A brewery that cleans its waste water completely

In less than twenty years, Oppigårds has grown to become one of Sweden's most recognized craft breweries. As part of the company's environmental policy, all waste water is cleaned to the highest requirements. The brewery is also integrated into the organic cycle.

As elsewhere in Europe, Sweden has had a wild flourishing of craft breweries over the past twenty years, with many remaining at the micro level while a few have grown up.

Growth

A brewery that has managed to hit the beer wave with full force is Oppigårds Bryggeri in Hedemora. In the course of 18 years, it has grown from a one-man business to 20 employees and two million liters of production in 2022.

- We have had extreme growth but still consider ourselves a craft brewery. To make good beer is our driving force. Many people have asked me what the success is due. I think it is an advantage to be extremely thorough and also self-critical.

In the control room, it is easy to see the state of the facility, and Bjørn also has an app on his mobile that shows the status of operations, so it is rarely necessary to be here.

Besides delivering one complete taste experience, durability is important. Beer is a fresh product. Hygiene and good bottling technique are alpha and omega, the brew must be clean, says founder Bjørn Falkeström.

Innate

The interest in beer brewing has followed Bjørn since his youth. At a point in his adulthood, he decided to invest in his own brewery - and in his home village. The first brew saw the light of day in the old forge on small-the mill that has been in the family for 300 years.

But breaking through in a market where much is about traditions, patriotism and personal choices was not done in a day.

- I remember the first few years I stood at beer fairs with the products, all visitors were at the brewery which stood on the other side. No one was with me. I seriously considered giving up on the dream, says Bjørn.

The process basins in the treatment plant are located underground, in the middle of leveling pool, on both sides of the operating building there is activated sludge/chemical purification and on the far right inmembrane filter system can be seen at the back. Inset image of permeate (outlet water)

The wind is turning

But after years of setbacks, it should loosen. Word of quality spread. The wind turned and suddenly people were all for Bjørn's brew. Now everyone stood at Bjørn's stand at the beer fair. And since then it has only gone upwards. Oppigårds has won more than 60 quality awards, mostly gold, some silver and bronze medals.
- I grew up in the countryside where we are used to trusting our own strength and not giving up. In addition to sheer stubbornness, the family has supported me in adversity. And when it's heaviest it's often right before it comes loose, says Bjørn, who also thinks success has been demanding. In the worst times, annual growth was between 20 and 30 per cent. The building became to small and so four years ago Bjørn and his wife designed a new complete brewery, where all experience and ideas were put into a system.

Trend and tradition

Today, the range includes 26 types of beer, one cider and two schnapps. Everything indicates that Oppigårds has mastered the art of combining solid traditions with new trends. All the goods are available at Systembolaget.
- Success also has a downside, it has been a crazy pace and I have felt burnt out. The fact that we have brought in new owners has eased the worst pressure. Today I work with development, while others take care of operations, says Bjørn.

The municipality

One of the challenges with the growth was that the local sewage network could not accommodate the increasing amount of waste water from the plant. There was more and more washing water from tanks and tap lines.
- We were in the process of overloading the municipality's system. We couldn't wait for the municipality to lay a new line and expand its treatment plant. We chose to trust that we could clean the waste water ourselves. This is also about taking the whole and full responsibility for the environment, not everything can be left to others, says Bjørn.

Few suppliers

Finding a treatment plant for this type of wastewater was not going to be easy. A painstaking search for solutions ended up in the Czech Republic, a country with strong traditions in beer brewing.
- We received only one offer for a treatment plant, and it came from the Czech Republic and the company Envi-Pur, which had experience with similar wastewater from breweries. We agreed on a fixed price. The only thing we had to do was dig three meters into the ground and pour a concrete base. We made it twice as big as they requested, to have something to go on for the future. It turned out to be smart, says Bjørn.

Turn key

The entire treatment plant was completed in containers from the Czech Republic, was mounted and cast in place by Envi-Pur and put into

Bioreactors, of which there are two. The color is due to the precipitating agent pix.

From the equalization tanks - inset image at top shows dosing of pix, adblue and sulfuric acid

