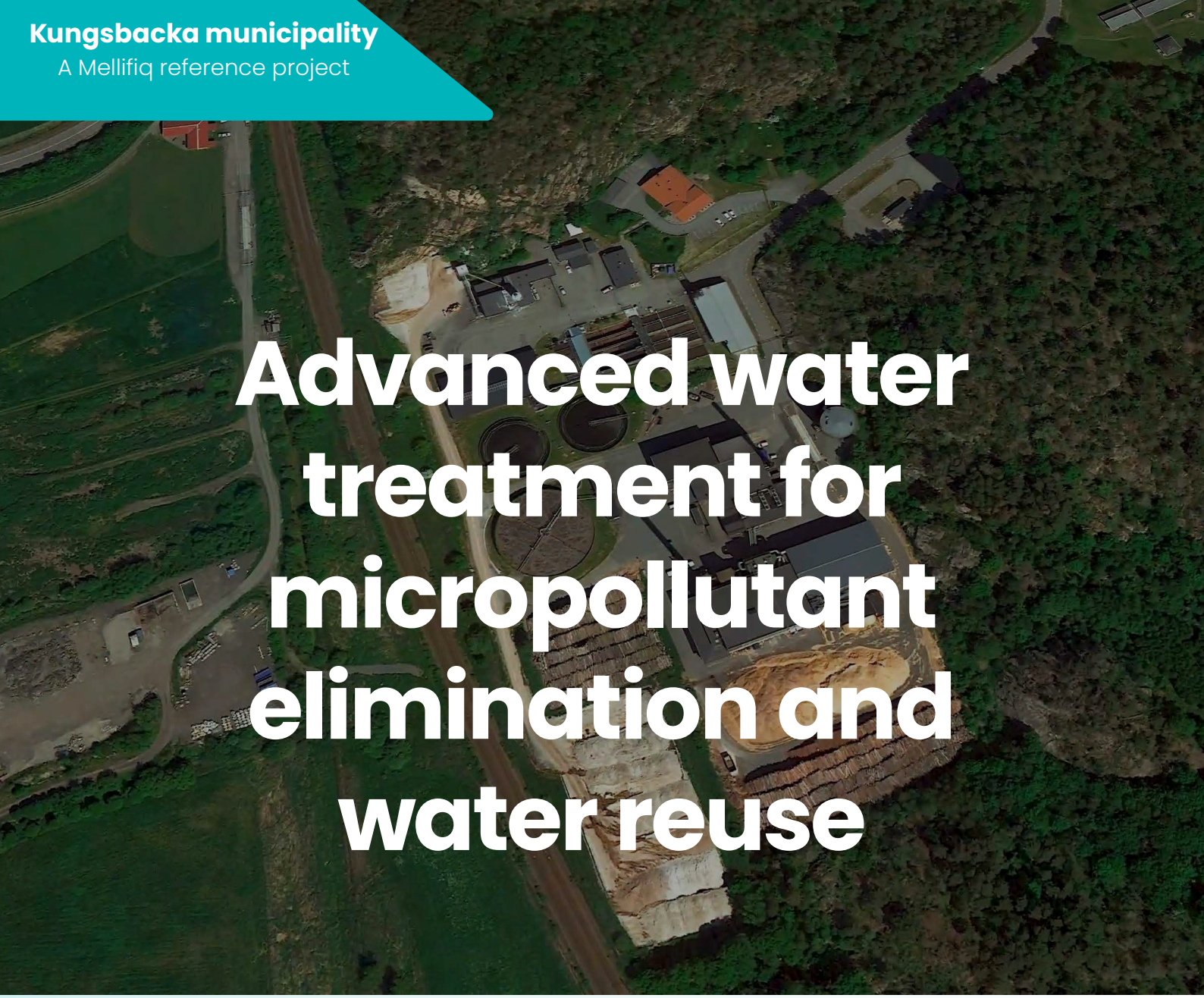
Kungsbacka municipality
A Mellifiq reference project



Advanced water treatment for micropollutant elimination and water reuse

Mellifiq advanced water treatment process to disinfect and eliminate pharmaceutical residues in wastewater, enabling production of technical water for water reuse

