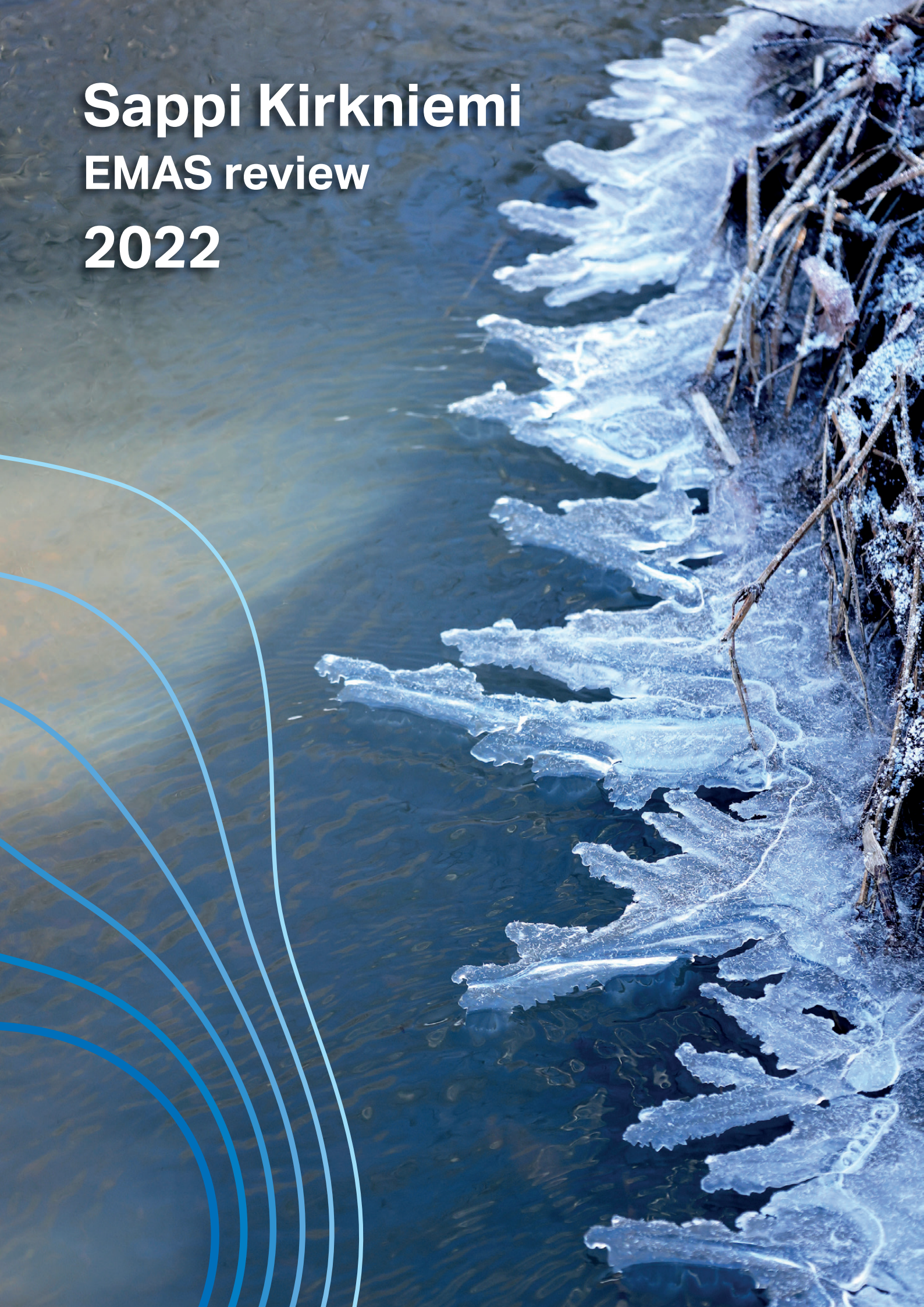


Sappi Kirkniemi

EMAS review

2022



Foreword

In line with the Sappi Kirkniemi Mill's strategy until 2025, we aim to continuously improve the environmental performance throughout our value chain. Reducing the mill's carbon dioxide emissions is a key goal for us. Our vision is to be the best publication paper operation in the world. We are committed to developing innovative products and service concepts to meet the needs of our customers with respect for the environment. Our operations are built on a committed staff who take pride in their high level of safety performance.

