

2021

HOLMEN

Environmental work at Iggesund Mill 2021



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Igesund mill

Igesund Mill is an integrated pulp and paperboard mill encompassing a pulp factory for manufacturing fully bleached sulphate pulp from softwood and hardwood, a paperboard factory and an aerated biological pond followed by chemical flotation for treating wastewater from the factories. Iggesund Mill is located just south of Hudiksvall on the Iggesundfjärden bay. A few kilometres north of Hudiksvall lies Strömsbruk, where paperboard from both Iggesund Mill and Holmen's mill in Workington is laminated and plastic coated. The Group has its own port facility in Skärnäs which organizationally belongs to Iggesund Mill.

Environmental work 2021

Each year, the global assessment company EcoVadis conducts approximately 25 000 sustainability evaluations of companies around the world in about 200 different categories in more than 160 countries. When reporting for 2020 was evaluated, Iggesund Mill was found to be best in the category "manufacturing light" and was therefore awarded the Sustainability Leadership Award 2021.

A great deal of committed and focused work in 2021 has led to Iggesund Mill gaining accreditation under the Nordic Ecolabel's criteria and qualifying as an approved supplier under IKEA I-way.

In general, Iggesund Mill has met all the criteria in the environmental permits for operations by a good margin.

In 2021, Iggesund Mill continued to work on active control of its waste water treatment plant. Over the past few years, measures within the process combined with major investments have led to a change in the composition of the process waste water and there has also been a major focus on ensuring a more effective treatment process.

The work on chemicals storage that began in 2020 continued during the year, including secondary containment of smaller chemicals tanks.

The old industrial landfill site at Strömsbruk is part of Iggesund Mill's environmental responsibility. Here work has focused on drawing up a detailed plan for final capping, i.e. a description of the environmental and technical solutions that will ensure stable and sustainable coverage of the area.

In 2021 a major operational project, HiQ Excellence, was carried out, with the aim of ensuring that all levels of the facility have targets that can be influenced, KPIs, to work towards and clear working methods in which governance and monitoring are central. It is hoped that working towards shared KPIs produced with a great deal of input from operators and engineers will ensure that each section of the process improves efficiency and minimises variations, so reducing waste. One effect of this will be a reduction in environmental impact

and optimised energy consumption, partly thanks to a more stable and even production process.

The mill has carried out a number of activities to safeguard operation in isolation, in other words, the mill must be able to cope on its own electricity supply in the event of major external disruption such as a lightning strike or other power cuts due to natural or other external causes affecting the external power to the mill. This will increase operational reliability, reducing lost energy and other disruption to the process.

During the year, work has been carried out to increase property automation in office premises. Hardware and software will enable security to be improved and enable energy saving measures in the future.

At Strömsbruk, an energy survey has been carried out in which several points were identified with a total annual potential saving of 1.7 GWh of heat and more than 750 MWh of electricity. Work is in progress to prioritise which measures are to be implemented.

Sustainable handling of waste products is one of the focus areas of Iggesund Mill in terms of the environment and energy. One of the targets is to reduce amounts of production waste and active management of waste water treatment is one activity linked to this target. Ensuring an environmentally sustainable balance between the need to treat waste water versus production and transport of the chemicals needed for the mill's final treatment stage has enabled a major reduction in amounts of chemical sludge, from 26 000 tonnes in 2019 to just under 8 000 tonnes in 2021.

A preliminary project has been carried out during the year to enable investments in new wash presses in the future. Consequently, one wash filter will be replaced with one wash press in the bleaching works on the pulp line in 2022, which is expected to produce an effect on the raw water and waste water flow in 2023.

A review to improve control of storm drains began during the year and activities are in progress as a result, including labelling storm drains.

Permits of operation

In October 2018 Iggesund Mill received a new permit under the Environmental Code for production of 500 000 tonnes of pulp and 450 000 tonnes of paperboard. This new permit incorporates Skärnäs Terminal. The permit was first claimed on 1 January 2019.

The coating and laminating plant at Strömsbruk have been classified as a 'C' plant with an obligation to notify its environmental activities to the authorities since 2007/2008.

