

## Environmental work at Hallsta Paper Mill

**Hallsta Paper Mill manufactures MF Magazine and book paper from thermo-mechanical pulp (TMP). The mill is located in northern Roslagen on Edeboviken, an inlet of around 10 km long that opens out into the Baltic Sea.**

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### Environmental activities in 2019

The fibre sludge and biosludge extracted at the mill's wastewater treatment plant is composted north of the mill (Norra plan). The composting process has been developed during the year with the injection of

approximately 10 per cent bark, which improves the composition of the sludge and speeds up the composting process while reducing odour. Sales of the final product of the composting process, fibre soil reinforcement, have increased.

The construction work capping the Rya landfill site was completed during the year and all that remains is final adjustments and approval from the supervisory authority.

The closure plan for Ehnsjö 3, the mill's landfill site for dredging material, submitted in 2011, was rejected by the County Administrative Board. Holmen appealed against the decision at the Land and Environment Court, and the case was then referred back to the County Administrative Board. Following renewed dialogue on expanding sampling, the mill's revised sampling plan was approved in early 2019. Sampling was carried out during the summer and analysis work began in the autumn and is estimated to be complete in early 2020. The analysis results will form the basis of continued decisions on the closure plan.

Measures taken following the problems with wastewater treatment in autumn 2018 have paid off and wastewater treatment has worked well all year with good margins on emission criteria and BAT-AEL for the whole year. A couple of incidents in the autumn meant the guideline values were exceeded for one parameter. Last summer the decision was made to invest in redesigning the wastewater treatment process and work began during the summer.

Work on targets has been expanded, with a major focus on the environment and energy as well as greater involvement of all mill personnel.

### Permits for operation

- Hallsta Paper Mill holds a permit for its operations granted under the Environmental Code in 2000. There has been a separate permit for the composting of sludge for fibre soil reinforcement and storage of bark at Norra plan since 2015.
- Hallsta Paper Mill also has three water judgments from 1930, 1955 and 1979 governing the permit to source process water from the nearby lake system.
- Hallsta Paper Mill has been covered by the rules on fossil carbon dioxide emissions trading since 1 January 2005. The mill holds a permit for emissions of greenhouse gases for the current trading period 2013–2020. Preparations have begun for the next trading period (2021–2030).
- Since the 2015 Environmental Report, the mill's outcomes and status have been reported in relation to current BAT conditions. These conditions became more stringent from 1 October 2018 onwards.

### Environmental certifications

- The environmental management system has been certified to ISO 14001 since 2001.
- The energy management system was certified to SS 62 77 50 in 2005 and to the international standard ISO 50001 in 2011.
- The health and safety management system has been certified to OHSAS 18001 since 2012.

- Holmen Paper Hallsta has held certification for the traceability of wood raw material since 2007 and for biofuel since 2016 (chain of custody).
- All products from Hallsta are approved to carry the EU Ecolabel.

### **Investments/environmental measures**

A construction project aiming to create a cost-effective, more easily controlled and better process solution for wastewater treatment began during the year. The project contains a number of elements, the most important of which being a new cooling tower, conversion to MBBR (Moving Bed Bio Reactor) technology and renovating the pre-sedimentation basin. The new cooling tower will be taken into operation in spring 2020, while the other aspects will gradually be finalised over the summer, with calibration in the autumn.

### **Disruptions to production and complaints**

In March there was one incident where sulphur dioxide was emitted when a truck and trailer were unloaded simultaneously. Valves were not shut off after unloading the trailer, and when the truck was to be unloaded, sulphur dioxide was released via air-relief valves. The person unloading the chemicals was quick to activate the emergency stop and emissions were kept to a minimum.

During the summer there was one incident of emissions to land in conjunction with start-up of a biological treatment pond. The problem was caused by a broken valve and the area was subsequently redesigned to prevent future incidents. The month still fell within the guideline limits.

In August and September the guideline limits for phosphorus were exceeded. The incident in August was probably due to anaerobic zones occurring biologically, which can lead to nutrients being released from the biosludge. One probable cause was failure of several mechanical aerators, which meant a major deterioration in oxygen capacity while the system was under heavy strain.

The incident in September was due to a problem with a urea delivery which created an imbalance in the system. Missed nitrogen dosing also disrupts the phosphorus balance and emissions were therefore high for several days.

In the summer, complaints of unpleasant odours from Norra plan were received from neighbours to the north of the plant. To reduce odours, trials of incorporating bark in the sludge have been carried out over the year. Mixing in bark improves the carbon balance of the sludge and analyses show a major reduction in odour and acceleration of the composting process. Bark will continue to be mixed in with the sludge in autumn/winter 2019/2020 and from summer 2020 all material at the composting plant will include bark. The effect of this full-scale trial will continue to be evaluated in the first half of 2020.

