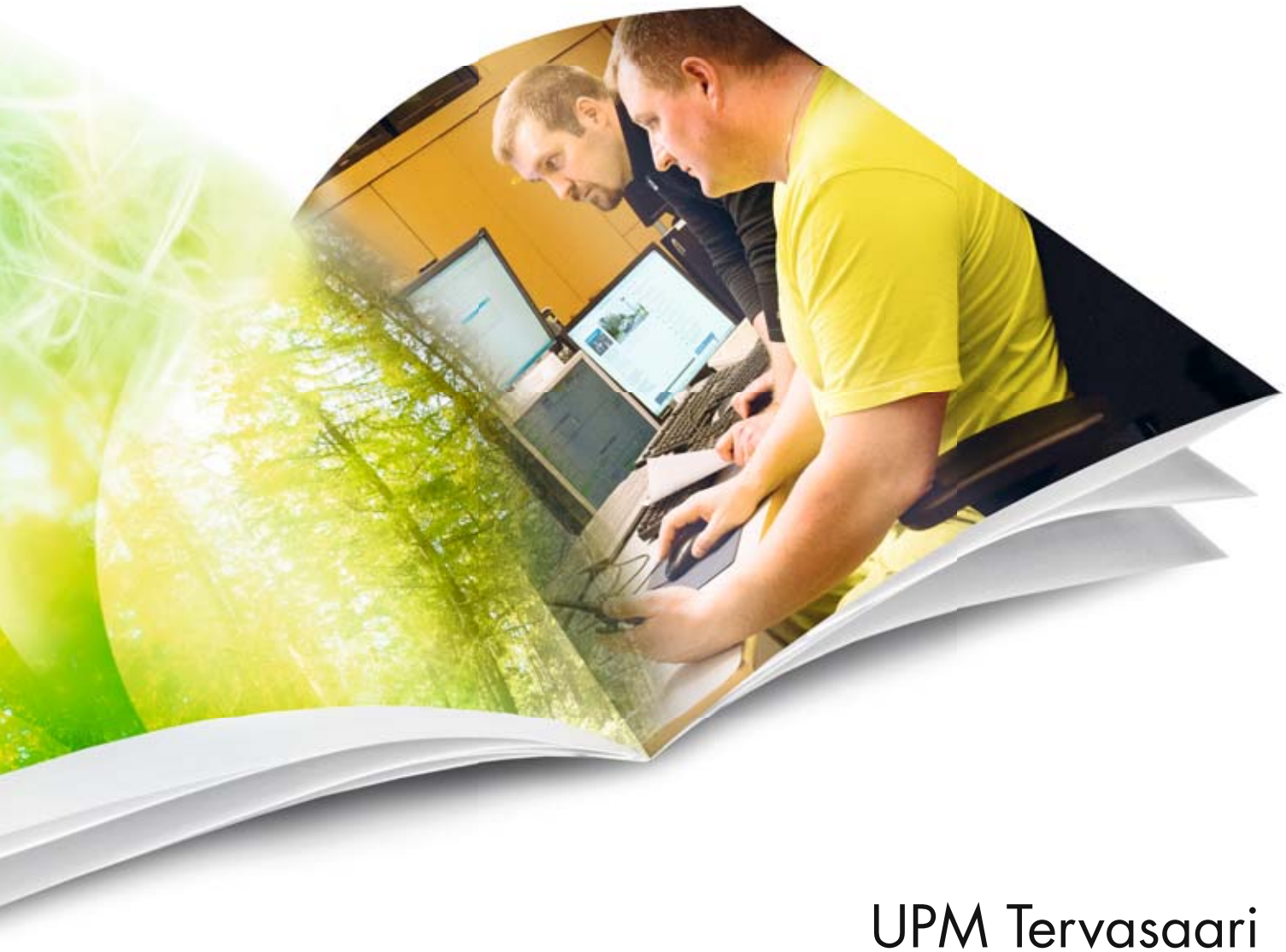
The Biofore Company UPM

Environmental performance in 2016



UPM Tervasaari

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 Specialty Papers, UPM Paper ENA and UPM Plywood. Our products are made of renewable raw materials and are recyclable. We serve our customers worldwide. The group employs around 19,300 people and its annual sales are approximately EUR 10 billion. UPM shares are listed on NASDAQ OMX Helsinki. UPM – The Biofore Company – www.upm.com

