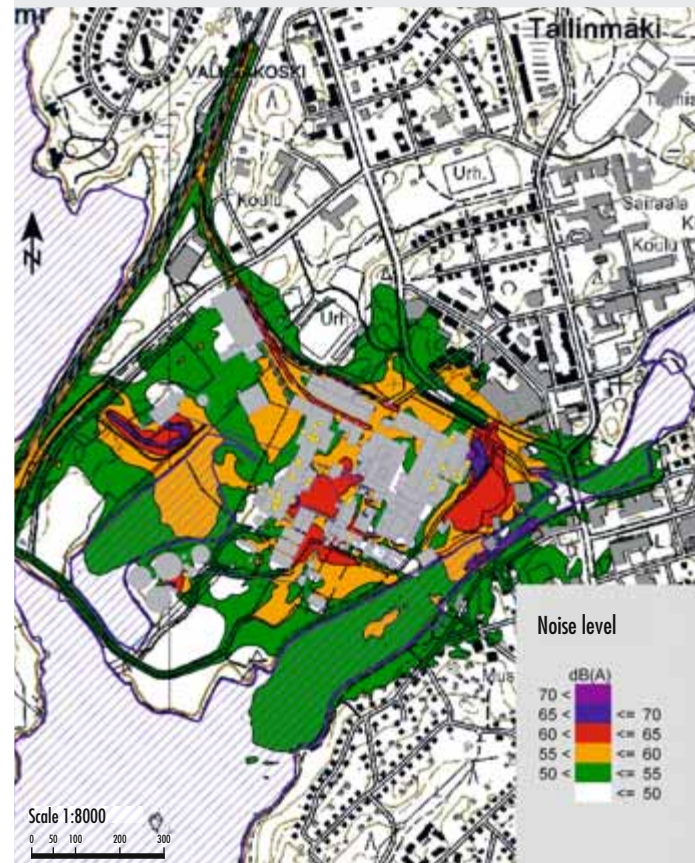
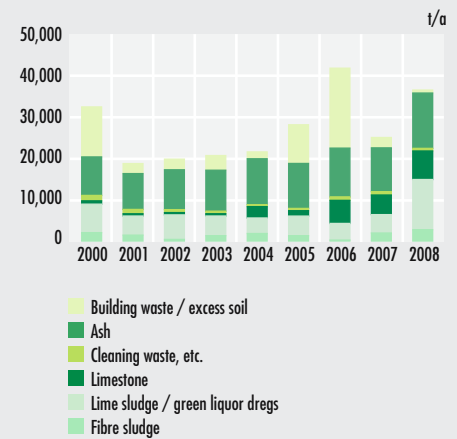
The use of recycled material saves rock resources but does not completely eliminate the need to use rock material. However, it does save non-renewable gravel resources that are important for water management. If the total amount of fly ash generated annually at Tervasaari could be reused through logistics and storage arrangements, this would enable the construction of, for example, 15 km of gravel or paved road or 25 km of pedestrian and cycle route. The consulting firm for the project is Ramboll, and the partners are Georgia-Pacific Nordic Oy, the Finnish Road Administration, the Häme Region of the Finnish Road Administration as well as cities and municipalities in the region when suitable pilot projects have been found.

A separate field (with an area of 10,000 m<sup>2</sup>) was constructed at the Suikki landfill for storing material for this project. The area is equipped with a storm-water collection system. From there, storm waters are routed to the Tervasaari effluent treatment plant. Despite attempts to do so, a suitable road project for the reuse of fly ash was not found in 2008. Instead, 1,590 tonnes of fly ash from Tervasaari's solid fuel boiler was used to stabilize sludge taken to Kuitu Finland Oy's landfill.

In 2008, bottom ash from a fluidized bed boiler was used in the closing of the Kalattomanlahti landfill. Crushed concrete and bricks were also used to replace virgin soil in the drainage layer. The Kalattomanlahti landfill will be closed in stages by the end of 2015.

The Kalattomanlahti landfill has a sedimentation basin for liquid sludge, from where the liquids are pumped to the Tervasaari effluent treatment plant and the sediment is taken to the Suikki landfill. In addition to sedimentation basins, the leachates from the Kalattomanlahti and Suikki landfills are also processed at Tervasaari's biological effluent treatment plant.