Towards carbon-free Kirkniemi

In 2020, Sappi Europe set its sustainable development goals (SDGs) for 2025. The company's climate objectives are to reduce its greenhouse gas emissions and increase the share of renewable energy in its total energy consumption. To meet these targets, we invested 16.5 million euros in Kirkniemi's energy production to allow the mill to switch to biofuels. We have built reception, storage and handling equipment in Kirkniemi for biofuels, such as bark and forest chips, which are produced as by-products of forestry and the wood processing industry. The investment will reduce the mill's direct fossil emissions by almost 90%, or 230,000 tonnes of carbon dioxide per year, also substantially reducing greenhouse gas emissions for the whole city of Lohja. The investment was completed in early 2023.

Turnover reaches record levels

During the years of covid pandemic, Kirkniemi's competitors shut down their paper machines, which was reflected in the increased demand for Kirkniemi's products. At the same time, we were able to pass increased production costs on to sales prices, and Kirkniemi's turnover for the 2022 business year reached a record high of 617 million euros.

In 2022, we worked actively on product development to expand our business into the thinprint paper market. Thinprint paper is a graphic paper with end uses such as religious publications, reference books and product labels for packaging.

Personnel and safety

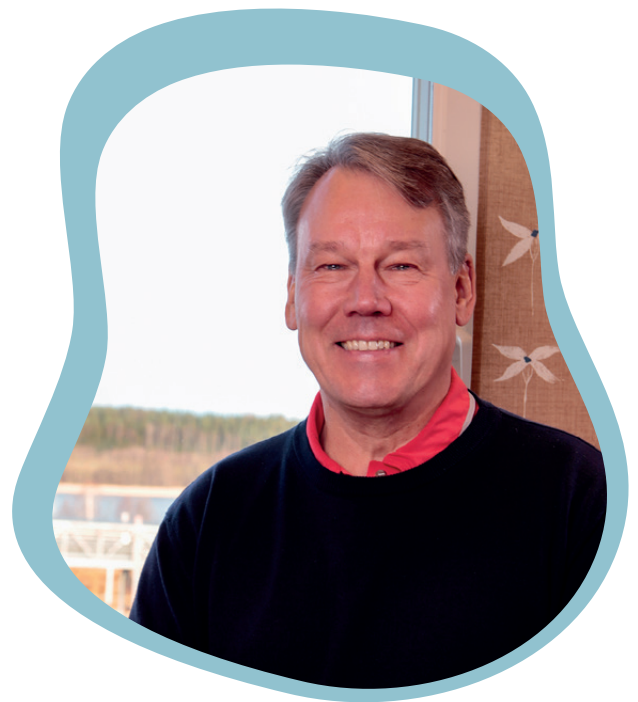
We aim to provide our personnel with a safe workplace and opportunities to develop their skills. The first company-specific collective agreement with the Finnish Paperworkers' Union reserved the right to include three training days per year in employees' work shift systems. In Sappi's 2022 business year, the number of training days per person was 5.5. As our employees' expertise grows, we want to make working at Kirkniemi more diverse, interesting and competitive.

To achieve our goal of zero accidents, it is important that everyone knows the dangers and risks of their job. In 2022, personnel were extensively involved in assessing task-specific hazards and risks. We always review the results of this assessment when training new employees. In the future, we will have updates as necessary, at least once a year, during induction for summer workers.

This review supplements the broader 2021 EMAS statement, and it offers an up-to-date view of our mill's operations and impacts.

13 April 2023

Martti Savelainen
Mill Director



Environmental activities in 2022

Environmental activities in 2022 focused on reducing load on watercourses and constructing the mill's investment to reduce carbon dioxide emissions.

Towards renewable energy

To meet the Kirkniemi mill's climate goals, work on the bioenergy investment continued as planned in 2022. A biofuel reception, storage and handling equipment were built at the mill's power plant. The equipment was commissioned in early 2023. Coal is gradually being replaced by biofuels in the multi-fuel boiler completed in 2015. With this investment, the Kirkniemi mill's direct fossil carbon dioxide emissions will be reduced by up to 90%, i.e. by about 230,000 tonnes of carbon dioxide per year.

After the bioenergy project is completed, the fuels used at the power plant will primarily be domestically sourced biofuels: wood chips and bark. The bark from the mill's debarking plant and the effluent treatment plant's sludge are also incinerated at the mill's power plant. The mill's power plant produces the steam and some of the electricity required by the mill. District heat is produced for heating the mill's buildings and the nearby residential area.