UPM Tervasaari

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

The Tervasaari integrated mill site has three paper machines, a power plant, a hydropower plant and a biological effluent treatment plant. Several businesses also operate onsite as tenants. The environmental load caused by the tenants' effluent emissions is included in the data of this report.

The heat required by the Tervasaari mills is produced by the mills' own power plant, and approximately one fifth of the electricity needed is produced at the mill. Heat is also sold to external users as district heating and steam.

The Suikki industrial landfill at the Tervasaari mill was in use throughout 2015. Closure of the old Kalatonlahti industrial landfill continued according to plan.

UPM Tervasaari is an important centre of expertise in the area of label papers, with a strong focus on the development of existing paper grades and new products.

UPM Tervasaari Environmental Performance in 2016 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 2016. 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 2018.

Production capacity	300,000 t/a	
Personnel	300	
Products	Label papers (Base):	
	UPM Brilliant	UPM Honey light
	UPM Brilliant evo	UPM Golden
	UPM Brilliant light	UPM SCK
	UPM Brilliant pro	UPM SCK light
	UPM Brilliant duo	UPM Topaz duo
	UPM Honey	
	UPM Honey evo	
Certificates	EMAS – EU Eco-Management and Audit Scheme ISO 22000 – Food Safety Management System Standard ISO 14001 – Environmental Management System Standard ISO 9001 – Quality Management System Standard PEFC™ Chain of Custody – Programme for the Endorsement of Forest Certification FSC® Chain of Custody – Forest Stewardship Council® *All certificates can be found from UPM's Certificate Finder (available at www.upm.com/responsibility)*	

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Environmental year 2016

In 2016, the UPM Specialty Papers (formerly UPM Paper Asia) business area successfully implemented its growth strategy. The new production line at UPM Changshu began regular commercial production in 2016. This significant investment reinforces UPM Specialty Papers' strong market position in Asia. Paper production at Tervasaari was slightly below the record-breaking level of 2015.

The mill's modern manufacturing technology for paper production enables us to produce a higher volume of thinner, lighter and environmentally-friendly label liners, reduce our usage of raw materials and improve energy efficiency in line with the goals of sustainable development.

As part of the cost improvement project undertaken by UPM, the profitability programme continued to produce good results throughout the company. The Tervasaari mill level even managed to exceed saving targets. Energy efficiency continued to provide significant additional savings. The unit's energy efficiency was improved by increasing the recovery of secondary heat. However, the goal of reducing the use of natural gas was not fully achieved.

The company-wide Clean Run programme that aims to further improve the management of environmental issues continued. The goals of Clean Run are to increase environmental awareness among our employees and to reduce abnormal emissions. Clean Run encourages all employees to detect, anticipate and actively prevent non-compliance with environmental policies.

Tervasaari has been very successful in managing environmental issues during recent years. It is still one of the best mills in terms of environmental Clean Run non-compliance with environmental Clean Run policies in the global comparison of UPM mills. No major environmental non-compliance took place at the Tervasaari mill in 2016.

The set goals for effluent and emissions into the air were achieved with excellent results. Emissions remained clearly below permitted limits. There have been no problems with the effluent treatment process at Tervasaari. Tervasaari also records all environmental feedback from outside the mill in its feedback system. In 2016, Tervasaari did not receive any feedback related to the operation of the mill. Our operations continued to be evaluated by the environmental and product safety authorities and independent external environmental specialists in 2016.

