

CASE  
STUDY



**57**  
m<sup>3</sup>/d

High-performance solution  
**FOR AN EXCEPTIONAL BREWERY**  
**LUPULUS**



## THE COMPANY

The world of beer has long been monopolised by a few beer brands sharing the entire market. With Belgian consumers now demanding more complex beers with new tastes, we see an increase in the number of breweries in our country. New figureheads are emerging, one of which is the Lupulus brewery, located at Gouvy in Belgium and set up in 2004 by Pierre Gobron.

This establishment, the only ambition of which, to begin with, was simply to supply the neighbouring bar, has met with resounding success (2016 Gazelles Trends Tendances prize, 3<sup>rd</sup> Luxembourg beer in volume) thanks to the creation of a thoroughbred beer that takes its name from the Latin name of the hop used (*Humulus Lupulus*). With their strong character and subtle, hoppy aromas, the brewery's beers took the market by storm.

## THE REQUIREMENTS

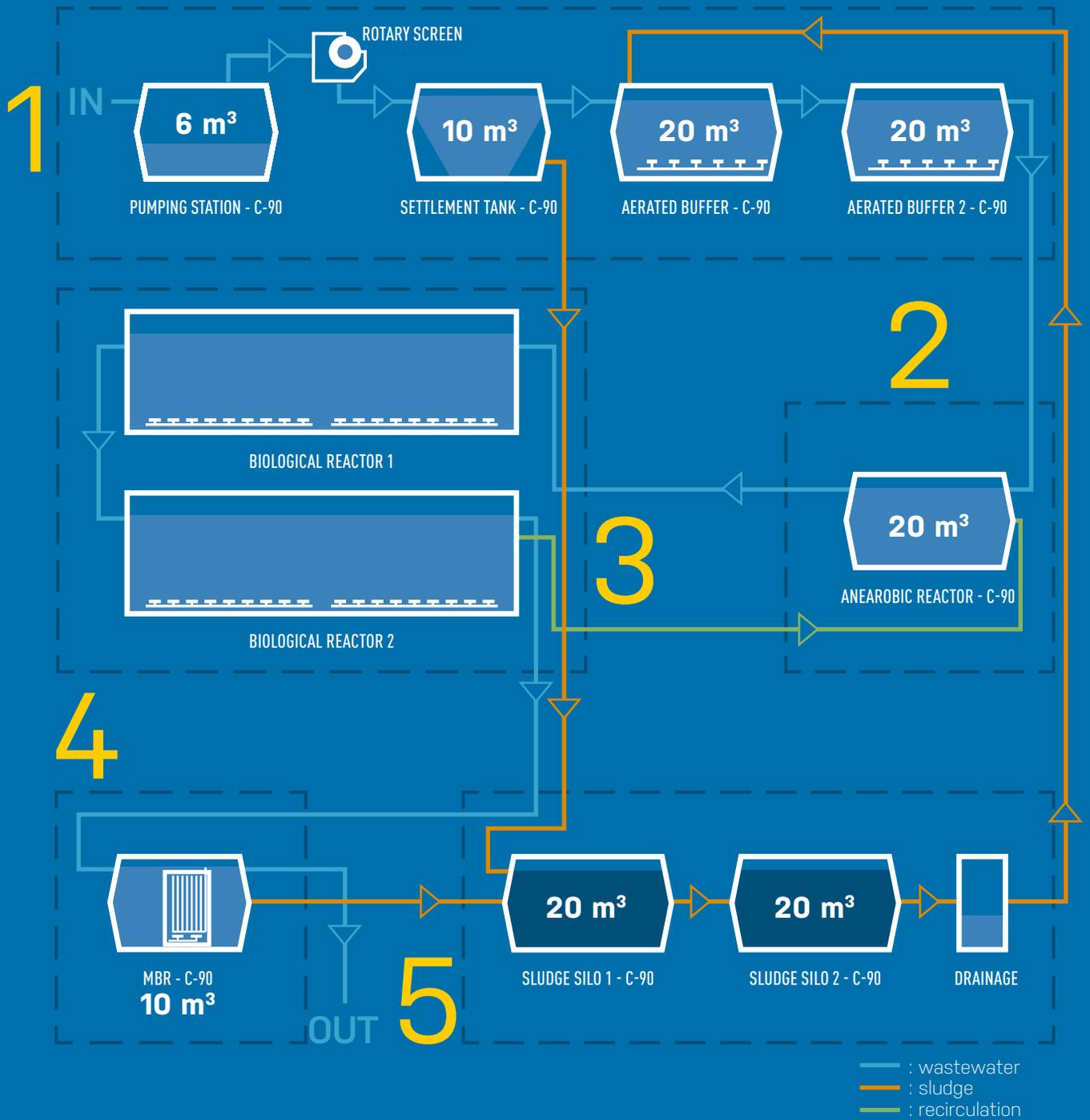
With its fast growing production, the brewery soon had to consider an extension to its production facilities. This extension and the future production growth lead to increasing requirements for wastewater treatment. Furthermore the Belgian government demanded more demanding permits since the brewery is located in a sensitive ecological zone, subject to very restrictive legislation.