Reducing load to watercourses and ensuring resource-efficient production

Work on reducing load to watercourses continued in 2022. Compared to 2021, all emissions to watercourses decreased both in absolute terms and relative to production. The biggest decrease was in solids emissions, which decreased by more than 40%. Although the mill's specific effluent flow rate has been at a good level for many years, around the lower bound of the BAT range, reducing water use is still an important part of managing the load on the effluent treatment plant. In 2022, a master's thesis was commissioned to find opportunities to reduce freshwater use in Kirkniemi's paper machine lines. Opportunities for saving hot water were also identified throughout the mill. In 2022, the specific effluent flow rate was 8.9 m³/h, which is below the minimum BAT level.



Share of certified wood fibre

88%



Preventive safety notification

2,836 observations



Specific effluent volume

8.9 m³/t

The Kirkniemi mill employed

565 people



Using materials and raw materials economically, reducing losses, and reducing the waste generated are important parts of environmentally responsible operations. In 2022, material losses accounted for 1.69% of production. Losses decreased, compared to the previous year, but were still above the target level of 1.4%. The work on reducing material losses continued in 2022, including using new indicators to identify a previously unidentified source of material loss. Work on these loss-reduction projects will continue in 2023.

In 2022, a total of 37,800 tonnes of waste was generated in the mill area. The largest abnormal waste batches came from ongoing construction sites in the mill area. In addition to the bioenergy investment, the old oil storage tank area in the mill area was renovated. Approximately 1,800 tonnes of soil were removed from the bio-fuel jobsite and roughly 640 tonnes of soil and concrete waste were removed from the oil storage tank jobsite. Approximately 230 tonnes of the soil were disposed of in landfills. About 21,500 tonnes of bark, classified as a by-product, were produced.

Efficient energy use saves both resources and costs

The Kirkniemi mill participates in the national energy efficiency agreement. The total energy savings target for 2017–2025 is 7.5%. The energy savings have been successful and slightly ahead of the target levels. In 2022, energy-saving projects resulted in almost 19 GWh of savings. The biggest savings were made by introducing energy-efficient grinding stones at the pulp mill and refurbishing the bark press.

Managing energy efficiency is a natural part of all development projects, and improving it is part of daily work. In addition to equipment procurement and investments, energy efficiency is addressed in the development of process operating methods and products. In 2022, an internal audit was carried out on the efficiency of handling maintenance/fault reports related to the energy-efficiency of equipment. The mill is ISO 50001 certified to indicate its systematic approach to improving energy efficiency.

Personnel training is part of safe operations and risk management

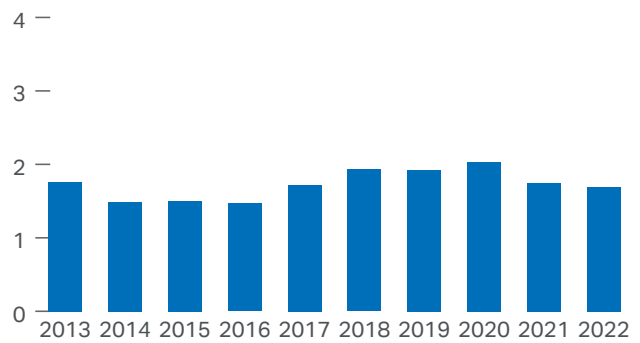
Safety is one of the main themes of the Kirkniemi mill's strategy. In 2022, investments were made in personnel safety training and safety workshops, several of which were held for each department. The main theme was developing a culture of occupational safety through teamwork. There were 2,836 proactive safety observations at the mill. A total of 558 Behaviour Based Safety assessments (BBS assessments) were carried out. Kirkniemi personnel had seven minor accidents resulting in absences. The Kirkniemi mill's occupational safety and health system is ISO 45001 certified, and its operations meet those requirements.

In March, a fire at the mill damaged the paper machine's winding roller. The fire was quickly brought under control, avoiding any major damage. The fire stopped the paper machine line for about three days.

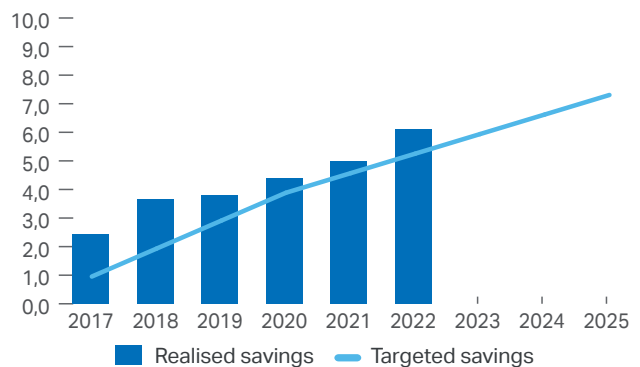
The mill personnel were trained to prepare for emergencies in accordance with the rescue plan. The mill's fire brigade