Solid waste taken to landfill



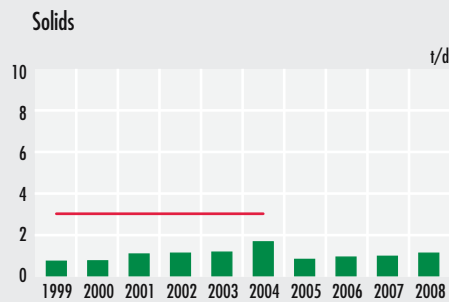
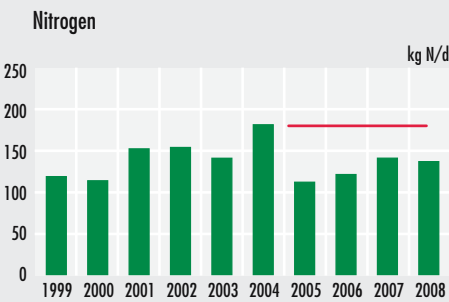
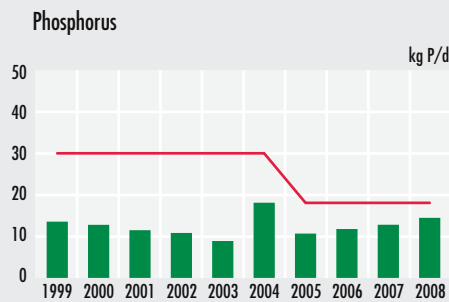
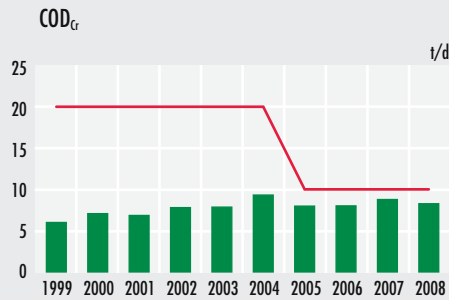
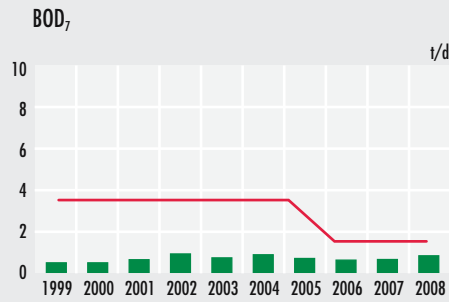
© National Land Survey, permit no. 7/MML/09  
OIVA service/Finnish Environment Institute/11 May 2009

## Noise

Noise modelling was performed using the Nordic model for calculating industrial noise and SoundPLAN software. The figure shows the situation in the daytime in December 2008 after the closure of the pulp mill.

In residential areas, the average noise level is below the recommended daytime limit of 55 dB. Compared to 2004, the daytime noise level has lowered in the residential area of Kauppinmäki in the southeast by 2–3 dB, in the direction of the town centre in the north by about 3–5 dB and in the park area near the football stadium by more than 5 dB in places.

## EFFLUENT LOAD



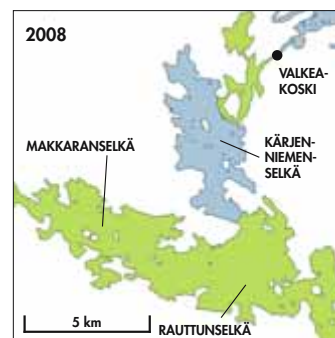
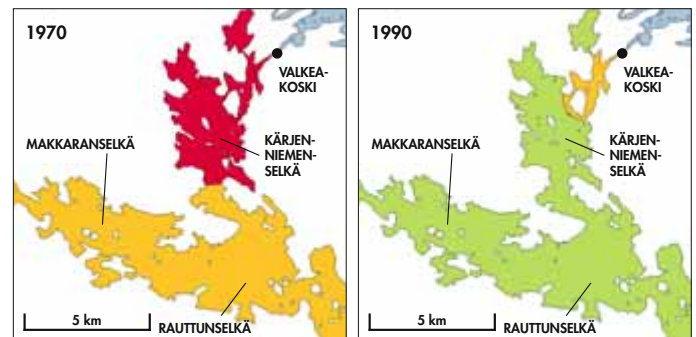
— Permit, monthly average

## Water

The amount of effluent directed to the Tervasaari treatment plant has been reduced through various changes in the paper-making process. On the other hand, increased production of bleached pulp at the pulp mill in 2008 led to a slight growth in effluent volume. Despite this, the amount of effluent decreased by about 800 m<sup>3</sup>/d on average compared to the 2007 level.