Mr. Pierre Gobron, managing director, explained: "The production was 10,000 hl in 2015 and estimated to reach at least 25,000 hl in 2020." "We wanted the solution to be large enough for this projected capacity with a margin for growth of 20 % and the possibility of easily extending it in the event of continued success." Under current conditions, the maximum total daily flow has been estimated at 35 m<sup>3</sup>/d with a possible increase with the same installation to 57m<sup>3</sup>/d (20% growth included).

Effluent measurements compared to the required discharge standards impose reductions of 99% in BOD<sub>5</sub>, of 98 % in COD, of 85% in TSS and a specific reduction of nitrogen and phosphorus.

The future installation must meet various constraints, including compliance with the regulations for discharge quality, low costs of operation and perfect integration into the site, reducing any noise and, above all, no odours. Finally, the solution should also cope with the variations in organic and hydraulic loads due to production varying during the week.





## The Advantages

- Optimised operating and installation costs
- Very high performances
- Ideal management of variable organic and hydraulic loads
- Automated operation
- Scalable solution in the event of future extension
- No visual, odour or sound impacts



# The Solution

ELOY WATER offered a system with membrane reactor which will deliver very high performances on the required parameters, reliability of treatment and flexibility in use despite a considerable influent variation.

The system has the advantage of being fully automated, reliable and robust, producing no odours, all in very limited space. Indeed, the solution, consisting of 10 underground tanks and a control room above ground, occupies only 400 m<sup>2</sup>. Finally, on specific request, it offers the possibility of reusing the treated wastewater.

**1.** Downstream of a pumping station, the system installed comprises, to begin with, a pre-treatment consisting of a screen (rotary filter, assuring protection of the membranes) and a primary settlement tank. It permits retention of the yeasts still present to limit their activation and development in the downstream reactors. An aerated buffer regularises the flow supplying the biological units and the pre-oxygenation of the effluents while, at the same time, correcting the pH.

**2.** The pre-treated water then arrives in an anoxic, biological reactor, where the residual biological pollution is broken down by heterotrophic bacteria, which consume the oxygen contained in nitrates. This anaerobic reactor also receives the recirculated sludge from one of the 2 aerobic, biological reactors and the overflow from the tank where the membrane is installed. This phase allows the breakdown of the residual pollution under high organic load.

**3.** The biological treatment is then completed by an aerated, biomass in suspension stage consisting of 2 aerobic biological reactors in series as a low-load treatment to reduce the pollution present.

The supply of oxygen is provided by an air blower with sequential operation. These biological reactors are designed for an average concentration of 9.5g/l of TSS, double that of a classical activated sludge, permitting

improved compactness of the system installed by ELOY WATER. They work at a very low mass load, corresponding to a very high sludge age and with very high performance. This stage permits a reduction in organic matter of 95 %.