Solid matter loss to the effluent treatment plant, %



Energy efficiency savings as % of total energy consumption, cumulative



trained with the Länsi-Uusimaa Rescue Department in case of events such as major accidents. The Länsi-Uusimaa Rescue Department visited the mill on a rotating shift schedule to learn about the storage and handling of hazardous chemicals. The theme of the annual drill for accidents defined by the Finnish Safety and Chemicals Agency (Tukes) was ammonia and its associated risks. Fire risk surveys were carried out four times in different parts of the mill area with the Rescue Department's fire inspector.

In 2022, external training on hazardous waste, its treatment and storage was carried out at the mill. The mill's design department discussed waste management issues, operating methods and the requirements of the revised Waste Act.

We aim for good interaction with stakeholders

The ongoing bioenergy investment in 2022 caused increased noise and traffic in the mill's vicinity. These were communicated in advance, both to targeted stakeholders and via social media. Social media has also been actively used to communicate other issues.

We received feedback from 12 stakeholders. Most of the feedback was related to odours (4). The observations were about temporary odours that could be linked

to the mill's effluent treatment plant. Two responses were related to the winter maintenance of nearby light traffic routes by salting. Salting was considered to be excessive. Following this feedback, the light traffic routes have been maintained by ploughing and sanding.

At the end of the year, the discharge ditch for the mill's purified effluent into Osuniemenlahti was renovated. The eroded bank was restored with gravel and the maintenance bridges over the ditch were replaced. The surrounding beach was also cleaned up. The area is a popular destination for birdwatchers.

In 2022, the Kirkniemi mill employed 565 people and 112 summer workers, which is more than ever before. Personnel well-being is important, and the mill supported its employees' physical and cultural activities, for example, by offering a bicycle benefit and sports and culture vouchers.

We worked with local educational institutions to offer orientation and internship opportunities to students. Cooperation with students in the industry involved providing project work opportunities for students at universities of applied sciences.

As part of the Ympäristöviisas Uusimaa (Environmentally Smart Uusimaa) event organised by the Helsinki-Uusimaa Regional Council, the Kirkniemi mill

held an invitation-only event in May for decision-makers, officials and parliamentarians from neighbouring municipalities. The event included discussions of the mill's environmental activities, economic footprint, future labour needs, and a presentation on the history of water protection in Lake Lohjanjärvi.

Noise measurements were carried out in 2022

The Kirkniemi mill's operations cause noise in the surrounding area. In 2022, noise measurements were carried out in accordance with the environmental permit regulations. The noise level in residential areas may not exceed 55 dB during the day and 50 dB at night. The measured day and night-time average noise levels did not exceed the set limits when taking into account the estimated uncertainty of the measurements.

The environmental permit decision was received in October 2022

The Regional State Administrative Agency for Southern Finland issued an environmental permit decision to the Kirkniemi mill on 21 October 2022. As a result of the appeals, the new permit decision has not gained legal force.



Environmental results in 2022

In 2022, the mill's load into watercourses complied with the environmental permit regulations for COD, nitrogen and solids emissions, but the monthly limit for phosphorus was exceeded three times: in March, September and November. The excess in March was caused by a large emission of solids, which also carried phosphorus into the lake. The excesses in autumn were due to an imbalance in

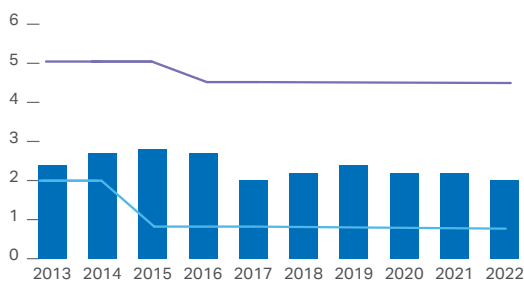
phosphorus nutrients in the treatment plant. The proportion of dissolved phosphorus became abnormally high, compared to the phosphorus bound in the sludge, and removing it in the treatment plant's tertiary phase was challenging. The situation was resolved by using a problem-solving tool, consulting external experts, and examining the phosphorus loads from the raw materials and chemicals.

The various measures taken to reduce the pollutant load proved to be effective, and emissions were brought under control. Annual emissions were within permit limits. However, compared to 2021, all emissions into water bodies decreased both in absolute terms and relative to production. Emissions were in line with BAT emission levels for the pulp and paper industry, except for solids in the effluent.