The company is covered by the rules on fossil carbon dioxide emissions trading. It holds a permit for carbon dioxide emissions and has been awarded emission allowances for the trading period 2013–2020. An application for a permit for the period 2021–2030 has been submitted to the Swedish Environmental Protection Agency.



Environmental certifications

ISO 14001

Iggesund Mill's environmental management system has been certified to ISO 14001 since 2001.

- The production units at Strömsbruk and Skärnäs Terminal are covered by all certifications.

ISO 50001

Iggesund Mill's energy management system was certified in 2005, and this system was upgraded in line with ISO 50001 in 2011.

- The production units at Strömsbruk and Skärnäs Terminal are covered by all certifications.

PEFC™ and FSC® ([FSC-ID](#))

The company also has both PEFC™ and FSC® ([FSC-ID](#)) certification for the wood raw material.

- The production units at Strömsbruk and Skärnäs Terminal are covered by all certifications.

ISO 45001

Iggesund Mill's Health and safety management system has been certified under OHSAS 18001 since September 2016 and was upgraded to ISO 45001 in 2020.

- The production units at Strömsbruk and Skärnäs Terminal are covered by all certifications.

Investments/environmental and energy measures during 2021

- During the mill's major maintenance shutdown, the wooden pipe for incoming raw water was mended, ensuring future access to process water.
- The final stage of the waste water pipe was mended, concluding the far-reaching work of recent years to patch and seal the waste water pipeline from the factory to the mill's biological treatment plant.
- Operators, engineers and those responsible at the plant have been trained in the Ordinance on large incineration plants, SFS 2013:252.
- The programme of action to reduce sources of noise has continued and a total of 9 sources of noise have been addressed during the year.



- A lye analyser has been installed to optimise caustification. After calibration, this is expected to produce an energy saving of 6.3 GWh.
- A new bottom blowdown valve has been installed and taken into operation on SP5 and after calibration is expected to save about 0.5 GWh steam per year through optimised control.
- Installation of a new compressor is expected to reduce electricity consumption by 1.9 GWh.
- A total of 16 charging stations for electric cars have been installed in the mill's car parks. These are available for the use of guests, employees and contractors.

Production disturbances, incidents, and complaints during 2021

In November a serious incident occurred at the mill's chemicals plant when a chlorine dioxide reactor broke down. No-one was injured and the equipment concerned was immediately taken out of operation. As the chlorine dioxide reactor is an important part of the process of manufacturing pulp, production slowed for a number of days, which resulted in changed conditions in the process waste water. In turn, this had an impact on the mill's biological treatment plant which had limited chlorate reduction for a period of time, leading to exceeding the monthly threshold value for chlorate in November. However, the figures for December were below the monthly threshold value so under the criteria system, the limit for the month as a whole was met.

Igesund Mill is focused at all times on designing out risks that could cause environmental incidents. In 2021, 23 incidents affecting the environment occurred at Iggesund Mill requiring reporting to the supervisory authority, plus one event concerning coolants at Strömsbruk. The majority of the reported events at Iggesund Mill are linked to temporary discharges to water.

Igesund Mill has a condition regarding emissions of diffuse sulphur, calculated as total reduced sulphur, which was exceeded in 2021 due to increased emissions from one part of the process on one of the fibre lines. Another exceedance of the conditions concerning failure to measure dust at two points occurred in the fourth quarter.

The external audit of Iggesund Mill's environmental and energy management systems found seven minor non-conformities linked to ISO 14001 and one minor nonconformity for ISO 50001. No nonconformities were found in the audit of the system for FSC® and PEFC™.

Follow-up on environmental and energy targets 2021

Using the outcome figures for 2020 as a basis.

- Proportion of biogenic fuel consumption (excluding vehicle fuel) to exceed 98 per cent.
 - Outcome: 97.7 per cent. The target was not met mainly due to production disruptions resulting in increased use of fossil fuel
- Energy use per tonne of Invercote is to be less than 5.0 MWh
 - Outcome: 5.74 MWh/tonne Invercote, which is slightly over the target but an improvement on the outcome for 2020 of 5.77 MWh. The explanation is production disruptions as unstable operation produces both higher actual energy consumption and impact on product quality.
- Waste water flow is to be less than 54.8 m³ per day per tonne Invercote
 - Outcome: 56.7 m³. The target was not met partly due to an increased flow in conjunction with various disruptions in process equipment.
- The amount of production waste is to be less than 3 200 tonnes per month
 - Outcome: 3 340 tonnes per month, whereby the target was not met.
- The weight of unsorted small-scale production waste is to fall by 50 per cent compared with 2019.
 - The target was not achieved. Work to reduce the amount of unsorted small-scale production waste will continue in 2022.