**4.** The ultra-filtration membrane biological reactor (MBR) presents a physical barrier for suspended solids (TSS < 5 mg/l), viruses and bacteria. This physical disinfection avoids the use of chemical disinfectants.

The membrane system leads to a lower production of sludge than conventional biological treatments, thus limiting operating costs.

**5.** Finally, the primary sludge from the initial settlement tank and the secondary sludge from the membrane biological reactor are stored in two silos, which concentrate the sludge to increase its concentration to a value of 40g/l. This configuration allows a 4 months storage autonomy before drainage.

These 2 silos are equipped with vertical drains where the drained water is recovered by collectors and discharge to a pumping chamber to be recirculated to the buffer tank.

In order to limit the visual and noise impacts the wastewater treatment plant was completely buried in the neighbouring field apart from the technical building.

- To reduce the costs at the same time as offering higher quality, **ELOY WATER** prefabricated and pre-equipped all the equipment in its factory. It then proceeded with the installation and commissioning of the treatment plant in partnership with CMI BALTEAU, a company specialising in water treatment.
- The system is fully automated to reduce intervention by the operating company. A remote management system permits monitoring and management from a distance.

# The Result

The brewery now has a high-performance and scalable treatment plant capable of treating the wastewater subject to weekly variations and ready for production growth over the coming years. A particular attention to the control of the overall costs: from implementation of the treatment plant with reduced installation and on-site time to minimisation of the operating costs.

The plant is automated for ease of use and personnel training sessions permit ideal autonomy for day-to-day operation at the highest level. Finally, the follow-up period after installation enabled **ELOY WATER** to refine all the adjustments for use with the highest possible performance in production.

PARAMETERS	INDUSTRIAL BREWERY INFLUENT (57 M <sup>3</sup> /D)
pH	5,8 - 10
COD (mgO <sub>2</sub> /L)	5870
COD/ BOD5	1,96
BOD5 (mgO <sub>2</sub> /L)	3000
TSS (mg/L)	300
NO <sub>3</sub> (mg/L)	29,5
N-Kjeld. (mg/L)	63,8
N-T (mg/L)	93,3
P total (mg/L)	15
COD sol (mgO <sub>2</sub> /L)	4400

## Mr. GOBRON CONCLUDED



We were looking for a company capable of successfully realising the project while becoming fully involved to give us confidence. We chose **ELOY WATER** after talking to and visiting companies with similar projects. We were not let down: **ELOY WATER** got the measure of our ambitions and did everything to make the project a complete success while meeting our demanding conditions with regard to efficiency and cost control. The fact that the solution was factory made at **ELOY WATER** was of real benefit in reducing the time on site at the brewery and the related costs.

**A real success!"**





PERFORMANCE GUARANTEES	LIMITS	MEASURED /24H *
pH (after pH correction)	6,5 - 9,0	8,26
BOD5 (mgO <sub>2</sub> /L)	< 25	5
COD (mgO <sub>2</sub> /L)	< 150	56
Settleable solids (ml/L)	0,5	0
Total nitrogen (mg/L)	< 20	0,5
Total phosphorus (mg/L)	< 5	1,7
Suspended solids (TSS) (mg/L)	< 60	2

\* measured by an laboratory

THE ON-SITE INSTALLATION TIME WAS 12 WEEKS, SPLIT UP AS FOLLOWS:

- Preparatory groundwork: **1 WEEK**
- Installation of underground treatment tanks + backfill: **1 WEEK**
- Electrical and hydraulic connections: **2 WEEKS**
- Installation of technical building and connection: **1 WEEK**
- Electrical and hydraulic tests and commissioning: **1 WEEK**
- Set-up of the treatment plant, parameter monitoring and adaptations: **6 WEEKS**

# =12

In order to guarantee long-term and effective operation, ELOY WATER systematically selected the most appropriate materials. The tanks, for example, were made of a high-performance, fibre-reinforced concrete.