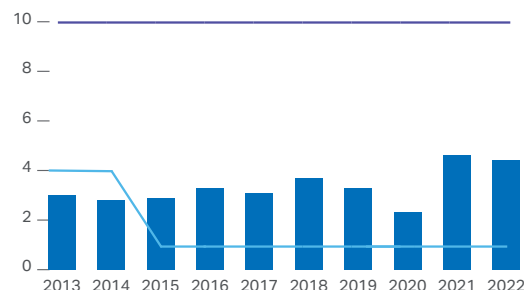
Emissions to watercourses vs. permit limits in 2022

Emission parameter	Unit	Permit limit, monthly average	Permit limit, annual average	Realised annual average in 2022	Note
COD _{Cr}	kg/d	7,000	5,400	3,216	
Total phosphorus	kg/d	9	7	7.0	The monthly limit was exceeded three times
Total nitrogen	kg/d	130	100	47	
Solids	kg/t		0.8	0.62	

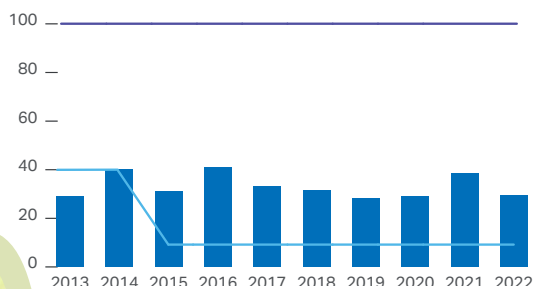
COD_{Cr} specific kg/t of paper



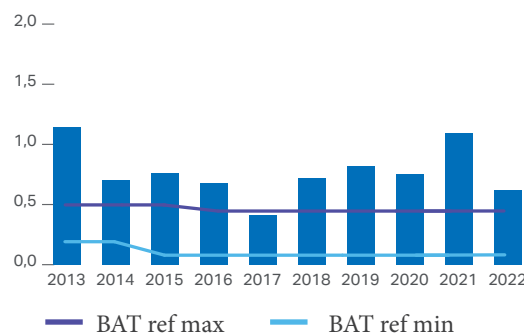
Phosphorus specific, g/t of paper



Nitrogen specific, g/t of paper



Rated load of solids, kg/t of paper

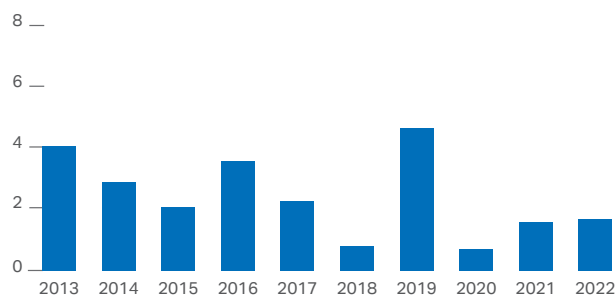


The power plant's emissions to air increased slightly across all emissions parameters. The increase was small, around 1–7% compared to the previous year, and was due to an increase in the plant's electricity

production. The emissions complied with the permit conditions, except for two days when the K5 boiler's NO_x emission limit was exceeded, and on one day when both NO_x and SO₂ emission limits were

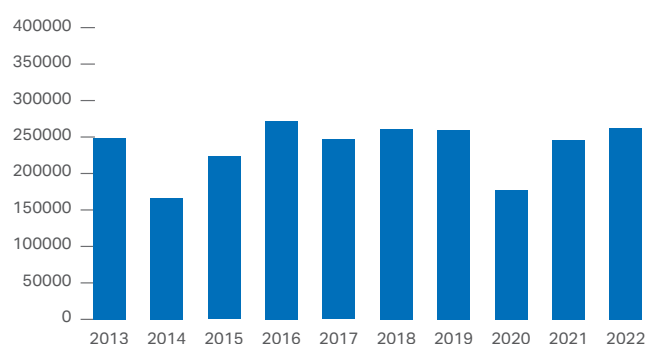
exceeded. The overruns were caused by a malfunction in the solid fuel feeding equipment.

