

Producing Process, Cooling, Boiler, and High-Pressure Boiler Water with Membrane Filtration



The challenge

In 2008, Belgian municipal water supplier Tussengemeentelijke Maatschappij der Vlaanderen voor Watervoorziening (TMVW) saw an emerging market for the valorization of surface water, and thus an opportunity to expand into industrial water supply. TMVW created Induss II, a fully integrated water production site in the port of Ghent to serve surrounding industrial customers. Ultimately, TMVW in cooperation with Antwerpse Water Werken created Induss, a separate company for industrial water, to take over and operate new and existing plants in Belgium.

To successfully infiltrate this new market, plant operators needed to implement a water treatment system capable of meeting the wide variety of water quality demands and requirements for process, cooling, boiler, and high-pressure (HP) boiler water. In addition, the solution needed to comply with local regulations regarding the amount of water the plant could extract from the local river, which is the main water source. This water posed a unique challenge, as the river quality varies with the seasons and has high salinity due to its proximity to the sea. High levels of conductivity are faced in the summer months.

Due to footprint restrictions and discharge limits capping a maximum daily flow and limiting hours for peak flow rates, as well as the fact that no sewerage or wastewater treatment plant was available, conventional treatment methods that require coagulants and produce sludge could not be considered. In general, chemical use was limited and required balanced discharge of any residual stream containing chemicals or solids. With these limits, the reverse osmosis (RO) system had to handle a varied range of salinity to maintain high recovery without sacrificing production and quality.

The solution

Ultimately, the Induss II plant selected Aria Filtra® due to its compact, robust, and proven membrane solution, along with the company's support and expertise. Facility operators invested in the Aria FLEX™ integrated membrane system, using the advanced pressurized membrane filtration to successfully meet the four different water quality requirements. Aria Filtra also was selected in large part due to its ability to fit a wide range of capacities within the small footprint, meet the new treatment and flow rate demands, and deliver a system that could be operated remotely.

The full turnkey filtration system was built to accommodate future expansion and the ability to scale operations. The original water treatment design scheme included automatic cleaning strainers (300 micrometers) to remove larger solids and filtration membranes to remove suspended solids and microorganisms, preventing the RO from fouling. It also

incorporated first pass RO to (partially) desalinate the water, second pass RO as polisher for desalination, and electrodeionization as final polisher. This concept is flexible to meet the feedwater conditions of the operating window.

The results

Following the implementation of the Aria FLEX system, the Induss II plant was able to meet feedwater demands and comply with necessary regulations and permit limitations. This was critical for the plant, as Induss II's water demand fluctuates due to flow levels and regulations, and the water source soars during the summer months. The flexible system was able to meet all 4 water treatment demands, producing 80 cubic meters per hour (m³/h) of process water, 180 m³/h for cooling water, 20 m³/h for boiling water, and 25 m³/h of HP boiler feedwater. The membrane solution has proven critical for capacity, particularly given the system's ability to scale to meet peak demand.

Beyond the added water capacity, the operator-friendly nature of the system was a colossal benefit. Between the plant's remote location in an industrial area and the number of other plants operated by Induss, operating the plant remotely was necessary, as maintenance monitors are only onsite two days a week. With the Aria FLEX platform's fully integrated operating system, facility operators can manage, monitor, and adjust water levels remotely with ease. The installation is monitored and operated remotely from Induss' central control room, with minimum onsite intervention.

The benefits

The Induss II plant in the port of Ghent has been in operation for more than eight years and has successfully delivered on its promise to be seamlessly and remotely operated. The flexible membrane unit has fulfilled the facility's water quality needs, allowing it to meet water requirements for the variety of industrial water that it delivers. Overall, the Aria FLEX system provided the following benefits:

- **Ability to produce numerous water qualities for a variety of industries**
- **Capability to fully operate the plant remotely**
- **Ability to scale to meet future demand**
- **Robust membranes and proven technology**



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