### **Follow-up of environmental and energy targets in 2018**

In 2019 the mill has worked to optimise electricity, water, wood and chemical consumption. In terms of water consumption, the measures taken have helped to seriously reduce consumption and the target has been attained. The target has also been met for wood, a consequence of a newly installed debarking process.

As far as electricity is concerned, many start-ups and shutdowns have made it difficult to ensure that energy is consumed efficiently and the target has not been able to be met. The use of chemicals fell at the start of the year, partly as a result of a new dewatering stage between the TMP factory and PM12, which was taken into operation in autumn 2018. As a result of low average brightness of incoming wood in the summer, there was a need to increase bleaching, which meant the target could not be met.

Planned and completed environmental and energy measures in 2019.

The decision to redesign the wastewater treatment process was taken last summer and the project began in the autumn with introductory renovation work. In winter 2019/2020 three old cooling towers will be taken out of operation and replaced with two new ones, safeguarding operational availability. The rebuilding work will continue in 2020 and will be completed by autumn of the same year.

The redesigned wastewater treatment plant will lead to more efficient and more robust operation, making it better able to reduce emissions to water. Other positive effects will include improved energy performance, lower dosage of chemicals and more easily dewatered sludge that will help to accelerate the composting process with less odour.

### **Environmental and energy targets 2020**

In 2020 work will continue to improve resource efficiency with a focus on electricity, water and additives. There will also be a focus on successful implementation of the wastewater treatment process.

## Water environment at Hallsta Paper Mill

Hallsta Paper Mill in Roslagen is situated on Edeboviken, a narrow inlet with limited water turnover. Edeboviken opens up into the Galtfjärden and Singöfjärden areas of the Baltic Sea.

### **Edeboviken and outlying water**

Holmen Paper's Hallsta Paper Mill annually monitors Edeboviken and the outlying waters as receiving bodies of water. In addition to emissions of treated wastewater from the mill, the inlet is also fed by various watercourses and subject to emissions from a municipal wastewater treatment plant, surface water from the Hallstavik community, ship traffic to and from the mill, and a marina.

The ecological status of Edeboviken and the outlying waters is determined primarily by biological variables such as phytoplankton, bottom fauna and rooted vegetation. The nutrient levels, visible depth and oxygen conditions of the water are used to help assess the status of the water. The status is classified in line with current regulations (HVMFS 2013:19 as amended by HVMFS 2018:17). An overall assessment shows a poor status for Edeboviken, an unsatisfactory status for Galtfjärden and a moderate status for Singöfjärden. For Galtfjärden the assessment indicates an improvement compared with the previous year. The status for the other two areas of water remains unchanged.

### **Oxygen conditions and chemical oxygen demand**

Measurements taken during the period 2016–2019 show generally good oxygen conditions and a high status in both Edeboviken and the outlying waters. Oxygen conditions were consistently good in the bottom water, even in stratified conditions, apart from in Singöfjärden where they fell to moderate status in February. Unlike the previous three years (2016–2018) low oxygen content was not measured on any single occasion in the surface water of inner Edeboviken. The mill is the source of about 30 per cent of the total chemical oxygen demand (COD) in Edeboviken.

### **Plant nutrients**

The highest levels of phosphorus and nitrogen are normally recorded in Skeboån, with levels declining away from the inner part of Edeboviken. In terms of nutrients, Edeboviken appears to be the most impacted sea area included in the current monitoring of receiving waters. The inlet is characterised by high levels of nitrogen during the winter (unsatisfactory–poor status) and high levels of phosphorus in summer (unsatisfactory–poor status). Singöfjärden is the least affected sea area. Taken together Edeboviken and Galtfjärden are judged to have unsatisfactory status regarding nutrients. Singöfjärden is judged to have moderate status.

In the period 1990–2019, a trend of increasing phosphorus content can be observed for Edeboviken. The open water outside the inlet demonstrated increasing phosphorus content up to and including 2013. Seen over the entire period, increasing nitrogen content was observed for Edeboviken, as well as Galtfjärden and Singöfjärden. No trends can be determined for the most recent decade (2010–2019). Decreasing phosphorus levels are observed over the whole period for Skeboån, the largest watercourse draining into the inner part of Edeboviken, and no trends otherwise.

In terms of total emissions of phosphorus and nitrogen to Edeboviken, Hallsta accounts for around 10 per cent and 30 per cent respectively.

