

Petrochemical Industry

MBR Wastewater Treatment



PROJECT DETAILS

Location: Asia
 Application: Industrial MBR
 Product: Tubular UF membrane modules
 Capacity: 6,700 m³/day
 Membrane: 8 mm PVDF, non-backwashable

PROJECT OVERVIEW

A large petroleum and petrochemical company in Southeast Asia produces **liquified petroleum gas (for cooking), gasoline, diesel and other products from crude oil via fractionation**. In order to minimize its environmental impact and to protect the health and natural resources of the surrounding area, the company built a **centralized wastewater treatment plant** to treat the discharge from all of its various petrochemical and petroleum processing facilities.

THE CHALLENGE

The company planned the central wastewater treatment plant (CWTP) to be built on a parcel of land measuring 528,000 m² and located in its own industrial zone. A small CWTP facility already existed on the property but was much smaller in scale. The company therefore decided to build a larger, more advanced treatment facility over the course of about 2,5 years.

The new CWTP would take four heavy-loaded feed streams from various manufacturing processes. Three of these streams are directed to a Corrugated Plate Interceptor (CPI) separator unit, then pass through a tank. The waste gas from each of these three units is then sent to an odor treatment system, dissolved air flotation (DAF) unit, and into an equalization for neutralization.

The fourth stream is the UHV wastewater which stems from the company's "Upstream Project for Hygiene and Value Added Products", the process of using petrochemical / petroleum residue as the raw material to produce propylene gas that can be further used for making housewares or other goods. This UHV wastewater stream is sent directly to the equalization tank where it settles with the other three streams, and then all are directed to the plant's membrane bioreactor (MBR) which features an aeration tank and a tubular UF system from Berghof Membranes (image 1).

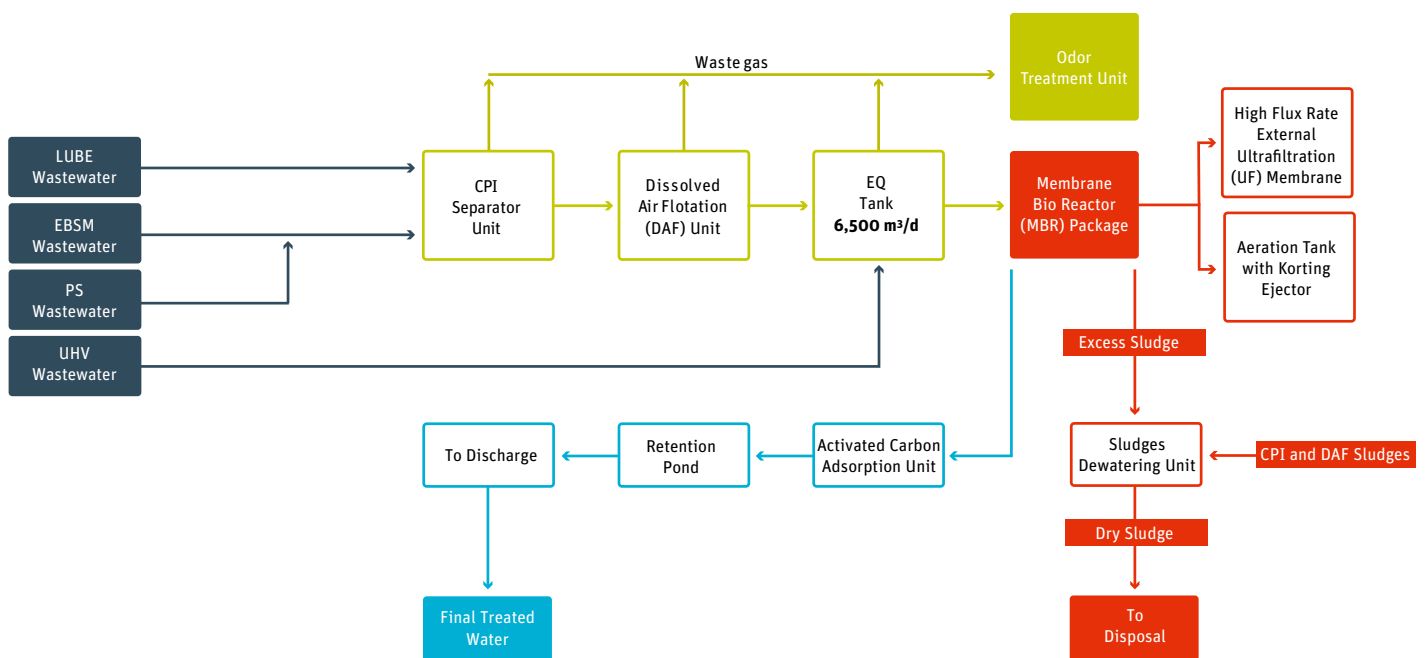


Figure 1: Process design of the central wastewater treatment plant

THE BERGHOF MEMBRANES SOLUTION

The Berghof Membranes UF system was designed with **6 loops** – each loop having **6 modules in series**. Given the plant's size, Berghof modules were installed and are operating at a **crossflow velocity of 3.8 m/s**, which translates to maximized performance of the system. Below is a table detailing the influent and effluent characteristics of the UF system.

The winning project ensured the end-user that discharge limits were met. The ultrafiltration was installed with a minimum amount of civil work. In contrast to the Conventional Activated Sludge treatment, the new plant makes **chemical pretreatment unnecessary**. As a result the end-user **saves** on both **CAPEX and footprint**. In addition, the fewer steps in pretreatment result in **less energy consumption** of the total plant. The higher concentration rates of biomass due to external filtration ensures a healthier and highly specialized biology in the bioreactor, thus the biological process can digest more waste and remove the slowly biodegradable matter. As a result, the **effluent quality improves, less waste is left** in the sludge and the end-user **saves on disposal costs**.

| Parameter | Influent Quality | Effluent Quality | Effluent Requirement |
|--------------|------------------|------------------|----------------------|
| pH | 6.0 – 8.5 | 6.5 – 7.5 | 5.5 – 9.0 |
| COD (mg/L) | 1,200 – 1,500 | < 30 | ≤ 120 |
| BOD, mg/l | 600 | < 5 | ≤ 20 |
| TDS, mg/l | 2,000 | 2,200 | ≤ 3,000 |
| TKN, mg/l | < 50 | < 10 | ≤ 100 |
| SS, mg/l | 100 | < 3 | ≤ 50 |
| O&G, mg/l | 100 – 2,000 | < 2 | ≤ 5 |
| Phenol, mg/l | 50 | < 0.2 | 1 |

Table 1: Influent and effluent characteristics of the MBR system

Customer benefits

- High flux rate of 145 LMH with a small footprint
- Lower CAPEX and OPEX, due to eliminating the need for chemical pretreatment
- Plug-and-play solution and minimum amount of civil work for site preparation
- Less costs for discharge of waste to the disposal
- Safe and dry access for operators



ABOUT BERGHOF MEMBRANES

Berghof Membrane Technology GmbH, part of the Berghof Group, is your leading manufacturer of tubular UF membrane solutions for the filtration and separation of process streams and wastewater in a variety of industries including dairy, landfills, food & beverage, chemical, pharmaceutical and oil & gas.

We at Berghof Membranes continuously “think outside the box” by not only offering tubular UF membrane modules, but we also deliver engineered filtration systems and support services to our OEM partners. From lab-scale testing, to piloting, to engineering design, to commissioning, to remote monitoring and analysis, to replace parts – we’re more than just a membrane supplier.

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