Planned environmental and energy measures 2022

- Installation of a new wash press on the hardwood line – will lead to reduced waste water flow and a reduced load on the water treatment plants.
- The “Future steam supply” project to ensure compliance with the law based on future requirements and to create good economic conditions and safe, stable production.
- A feasibility study “Sustainable transport”, which seeks to review current handling of internal transport and plan future solutions.
- A feasibility study to review and optimise the use of primary energy carriers, which seeks to reduce emissions of fossil CO₂.

Environmental and energy targets 2022

- **Focus area Road map to a fossil-free factory:** Biogenic fuel consumption (excluding vehicle fuel) is to exceed 98.5 per cent
- **Focus area Optimised energy consumption:** Energy use per tonne of Invercote is to be less than 5.7 MWh/tonne
- **Focus area Reduced water consumption:** Wastewater flow is to be less than 54.8 m³ per tonne of Invercote
- **Focus area Sustainable waste production management:** Iggesund Mill intends to have two targets linked to production waste and the level of sorting regarding minor production waste. Target levels will be decided in the first quarter of 2022.

Water environment at Iggesund Mill

Iggesund Mill is located at the point where the Iggesundån river flows into the Iggesundsfjärden bay. Byfjärden joins it from the north. Iggesundsfjärden and Gårdsfjärden join together through the Snokskärssundet inlet, and the Dukarsundet inlet links Gårdsfjärden with the sea. The narrow inlets have a low water turnover.

The company takes part in the programme for coordinated monitoring of receiving bodies of water in north-eastern Hälsingland, which involves monitoring the environmental impacts of different activities on the water systems concerned, including lakes, watercourses and coastal waters. The company also carries out sampling from the receiving bodies of water in the vicinity of the mill as part of its self-inspection.

Data is reported below along with an assessment of the status of Gårdsfjärden regarding plant nutrients, oxygen level, etc. based on data from the 2020 summary of coordinated monitoring of receiving waters.

Chemical Oxygen Demand (COD)

Iggesund Mill was the land source of a calculated around 28 per cent of the total chemical oxygen demand (based on measuring total organic carbon) in Iggesundsfjärden and Gårdsfjärden in 2021.

Visible depth

In 2020 the average annual value for visible depth at control point K179, located in the middle of Gårdsfjärden, was 3.0 m. The assessment for the three-year period 2019–2021 is poor status regarding visible depth, which means a deterioration compared with the previous three-year period (2018–2020) when it was judged to be moderate. Since 2000, however, there has been a significant increase in the visual depth in Gårdsfjärden.

Plant nutrients

The combined status in terms of nutrients (nitrogen and phosphorus) for the three-year period 2019–2021 was judged to be moderate in Gårdsfjärden which is a deterioration compared with the assessment for 2018–2020 when the status was judged to be good. However, the assessment for 2021 is made based on fewer months than in previous years, which has impacted the result.

There is no clear trend over time in terms of an increase or reduction of nitrogen and phosphorus at the coastal station. During 2021, the total phosphorus level in the surface water at the K179 measuring station was on average 27 µg/l and the average total nitrogen level was 382 µg/l. The average levels in surface water for 2020 were 23 µg/l and 344 µg/l respectively.

Transport calculations show that point emissions from Iggesund Mill in 2021 were equivalent to approximately 27 per cent and 64 per cent respectively of total nitrogen and phosphorus entering Gårdsfjärden.

Oxygen saturation

The oxygen level in the bottom water at K179 was generally high during 2021, but during the summer months there were periods when the oxygen level was not as high. The lowest measured oxygen level was 7.7 mg/l, which was higher than the average of the lowest measured oxygen levels for the period 2015–2020 but somewhat higher than the lowest value in 2020 (7.1 mg/l). The oxygen status was judged to be high overall at the measuring station.