### **Bottom fauna and rooted vegetation**

Bottom fauna is studied annually. The outcome of the most recent assessment, based on 2019 data, is poor status for Edeboviken, unsatisfactory status for Galtfjärden and moderate status for Singöfjärden. For Galtfjärden the assessment indicates an improvement compared with the previous year. The status for the other two areas of water remains unchanged.

A survey of rooted vegetation takes place every three years, with the most recent conducted in 2017. The survey indicates poor to moderate status at the three stations visited in Edeboviken, moderate to good status in Galtfjärden and good to high status in Singöfjärden. Compared with the last survey (2014), the situation is judged to remain unchanged.

### **Sediment**

A survey of metals and extractive substances in sediment is carried out every three years, with the most recent conducted in 2017. In an analysis of metal levels in sediment, a third of the samples showed significantly lower levels and ten per cent had much higher levels compared with the results of the previous survey (2014). For the remaining samples, the levels were largely unchanged. Lead levels in inner Edeboviken and Singöfjärden were at a level that meant good chemical status could not be achieved. Metals that showed a substantial deviation from comparative values (pre-industrial levels) were

lead, copper, cadmium, chromium, mercury and zinc in inner Edeboviken, copper and chromium in central and outer Edeboviken respectively, chromium in Galtfjärden and lead, chromium and copper in Singöfjärden. The levels of what are known as extractive substances were higher at all the stations compared with the previous years surveyed (2006, 2011, 2014). The levels were lowest in inner Edeboviken and Singöfjärden, and highest in the outer part of Edeboviken.

### **Fish**

A survey of fish health is carried out every five years. The most recent survey was conducted in 2018 and indicated a somewhat lower health status for perch in the inner/southern part of Edeboviken compared with the outer/northern part of the bay. In comparison with previous survey years, unusually high activity in the liver's detoxification system (EROD activity) was found in Edeboviken, although this was within the interval reported for national reference areas. The next fish health survey will be held in 2023.

## KPIs production and environment

Production and environment	2019	2018	2017	2016	2015
<i>Hallsta Paper Mill, Production, 1 000 tonnes</i>					
Paper	456	548	566	506	498
<i>Raw materials, 1 000 tonnes</i>					
Wood, million m <sup>3</sup> solid volume under bark	1,00	1,23	1,29	1,13	1,10
Purchased pulp	1,8	4,4	6,5	3,0	5,8
Water consumption, million m <sup>3</sup>	10,7	12,0	11,8	11,2	10,7
Chemicals <sup>1)</sup>	23,1	31,5	24,9	22,5	21,8
Filler, pigment <sup>1)</sup>	37,7	42,7	32,7	30,5	37,5
<i>Thermal energy, GWh</i>					
Recovered in the TMP process <sup>2)</sup>	495	705	664	620	599
Fossil fuels	3	4	4	4	4
<i>Emissions to air, tonnes</i>					
Fossil Carbon dioxide, 1 000 tonnes	0,01	0,01	0,01	0,01	0,01
<i>Emissions to water, tonnes</i>					
COD (organic matter), 1 000 tonnes	2,2	4,3	3,3	3,8	3,2
Suspended solids	119	676	214	416	141
Nitrogen	26	65	50	47	37
Phosphorus	2,0	3,1	2,5	2,5	2,0
<i>By-products, 1 000 tonnes</i>					
To energy production, internally/externally	112	139	170	117	144
Utilised or for recovering <sup>3)</sup>	58	51	53	46	44
<i>Waste, 1 000 tonnes</i>					
Hazardous <sup>4)</sup>	018	0,01	0,17	0,20	0,04
Sent to landfill (wet)	0,3	0,07	0,07	0,06	0,1
<i>Energy deliveries</i>					
Thermal energy, GWh <sup>5)</sup>	7,3	4,8	11,6	4,2	13

1. 100 per cent active substance. The quantity of commodities was 41 800 tonnes for chemicals and 54 400 tonnes for filler and pigment.
2. Thermal energy is produced from the electricity used in the production of thermo-mechanical pulp at Hallsta Paper Mill; this is recovered and used in production.
3. By-products used, for example, as filling material, construction material or for the production of soil products.
4. Hazardous waste is dealt with by an authorised collection and recovery contractor. Oil-containing waste from docking ships is dealt with at port facilities at three Holmen mills. For Hallsta Paper Mill the volume of this waste in 2019 totalled 367 (352) tonnes (not included in the figure).
5. Thermal energy from the mill to the district heating network of the local community.