Water is one of the most important natural resources and an essential raw material for UPM. Tervasaari has been involved in the "Local waters" project, in which local schools have been given the opportunity to participate in studying and monitoring local waters. Schools involved in the project have received equipment needed for water studies. We are very happy to be involved in this project, which provides information on water and its importance for environmental well-being.

During the past few years, UPM has focused on implementing a step change to improve safety at work. Safety at work has also been a focus point at Tervasaari, with all indicators showing that results have improved during recent years. In 2016, Tervasaari achieved a new record in TRIF numbers, which include accidents that result in time being lost as well as cases where an employee has been assigned alternative work or required medical care. The frequency of such accidents was 7.3 per one million hours of work, which can be considered an excellent achievement.

During the first part of 2016, UPM implemented the global One Safety tool. This tool facilitates the recording and efficient handling of environmental, occupational and product safety observations in order to improve operations.

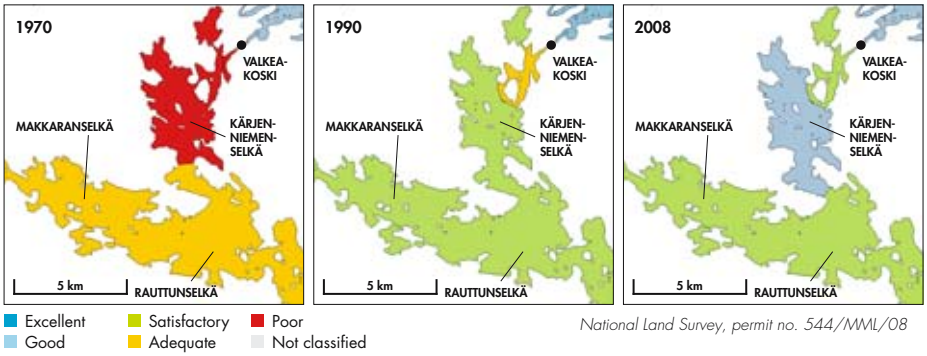
The number of product-related questions from our customers has increased year after year, and these questions have predominately concerned issues relating to product safety. Food safety management is an absolute basic requirement for the production of paper products that are suitable for use with food. This was our main incentive when certifying our operations at Tervasaari in line with the ISO 22000 standard (food safety management) in 2016.

In compliance with its Biofore strategy, UPM is strongly committed to the responsible handling of matters relating to finance, people, society and the environment and to the continuous improvement of its operations at Tervasaari.

Harri Hiltunen,
Manager, Environment and Responsibility

Jari Tamminen,
General Manager

Surface water quality classification for the years 1970, 1990 and 2008 based on samples taken and analysed by the Kokemäki Watercourse Protection Association in the water courses south of Valkeakoski.



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

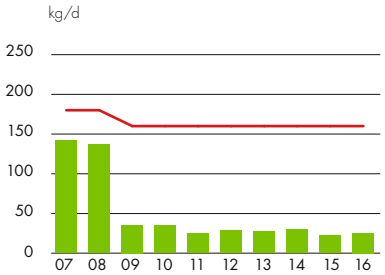
Water

The amount of effluent treated at the Tervasaari effluent treatment plant increased slightly from the previous year. During the coldest time of the year, a controlled stream of warm process water was directed to the mill's waste water treatment plant to maintain the temperature of the waste water processed at the biological treatment plant at a sufficiently high level.

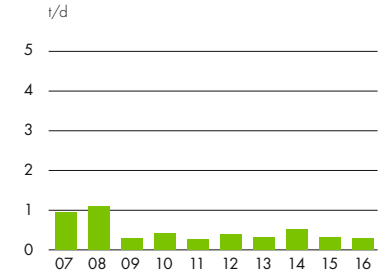
This was partly due to the fact that production at the BillerudKorsnäs paper machine ended in autumn 2016, which led to a change in the heat load and discharge of the waste water from the mill integrate. The warm process water directed to the plant increased the volume of processed waste water, which meant that the target for specific water consumption was not achieved. We did however reach our target for the amount of solids being sent to the effluent treatment plant.