Metals

The status of specific pollutants (arsenic, copper, chromium and zinc) was judged to be good from sampling in 2021, except for arsenic which was judged to be moderate because the limit value for the average annual value was exceeded. However, the arsenic content was close to the borderline for good status.

For the priority substances (cadmium, nickel and lead) the values were below the limit values/assessment criteria in respect of average annual value and maximum permitted concentration. The status of these parameters was therefore judged to be good.

Chlorophyll

The chlorophyll status was classified as moderate for the three-year period 2019–2021, corresponding to the classification in 2019 and 2020. The maximum chlorophyll level was 18 µg/l compared with 2020 when it was 4.9 µg/l.

Macro-algae

In biological surveys in Gårdsfjärden in June, bottom fauna were found at all stations studied, mainly consisting of *Limecola balthica*, *Marenzelleria* sp., *Potamopyrgus antipodarum* and *Monoporeia affinis*. The species found in the survey represented species with both high and low sensitivity values, i.e. species that are tolerant of a shortage of oxygen, high nutrient loads

and pollutants and species that are sensitive to the above. The status in the area was judged to be moderate regarding bottom fauna.

Comments

The mill's emissions of eutrophication substances have fallen sharply since the 1980s. In trial fishing in 1987, the fish life in Gårdsfjärden was characterised as typical of areas of water high in nutrients. Some changes in the direction of more normal status were noted in 1996, but fish production remained high and with a preponderance of the carp family.

Recovery proceeds slowly in such enclosed areas as Gårdsfjärden, where large amounts of organic material and mineral nutrients from earlier emissions have accumulated on the bottoms. In 1996 impairment of liver function and reproduction was observed in perch in Gårdsfjärden. However, growth and survival were normal. Further studies of perch in the waters off Iggesund were performed in 2001, with similar results to those found in the study in 1996.

Reproductive studies were performed on both perch and zebra fish in 2001 and 2002. The results show that perch that have spawned in the receiving body of water produce eggs with just as good hatchability and larval survival as the perch in an unaffected reference area, and the studies in the laboratory on zebra fish did not indicate any effects.

In late 2009 a treatment plant was brought on line with chemical flotation after the existing aerated lagoon. This has resulted in a reduced load on the receiving bodies of water, particularly regarding mineral salts.

In connection with an application for a new environmental permit, the company conducted a follow-up fish study in autumn 2009, which showed that a small number of significant differences, which cannot be regarded as biologically significant, existed between the sites studied. No evidence was discovered of the inhibition of reproduction found in previous studies, and the results therefore indicate clear recovery.

The fish study was conducted before the chemical flotation plant was commissioned, which means that the recovery that has occurred must have had another cause, such as internal measures already taken. As part of the permit application procedure, a hard-bottom inventory was also conducted in August 2010, and the study showed that there has been a large-scale improvement in the inner reaches of Gårdsfjärden and the outer reaches of Enångersfjärden since 1987.

It is impossible today to differentiate the effect of outflow from the Iggesundån river in the studied reaches of Gårdsfjärden on the plant communities on the bottoms from the effect of the point source Iggesund Mill in the same receiving body of water. There is no visible toxic effect. The sediments in Gårdsfjärden are finely divided, oxidised and teeming with life. Filtering organisms such as freshwater fungi, barnacles and hydras occur on rocks. Nor do TOC concentrations in water and sediment suggest any unusual conditions.

The existence of what is termed fibre sediment – sediment with elements of pulp fibres and other waste products from earlier pulp and paper production – outside Sweden's forest

industry facilities has attracted considerable attention in recent years. Fibre banks have been found outside Iggesund Mill in the inner part of the Iggesundsfjärden bay and in the adjoining Byfjärden. In autumn 2017, fish were caught at different distances from Iggesund Mill with the aim of studying any spread of sediment-bound pollutants and their uptake in fish. The fish were analysed for content of metals and organic substances.

All morphological measurements, fish growth and fat content were at a level that can be considered normal for coastal fish and the differences between the locations were numerically small. For the variable GSI (gonadosomatic index), the median value varied considerably between the sites and the spread between individuals at each site was significant. A larger number of individuals in different length classes would have been needed to evaluate any significant differences in this variable between fish areas. Mercury content at all sites was below the EU's limit values for fish for consumption by a reassuring margin. From a general Swedish perspective too, the mercury content can be considered to be low.