Among the environmental targets for 2008 were keeping daily COD emissions below 10 t/d and the monthly average below 9 t/d. During the bulking sludge problem at the biological effluent treatment plant, these targets were not achieved: the permit limit for COD (10 t/d) was exceeded in July (10.5 t/d), August (11.2 t/d) and September (10.2 t/d). The limit for phosphorus (18 kg/d) was exceeded in July (32.3 kg/d). The limit for nitrogen (180 kg/d) was exceeded in August (239 kg/d) as well as in November due to an excessive dosage of nutrients at the treatment plant (190 kg/d). Biological oxygen demand remained within the permit limits throughout the year.

As in previous years, the aeration of Viidennumero Strait continued during the winter when the strait was covered with ice. Aeration prevents the flow of effluent along the bottom towards the middle of Lake Vanajanselkä, located approximately 10 km downstream from the mill. This requirement has also been included in Tervasaari's new environmental permit, although the effluent load from the direction of Valkeakoski is currently only a fraction of what it used to be before aeration was started in the mid-1970s.



National Land Survey, permit no. 544/MML/08

Surface water quality classification based on samples taken and analyzed by the Water Protection Association of Kokemäenjoki in water bodies downstream from Valkeakoski in the years 1970, 1990 and 2008.

- Excellent
- Good
- Satisfactory
- Passable
- Poor
- Unclassified

# Material balance in 2008

## Wood raw materials

wood	900,000 m <sup>3</sup>
purchased	
chemical pulp	160,000 t
fillers and coatings	4,500 t
glues/polymers	25,000 t
lye	8,000 t
lime	6,500 t
hydrogen peroxide	4,000 t
other	12,000 t

## Water

process and cooling water	28,500,000 m <sup>3</sup>
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## Energy/purchased fuel

biogenic	62%
fossil	38%

## Emissions into the air

Malodorous sulphur (TRS) as sulphur	11 t
particulates	295 t
sulphur dioxide	195 t
nitrogen oxides	481 t
fossil CO <sub>2</sub>	241 t



## Products sold

paper	329,500 t
soft soap	13,230 t
raw turpentine	238 t
heat	83 GWh

## Waste to landfill

ash	13,395 t
green liquor dregs / lime sludge	19,048 t
fibre sludge	2,720 t
soil and rock	655 t
demolition waste	70 t
cleaning waste	633 t
other	1,136 t

## Hazardous waste

87 t

## Recycled

metal waste, etc.	337 t
fly ash	2,693 t
energy waste	788 t

## Emissions to water

clean cooling water	19,386,290 m <sup>3</sup>
process effluent	9,116,290 m <sup>3</sup>
biological oxygen demand, BOD <sub>7</sub>	295 t
chemical oxygen demand, COD <sub>Cr</sub>	3,025 t
solids	398 t
phosphorus P	5.2 t
nitrogen N	50.0 t

## Environmental focus areas

### Key measures for improving environmental protection in 2009:

- Optimizing the new running mode in effluent treatment as well as costs:
  - effluent to watercourse (monthly average) COD < 5 t/d (new permit limit 9 t/d as of 1 July 2009), BOD<sub>7</sub> < 1 t/d (1.2 t/d), N < 120 kg/d (160 kg/d) and P < 12 kg/d (16 kg/d)
- Meeting the obligations of the environmental permit decision and updating control programmes
- Reducing water consumption, solids losses and the amount of solid waste:
  - PM5 effluent < 1,800 m<sup>3</sup>/d and solid emissions 1,500 kg/d
  - PM7 effluent < 3,700 m<sup>3</sup>/d and solid emissions 2,400 kg/d
  - PM8 effluent < 4,500 m<sup>3</sup>/d and solid emissions 1,500 kg/d
- amount of waste taken to landfill < 20,000 t/a and improving the efficiency of waste sorting
- Enhancing energy efficiency
- Finding more ways of reusing by-products, particularly ash



**EMAS**

**Verified  
environmental  
management**

REG.NO. FI-000048

Accredited verifier Inspecta Sertifiointi Oy (FI-V-0001) has audited the joint Environmental Report of the UPM pulp and paper mills for 2008, the Environmental Management System of the UPM Tervasaari mill and the updated information for the 2008 EMAS Statement. On the basis of this audit, it was stated on 29 May 2009 that the Environmental Management System and the EMAS Statement comply with the requirements of the EU's EMAS Regulation (EC) No. 761/2001.

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