It is also notable that all the measurements related to effluent emissions remained well below the permitted limits, and the internal effluent goals remained below the objectives set for 2016.

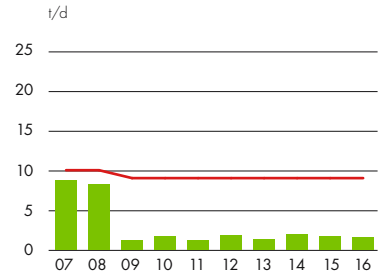
Nitrogen, N



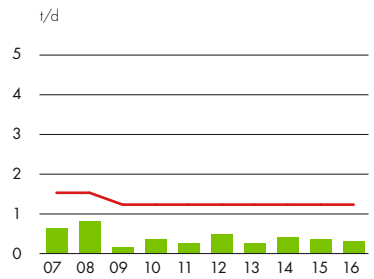
Total suspended solids, TSS



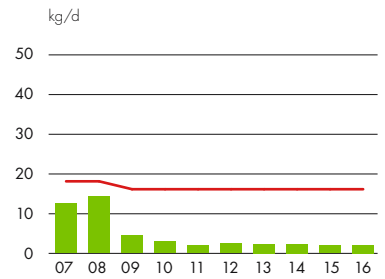
Chemical oxygen demand, COD



Biological oxygen demand, BOD



Phosphorus, P



Permit, monthly average

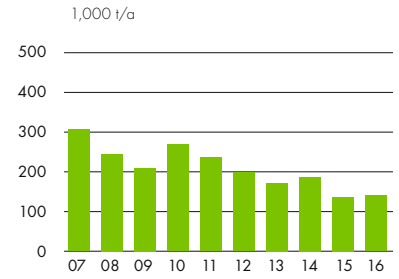
Air

We did not continue to monitor urban air quality in 2016. In recent years, industry in Valkeakoski has undergone a number of dramatic changes that have resulted in a decrease in air emissions.

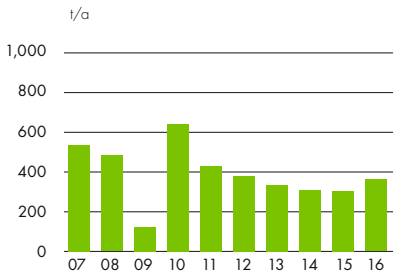
In 2015, the environmental protection authorities of Valkeakoski requested permission from the authorities overseeing environmental permits to stop monitoring air quality. The Pirkanmaa Centre for Economic Development, Transport and the Environment found that there was no need to continue monitoring community air quality after the current agreement term. Accordingly, monitoring of community air quality was discontinued in Valkeakoski on 31 December 2015.

Emissions into the air from the Tervasaari mill have remained below the permit limits throughout the year. The flue gas purification unit of the fluidized bed boiler commissioned at the end of 2014 has helped reduce the mill's SO_2 and particle emissions significantly.

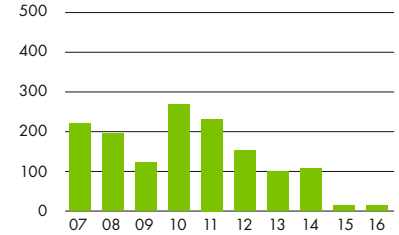
Fossil carbon dioxide, CO_2



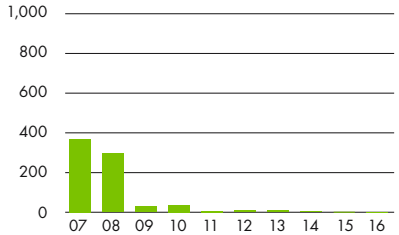
Nitrogen oxides, NO_x



Sulphur dioxide, SO_2



Particulates



Waste

Tervasaari is involved in UPM's Zero Waste project. One of the targets of the project is to eliminate all solid waste taken to landfills by 2018 by improving the sorting and recycling of waste.