Particulate emissions to air, t/a

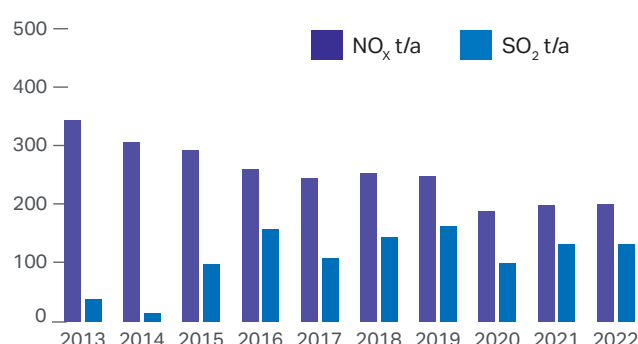


Sustainable development and respect for the environment are key principles in our everyday operating methods.

Fossil CO₂ emissions, t/a



Sulphur dioxide and nitrogen oxide emissions to air, t/a



Fulfilment of environmental goals in 2022

Target	Indicator	Unit	Target	Status
Chain of Custody management	Share of certified wood fibre	%	> 85	88
Improvement of raw material efficiency and water management	Solid matter loss at the effluent treatment plant	kg/t	< 14	16.9
	Effluent flow	m ³ /t	< 9.4	8.9
Improved energy efficiency: Savings objectives for 2017–2025 in accordance with the target programme	Energy savings: electricity, heat, fuel	GWh	≥ 12.8	18.8
Efficient waste sorting and utilisation	Utilisation rate	%	> 99	99.3
	Mixed waste after sorting	t/a	< 50	6
Good management of environmental risks: Identification of risks, analysis of non-conformity, and preventive measures No severe incidental releases	Number of unexplained non-conformities causing disturbances at the power plant	pcs	0	0
	Number of incidental releases	pcs	0	0
Compliance with environmental permit limits: Levels below the annual and monthly averages (in brackets) of emissions into watercourses set out in permit limits	COD _{Cr}	kg/d	≤ 5400 (7000)	3216
	Phosphorus	kg/d	≤ 7 (9)	7.0
	Nitrogen	kg/d	≤ 100 (130)	47
	Solids	kg/t	≤ 0.8	0.62
Air emissions from the power plant in compliance with the permit limits	Emissions < permit limits	Y/N	Yes	No
Reduction of CO ₂ emissions	Bio-project on schedule	Y/N	Yes	Yes

Environmental goals for 2023

The mill's environmental goals have been set for a three-year period (2022–2024). The goals will be monitored annually. If necessary, they will be revised according to the principle of continuous improvement. Our aim is to continuously improve environmental efficiency throughout the

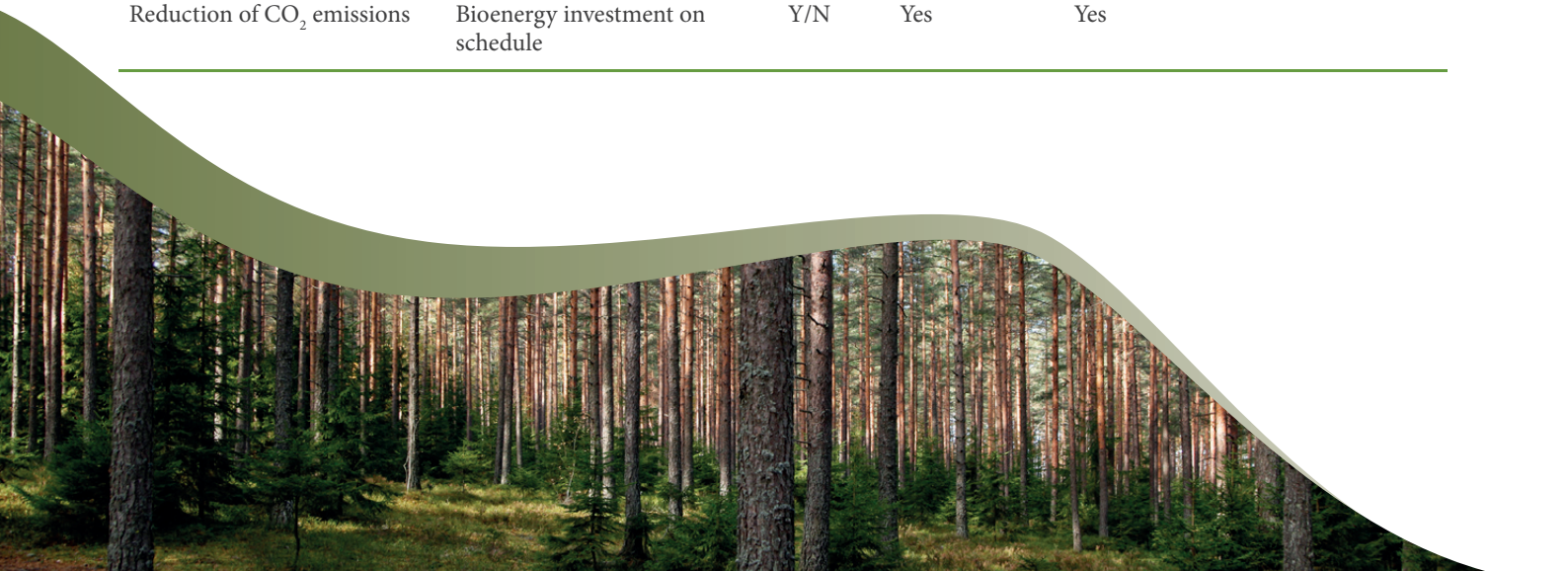
value chain.