MELLIFIQ

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Wastewater Treatment Plant, Kungsbacka, Sweden

Kungsbacka municipality, located 30 km south of Gothenburg, is working proactively to be at the forefront in terms of water management, according to "reduce, reuse recycle". Hence, Kungsbacka contacted Mellifiq to evaluate technologies for micropollutant removal and production of technical water for reuse. The delivery included two containerized water treatment systems incorporating the technologies ozonation, adsorption using granulated activated carbon (GAC), and membrane nanofiltration (NF). Additionally, the project scope included technical consulting and project management, as well as sizing of a full-scale quaternary treatment step.

Facts

Name:	Kungsbacka municipality
Location:	Kungsbacka, Sweden
Industry:	Public utility
Project value (USD):	500,000
Challange:	Micropollutant removal and reuse of technical water

Solution:

Mellifiq delivery:	Two containerized treatment systems incorporating a RENA Tellus X-series ozone system, Water Maid FlexKarb adsorption filter activated carbon, and a Water Maid membrane nanofilter
Preformance:	>98% API-treatment, >99% reduction of PFAS, >3 log reduction of microbial organisms
Capacity:	15 m³/h
Dimensions:	20ft container (ozonation and adsorption) and 10 ft container (nanofiltration)

The problem

Most municipal wastewater treatment plants are not configured to treat micropollutants such as active pharmaceutical ingredients (APIs), per- and polyfluorinated alkyl substances (PFAS), and microbial organisms. As the micropollutants reach the recipient, they may bioaccumulate and negatively affect the aquatic environment. The treated wastewater contains pollutants and is therefore not safe to use for other purposes.

Additionally, as the EU Urban Wastewater Directive is currently being revised, micropollutant treatment may be required for all treatment plants with a sensitive recipient. The upcoming regulations on API-treatment enforce using a quaternary treatment step, having an API-reduction of at least 80%.

Image from the wastewater treatment plant.

The solution

To enable water reuse of treated wastewater, a modular advanced water treatment system was utilized. The process equipment for ozonation, adsorption with granulated activated carbon (GAC) and membrane nanofiltration were installed in a 20 ft and 10 ft container, respectively. The equipment was installed in close proximity to the treatment plant, treating a part-flow of the wastewater effluent.

Enclosed in the 20 ft container was the ozonation treatment utilizing Mellifiq's RENA Tellus system, which is optimized for treatment of active pharmaceutical ingredients (APIs).

The system includes oxygen generation, ozone generation, dissolution of ozone into the liquid phase, reaction tank, piping, automation, and all necessary safety features. Following the ozonation step, a Water Maid FlexKarb adsorption system is installed. The system includes automation for backwashing the adsorption filter in case required and the filtration media consists of a specialized GAC, optimized for removal of pharmaceutical substances. In the 10 ft container, a Water Maid nanofiltration system is installed. The system includes a buffer tank, pre-filtration, membrane modules, piping, and automation.

Image of the two containerized treatment plants.