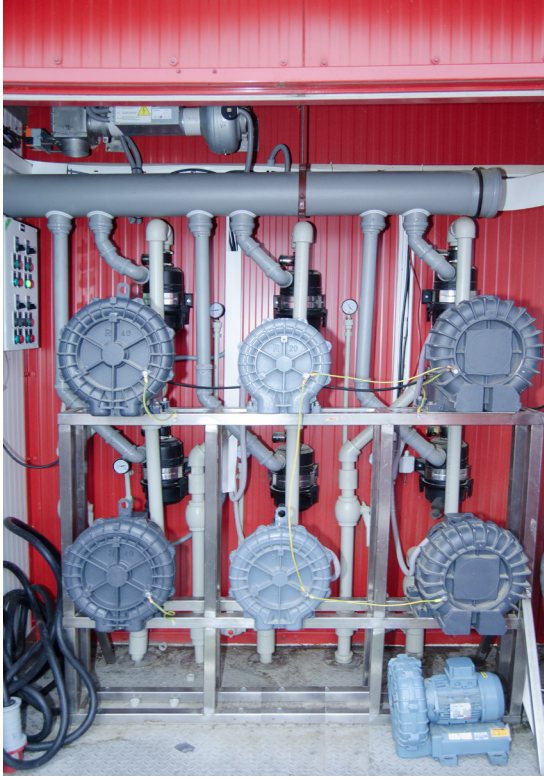
operation in 2015. The only thing that had to be supplied was a crane.
The waste water comes from washing the plant with lye solution as well as waste water from tapping, flushing, cleaning washing lines, as well as gray water and sanitary waste from welfare buildings and offices.
- Since we pour into cans, there will be a lot of spillage, we have to top the cans before the lid comes on. Filling up the packaging is important for durability, which is why we waste rather than save, emphasizes Bjørn.

Equalization

The waste water is pumped from a sump in controlled quantities to a coarse sieve with a screw where any coarse particles are removed, as these can interfere with the process. After filtering, the water goes to a mixing and leveling tank with automatic monitoring of pH and ditto dosing of sulfuric acid to balance the waste water, since it contains lye from washing the plant. During a strong blowing of air, precipitation chemicals (pix) are added as well as a "food supplement" in the form of urea so that the bacteria in the next step will have good growth. The water is pumped in portions from the equalization tank to the next chamber, where two processes take place at the same time; One is biological purification with activated sludge, and the other is chemical precipitation of phosphorus with pix. Here, the organic components are broken down under strong aeration (activated sludge). The precipitation of phosphorus and the growth of bacteria produces a bio-chemical sludge which is also the seat of natural bacteria.

Sludge outlet

When the sludge concentration reaches a certain level in the tank, a portion is drained to a sludge trap. The rest of the water flows on to the next step, which is a membrane filtration. Here, the water is pressure filtered through a "cloth" made of membrane material. Purified clear water comes out, also called permeate, which is also used to backwash the membranes. The membranes are backwashed approximately every 6 minutes. The membrane is also cleaned through automatic periodic



At the back of the control room are all the blowers that supply air to the tanks

cleaning with chlorine solution and citric acid solution.
Just three years after the plant came into operation, it was seen that it had to be expanded in line with increased production at the brewery. Envi-Pur therefore installed a parallel line of the same format next to the first, connected to the same equalization tank. Because the transport of sludge became cumbersome, Envi-Pur later installed a sludge thickening plant, which makes for more efficient sludge transport.

Composting

Today, the dewatered sludge is transported to an external company for hygienisation and production of natural compost.

Below, on the left, chemicals for the regeneration of membranes, on the right, pumps for emission samples, which are stored in a refrigerator (below)

The entire facility, on the right operating building with blowing machines (open door on the left) and control room (open door on the right) behind to the left chemical container and behind to the right sludge dewatering. All process tanks are fenced off.

- That the sludge goes back to the soil is a good solution. All organic waste from the brewery otherwise goes to fertilize organic agriculture. This means that we make circular use of all side streams from the brewery. It gives us certainty that we are not polluting and that we are contributing to a circular cycle, says Bjørn.

All tanks are underground and are built as plastic containers. All support functions such as blowers, permeate pumps, control panels and control panels are housed in an isolated service building. All chemicals are placed in a separate container, and sludge dewatering is also in a separate container.

Strict control

Monthly analyzes are made of representative samples of the waste water. The results can document very good results. The values are far below the requirements, for example, analyzes of June 2022 show below 0.05 mg/litre phosphorus and below 3 mg/litre BOD7. Here, the limits from the environmental authorities are set at 0.15 mg per liter and 250 mg per litre, respectively. The requirements are met at least by a factor of five times.

- The plant is fully automatic, so the operating expenses are chemicals and electricity in addition to the transport of sludge. The heaviest item is actually expenses for analyses, which are done monthly by an external laboratory, says Bjørn.

Online

The various functions in the plant are monitored online by Envi-Pur, in addition to Bjørn having an app on his mobile phone which shows, among other things, the oxygen values in the discharge water.

- The plant is a mechanical device and it is clear that after a few years unforeseen things can happen, but we have become confident in the process and satisfied with our choice. Through an app on my mobile, I have the system in my pocket. Should questions or issues arise at the facility, we know that Envi-Pur is online at the facility, they send us monthly reports and have regular visits a couple of times a year, says Bjørn.

The maximum load on the system is approx. 2,000 liters per hour, with a daily load of approx. 24,000 litres.

- In retrospect, we see that the equalization tank could perhaps have been somewhat larger, but the plant works very well. Getting the analysis results is satisfying. It also warms the heart to see how clean the water becomes before it flows into the local stream and on to the beautiful Dala River, concludes Bjørn Falkeström, founder of Oppigårds Bryggeri.

From one of the halls in the new brewery