Reducing carbon dioxide emissions is one of the mill's key goals until 2025, as specified in the strategy prepared in 2019. Investment work that will enable the K5 boiler to transition to biofuel started in the mill's power plant at the end of 2021.

The transition to biofuels will be gradual in 2023.

The amount of mixed waste generated at the mill has been decreasing in recent years, and the related target was tightened. Otherwise, annual goals will remain as set for the three-year period.

Target	Indicator	Unit	Target value	Measure
Chain of Custody management	Share of certified wood fibre	%	> 85	Monthly verification of raw material sources
Improvement of raw material efficiency	Solid material loss from the mill to the treatment plant	kg/t	< 14	Reduction of material loss according to the project plan
Improvement of the efficiency of water use	Effluent flow	m ³ /t	< 9.4	Potential areas for reducing the use of fresh water and hot water
Improved energy efficiency: Savings objectives for 2017–2025 according to the target programme	Energy savings: electricity, heat, fuel	GWh	12.8	Pre-planning and implementation of energy efficiency investments Energy efficiency meetings Continuous improvement projects
Efficient waste sorting and utilisation	Utilisation rate	%	> 99	Quarterly waste management rounds Environmental flash on sorting
	Mixed waste after sorting	t/a	< 10	
Good management of environmental risks: Identification of risks, analysis of non-conformity, and preventive measures No severe incidental releases	Number of unexplained non-conformities causing disturbance at the power plant	pcs	0	Operating and maintaining the SARA system, performing procedures
	Number of incidental releases	pcs	0	
Compliance with environmental permit limits: Levels below the annual and monthly averages (in brackets) of emissions into watercourses set out in permit limits	COD _{Cr}	kg/d	≤ 5,400 (7,000)	Daily monitoring and rapid response to irregularities Introducing and optimising the use of the online COD meter at the effluent treatment plant
	Phosphorus	kg/d	≤ 7 (9)	
	Nitrogen	kg/d	≤ 100 (130)	
	Solids	kg/t	≤ 0.8	
Air emissions from the power plant in compliance with the permit limits	Emissions vs. permit conditions	Y/N	Yes	Daily monitoring and rapid response to irregularities
Reduction of CO ₂ emissions	Bioenergy investment on schedule	Y/N	Yes	Yes