The objective at Tervasaari is to reduce the quantity of waste taken to landfill by minimizing waste generated in production and improving waste sorting. Another goal is to find ways to reuse waste – fly ash in particular.

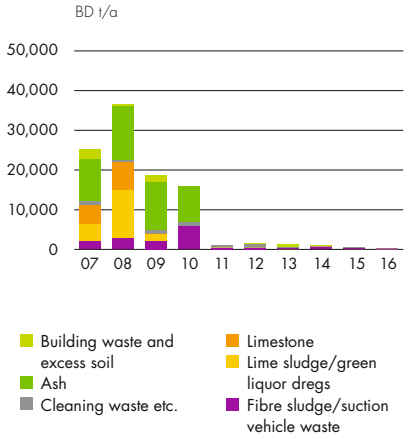
The amount of waste taken to the Suikki landfill decreased further compared to the previous year. At the end of 2016, we set ourselves the permanent goal of not taking production waste from UPM Tervasaari to the Suikki landfill but to reuse all waste instead. To ensure that waste is reused, we have increased collaboration with companies operating in this field during 2016.

In 2016, bottom ash from a fluidized bed boiler and fly ash were used during the closure of UPM's Kalatonlahti landfill.

We were able to maintain the share of reused waste at a high level. Of all waste generated in 2016, around 98.3% were reused.

Leachates from the Kalatonlahti and Suikki landfills are processed at Tervasaari's biological effluent treatment plant.

Solid waste taken to landfill

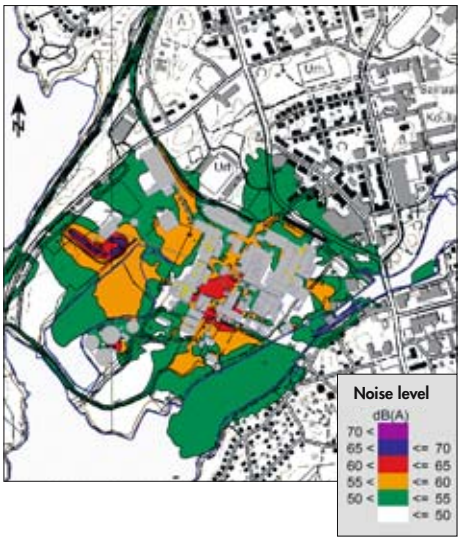


The weights in the image are dry weights.

Noise

The annual noise measurements defined in the Tervasaari environmental permit were conducted in 2016. The results of the measurements have been reported to the environmental protection authorities of Valkeakoski and the Pirkanmaa Centre for Economic Development, Transport and the Environment.

The noise mapping calculations are based on the Nordic calculation models for road, railroad and industry noise, using the SoundPLAN software solution. The picture represents the average noise level (LAeq7-22) at UPM Tervasaari in the daytime during the summer of 2014.



Environmental indicators 2016

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*	Paper	300,000 t
Raw materials	Pulp and chemicals	Information available in the UPM Corporate Environmental Statement.
Energy	Biofuels and fossil fuels	Biofuels 47% Fossil fuels 53%
	Purchased energy	Information available in the UPM Corporate environmental statement.
Emissions to air	Particulates	0.2 t
	Sulphur dioxide, SO_2	14 t
	Nitrogen oxides, NO_2	381 t
	Fossil CO_2	142,329 t
Water intake	Process and cooling water	12,017,803 m^3
Discharges to water	Clean cooling waters	6,838,204 m^3
	Process effluent	5,179,598 m^3
	BOD_7	106.8 t
	COD_{Cr}	570.0 t
	Solids	105.6 t
	Phosphorus, P	0.75 t
	Nitrogen, N	9.24 t
Waste	Landfill waste (dry)	
	– soil and rock	72 t
	– demolition waste	46 t
	– mixed waste (cleaning, gardening etc.)	166 t
	– fibre sludge, suction vehicle waste, dry	0.39 t
	Reused waste (dry)	
	– metal waste	693 t
	– ash	12,892 t
	– energy waste	1,309 t
	– suction vehicle waste	42 t
	– fibre sludge	1,006 t
	– other	86 t
	Hazardous waste	149 t
Size of mill area		73 ha