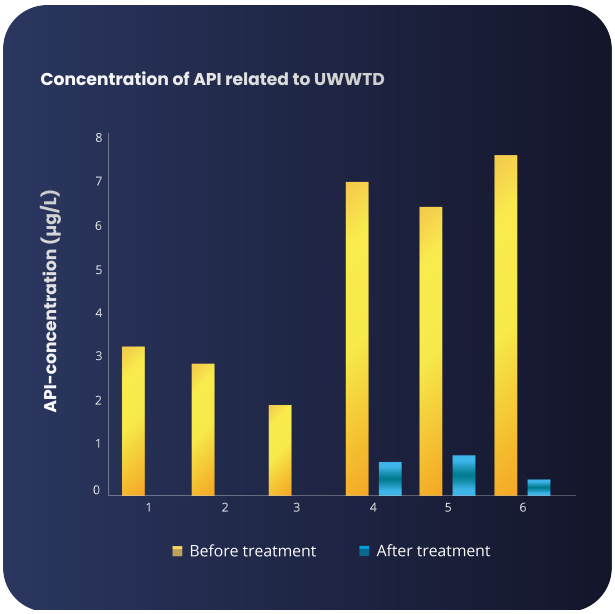
Evaluation

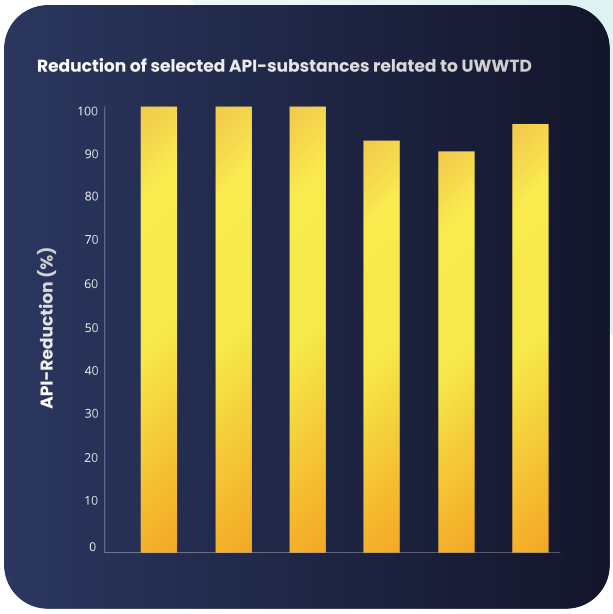
The project was evaluated during 6 months of operation, including different process scenarios and regular sampling to optimize the treatment efficiency and energy consumption. The results yielded 98% reduction of API-substances, >99% reduction of PFAS, and >3 log reduction in microbial activity (coliform bacteria, somatic coliphages, and *Escherichia coli*).

Substances included in the revised urban wastewater treatment directive (UWWTD) were analyzed specifically, where 10 out of 13 substances were detected. Among these were hydrochlorothiazide, metoprolol, diclofenac, venlafaxine, carbamazepine, and citalopram detected in concentrations ranging between 0.3 and 2.5 µg/L. In all evaluated process scenarios, the reduction of the APIs included in the revised UWWTD rate exceeded 88%.

Image from the inside of the 20 ft container.

Image from the inside of the 10 ft container.





The project results were used to size a full-scale advanced treatment system with >90% removal of selected API-substances, and a hydraulic flow of up to 2 000 m3/h.

By using the detected mean API-concentration together with the average flow for the full-scale system and an API-reduction of 80%, it was found that a total of 311 kg API-substances can be prevented to reach the recipient every year.

Learn more

Watch the Mellifiq case film on the treatment of micropollutants at Kungsbacka municipality here:
Youtube

You can also read some of the articles written on the project here:
SVT
Norra Halland

About Mellifiq

Mellifiq is a multi-awarded environmental service company group, that has since the early nineties evolved into a world leading system and solution provider with multiple groundbreaking applications for industrial, municipal, and real estate clients. We supply cutting-edge technologies to manage the most sophisticated air, water, and energy challenges.

Mellifiq offers a complete range of air and water treatment technologies and solutions across multiple industries such as processing industry, energy sector, food and beverage, pharmaceutical, wastewater treatment and commercial real estate.

Mellifiq offers strong and renowned brands, such as Ozonetech, Nodora and Water Maid, and world-class engineering services combined an excellent track record of more than 40 years of innovation. We help our clients achieve the most efficient and sustainable solutions while creating the maximum value for their businesses.

With several business units across Europe, Mellifiq is headquartered in Stockholm where research and development, production, QA and certification all take place. Our unique technology and our extensive expertise have made us the Center of Excellence for the world's most complex projects, and a global player with installations on all six continents.

Everyday millions of people rely on our solutions for ventilation, disinfection, sanitation, and odor control. We are committed to raising the bar for the concept of clean and the industry standard for engineering, technical services and general contracting.

For additional information, visit our website at www.mellifiq.com

MELLIFIQ

+ 46 10 252 30 00 Elektravägen 53, SE-126 30 Hägersten, Sweden www.mellifiq.com