Environmental key figures 2020–2022

	2020		2021		2022	
	Total per year	Key figure per tonne of paper	Total per year	Key figure per tonne of paper	Total per year	Key figure per tonne of paper
Production, paper, t	414,843	-	583,179	-	581,971	-
Raw materials¹⁾						
Chemical pulp, t	73,000	177 kg/t	102,000	175 kg/t	98,000	168 kg/t
Mechanical pulp, t	146,000	353 kg/t	220,000	377 kg/t	216,000	371 kg/t
Pigments, t	165,000	399 kg/t	236,000	405 kg/t	232,000	399 kg/t
Binders, t	16,000	39 kg/t	24,000	41 kg/t	23,000	40 kg/t
Additives, t	8,300	20 kg/t	12,000	21 kg/t	11,000	19 kg/t
Power plant fuels						
Fossil, GWh	504	-	718	-	772	-
Biofuels, GWh	179	-	201	-	206	-
Energy consumption in production						
Electricity, GWh	631	1.52 MWh/t	863	1.48 MWh/t	828	1.42 MWh/t
Renewable electricity, GWh	49	-	85	-	96	-
Heat, GWh	419	1.01 MWh/t	539	0.93 MWh/t	543	0.93 MWh/t
Renewable heat, GWh	122	-	134	-	118	-
Natural gas to the coating process, GWh	61	0.15 MWh/t	83	0.14 MWh/t	70	0.12 MWh/t
Heating of buildings, GWh	48	-	74	-	58	-
Emissions into the air, mill and power plant						
Sulphur dioxide, SO ₂ , t	100	0.24 kg/t	132	0.23 kg/t	133	0.23 kg/t
Nitrogen oxide NO _x , t	190	0.46 kg/t	199	0.34 kg/t	202	0.35 kg/t
Particles, t	0.7	0.002 kg/t	1.6	0.003 kg/t	1.7	0.003 kg/t
Fossil CO ₂ , t	176,940	427 kg/t	245,889	422 kg/t	262,051	450 kg/t
Total water use, m³	21,286,000	50.8 m ³ /t	25,886,000	44.4 m ³ /t	28,015,000	48.1 m ³ /t
Emissions into watercourses						
Pure cooling water, m ³	16,538,000	39.4 m ³ /t	20,050,000	34.4 m ³ /t	22,598,000	38.8 m ³ /t
Process effluent, m ³	4,615,000	11.0 m ³ /t	5,629,000	9.7 m ³ /t	5,204,000	8.9 m ³ /t
Biological oxygen demand, BOD ₇ , t ²⁾	43	0.10 kg/t	58	0.10 kg/t	53	0.09 kg/t
Chemical oxygen demand, COD _{Cr} , t ³⁾	912	2.2 kg/t	1,287	2.2 kg/t	1,174	2.02 kg/t
Phosphorus, P, t	0.97	2.3 g/t	2.68	4.6 g/t	2.56	4.4 g/t
Nitrogen, N, t	12.2	29 g/t	22.3	38 g/t	17.2	30 g/t
Solids, t	315	0.75 kg/t	634	1.09 kg/t	362	0.62 kg/t
Waste and by-products¹⁾						
Total waste, t	43,036	104 kg/t	55,940	96 kg/t	37,800	65 kg/t
Utilisation rate, %	99.3	-	98.3	-	99.4	-
Effluent treatment plant sludges, t	8,150	20 kg/t	10,350	18 kg/t	7,900	14 kg/t
Ash ⁴⁾ , t	18,600	45 kg/t	23,980	41 kg/t	25,700	44 kg/t
Landfill waste, t	4	0.01 kg/t	880	1.5 kg/t	230	0.39 kg/t
Other regular waste, t	1,246	3.0 kg/t	1,430	2.5 kg/t	3,750	6.4 kg/t
Hazardous waste, t	494	1.19 kg/t	170	0.29 kg/t	220	0.38 kg/t
Bark, t	14,550	35 kg/t	19,130	33 kg/t	21,500	37 kg/t
Size of the mill area, ha	112	-	112	-	112	-
Water impermeable area, ha	42	-	42	-	42	-
Size of the nature conservation area, ha	70	-	70	-	70	-

1) Raw materials and waste indicated in dry weight

2) Biological oxygen demand

3) Chemical oxygen demand

4) Ashes are reused



Sappi is the leading global provider of sustainable wood fibre products and solutions, including dissolving pulp, printing and writing papers, packaging and speciality papers, casting and release papers, biomaterials and bioenergy. As a company that relies on renewable natural resources, sustainability is at our core.

All of Sappi Europe's mills hold a chain-of-custody certification under the Forest Stewardship Council® (FSC® C015022) and Programme for the Endorsement of Forest Certification (PEFC/07-32-76) schemes. Our papers are produced in mills accredited with ISO 9001, ISO 14001, ISO 50001 and ISO 45001 certification. We have EMAS registration at eight of our ten mills in Europe.

Sappi Europe SA is a division of Sappi Limited (JSE), headquartered in Johannesburg, South Africa, with 12,500 employees and 18 production facilities on three continents in nine countries, 37 sales offices globally, and customers in over 150 countries around the world. Learn more about Sappi at www.sappi.com.

As an accredited environmental verifier (FI-V-0001), Inspecta Certification has examined the information of the environmental management system and 2022 EMAS review of Sappi Finland Operations Oy, Kirkniemi mill. On the basis of the examination, on 13/04/2023 the environmental verifier has confirmed that the environmental management system and the EMAS statement are in compliance with the requirements of the EMAS Regulation (EC) No. 1221/2009. The verification concerns only the version in Finnish.

The EMAS (EU Eco-Management and Audit Scheme) statement of the Kirkniemi paper mill is published in Finnish and in English. The EMAS statement and annual reviews are available in PDF format on the Sappi website at www.sappi.com. Please send any feedback and questions to the environmental manager via e-mail to Kirsi.Tuominen@sappi.com or by calling +358 10 464 2116.

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