Content of other studied trace metals was determined in liver samples. There was a small numerical difference in content between the sampling locations and it was not possible to distinguish any site with substantially different values. The results confirm the general picture obtained from other recipient surveys, that metals originating in forest industry emissions are often found in sediment but have low bioavailability.

When it comes to the chlororganic substances studied (PCB, DDT, HCB PCDD/Fs), generally a weak gradient was observed with slightly higher levels in Byfjärden, which gradually tail off. In comparison with chemical status assessment criteria for PCDD/Fs and PCBs, findings were below current threshold values by reassuring margins. Nor can the levels in themselves be considered to be high in relation to measurements taken in other areas around the Swedish coast, including background locations with no impact from urban activity.

Overall, the survey shows that the sediment-bound pollutants found as higher content levels in parts of the area have a limited spread to the surrounding ecosystem and minor uptake in fish. The levels in the fish studied are relatively low and in the region of those measured in background areas without any direct anthropogenic effects.

New surveys are being conducted in 2021 and 2022.

Environmental key figures

Iggesund Mill	2021	2020	2019	2018	2017
Raw materials					
Wood, million m3 solid volume under bark ¹⁾	1,72	1,77	1,76	1,65	1,65
Chemicals, 1 000 tonnes ²⁾	80,6	83,5	108	90,1	80,2
Filler, pigment, 1 000 tonnes ²⁾	47,7	45,3	46,5	47,5	47,3
Water use, million m ³	33,4	33,5	34,9	38,0	38,5
Thermal energy, GWh					
Production at the mill from recovered liquors, bark and wood residues	2 638	2 557	2 558	2 479	2 434
Fossil fuels, oil	66	60	53	101	105
Fossil fuels, diesel	6	7			
Electrical energy					
Production at the mill, GWh	322	282	309	304	256
Consumption, MWh	474	474	467	470	467
	126	758	128	608	588
Energy deliveries, GWh					
Thermal energy ³⁾	141	124	138	142	125
Emissions to air					
Sulphur dioxide, (counted as sulphur, S), tonnes	33	40	27	36	33
Nitrogen oxides, tonnes	553	575	528	585	586
Particulates, tonnes	29	25	21	40	26
Fossil carbon dioxide, 1 000 tonnes (Scope 1)	18	15,8	12,1	25,7	24,0
Biogenic carbon dioxide, 1 000 tonnes	869	815	847	876	811
Emissions to water					
COD, (organic matter), 1 000 tonnes	4,7	4,8	4,8	5,1	4,8
Suspended solids, tonnes	739	635	718	874	813
AOX, (chlorinated organic matter), tonnes	36,2	37,4	43,3	47,5	46,3
Nitrogen, ton	75	70	50	59	53
Phosphorus, ton	7,7	7,7	4,8	4,8	4,1

By-products, 1 000 tonnes					
To energy production internally/externally	224	224	244	246	252
By-products recycled into materials ⁴⁾	44	44	64	36	70
Tall oil ⁵⁾	16	16	10	13	14
Waste, 1 000 tonnes					
Hazardous ⁶⁾	1,3	1,6	1,7	1,4	1,1
Deposited (wet) ⁷⁾	0,07	0,2	0,4	7,0	1,8

1. At Group level, wood consumption is computed net, taking into account internal deliveries of chips from the Iggesund Sawmill to Iggesund Mill.
2. 100 per cent active substance. The quantity of commodities was 110 000 tonnes for chemicals and 59 200 tonnes for filler and pigment.
3. Thermal energy from Iggesund Mill is delivered to nearby Iggesund sawmill (124 GWh). Thermal energy is also delivered to the district heating network of the local community (17 GWh)
4. By-products used, for example, as filling material, construction material or for the production of soil products.
5. For delivery to the chemical industry.
6. Hazardous waste is dealt with by an authorized collection and recovery contractor. Oil-containing waste from docking ships at Skärnäs Terminal is dealt with. The volume of this waste in 2021 totalled 198 (147) tonnes (not included in the figure).
7. Non-hazardous waste.