** The figure does not include the paper production capacity of Billerud-Korsnäs Finland Oy.*

The environmental load caused by the operations of the tenants is included in the data of this report.

Performance against targets in 2016

Target(s)	Achievement	Comments
Preventing environmental non-conformances and achieving the Clean Run objectives COD < 1.9 t/d; BOD_7 < 0.4 t/d, N < 30 kg/d ja P < 3 kg/d	Yes	Treatment plant has been reliable. Emissions have been controlled.
Air emissions Fluidised bed boiler NO_x, less than 200 mg/m³(n) SO_2, less than 20 mg/m³(n) Particulates less than 10 mg/m³(n)	Yes	All air emissions were clearly below the target level. Implementation of the new flue gas purification unit had a significant effect on the decrease of the SO_2 and particle emissions.
Reducing water consumption, loss of solids and the amount of solid waste – Water consumption less than 8.2 m³/t – Solids loss less than 0.62%	 No Yes	Specific effluent consumption on average exceeded the target, but some progress was made in reducing solids loss in paper machines.
Amount of waste taken to landfills less than 200 t/a and improving waste sorting	No	Sorting of the types of waste produced by the mill had improved but was slightly below target.
Increasing opportunities for reuse of ash	Yes	Fly ash was reused according to plan.
Improving energy efficiency Reduction of natural gas consumption by 70 000 MWh compared to the 2015 level	No	The goal of reducing the use of natural gas in energy production was not achieved due to the prolonged shutdown of the fluidized bed boiler and steady operation of the paper machines.

Environmental targets 2017

The most significant actions for improving safety and protecting the environment in 2017 will be:

- Preventing environmental non-conformances and achieving the Clean Run objectives: COD less than 1.9 t/d; BOD_7 less than 0.4 t/d, N less than 30 kg/d and P less than 3 kg/d
- Emissions into the air; fluidised bed boiler
  - NO_x less than 200 mg/m³(n)
  - SO_2 less than 20 mg/m³(n)
  - Particulates less than 5 mg/m³(n)
- Reducing water consumption, loss of solids and the amount of solid waste
  - Water consumption level 9.5 m³/t
  - Solids losses 0.45%
  - Improving the sorting of waste to be incinerated
  - Zero t/a of solid production waste taken to landfills
- Increasing opportunities for reuse of ash
  - Aim to re-use 100% of fly ash and starting the recycling of bottom ash
  - Participation in one or more ash reuse projects
- Improving energy efficiency and decreasing fossil CO_2 emissions:
  - Reducing the use of natural gas by 70,000 MWh compared to 2016.

EMAS
Verified environmental management
REG.NO. FI - 000058

VALIDATION STATEMENT

As an accredited environmental verifier (FI-V-0001), Inspecta Sertifiointi Oy has examined the environmental management system and the information of UPM Tervasaari Environmental Performance 2016 report and of UPM Corporate Environmental statement 2016. On the basis of this examination, the environmental verifier has herewith confirmed on 2017-04-04 that the environmental management system, this UPM Tervasaari Environmental Performance report and the information concerning UPM Tervasaari of UPM Corporate Environmental statement are in compliance with the requirements of the EMAS Regulation (EC) No 1221/2009.

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UPM leads the integration of bio and forest industries into a sustainable future. Biofore stands for innovation, responsibility and efficiency.
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