

INCREASING ENERGY-EFFICIENCY FOR A BRACKISH WATER PLANT IN SWITZERLAND WITH THE LOW-PRESSURE PX




LOCATION
Biel, Switzerland

END USER
Energie Service Biel/Bienne (ESB)

OEM
Membrotec S.A.

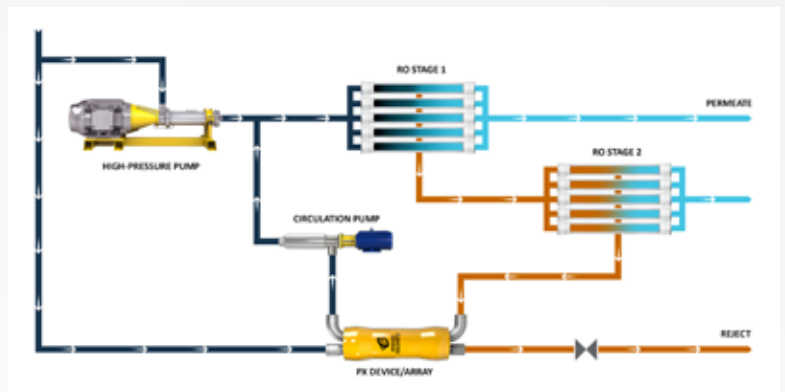
EST. COST SAVINGS
\$120,000 /year*

EST. ENERGY SAVINGS
400 MWh/year

THE CHALLENGE

Redesigning a Brackish Water Treatment Facility to Remove Contaminants

A brackish water reverse osmosis facility (BWRO) located along Lake Biel in western Switzerland underwent a complete redesign to provide clean water for an estimated 70,000 individuals in Biel and Nidau. The utility provider, Energie Service Biel/Bienne (ESB), sought a modern, energy-efficient solution for water treatment to remove trace contaminants. The goal was to reduce energy consumption and lower trace substances by approximately 50% to combat highly variable raw water quality and prepare for the effects of climate change.



THE SOLUTION

Low-Pressure PX[®] Pressure Exchanger[®] for Reduced Energy Consumption

ESB collaborated with Membrotec S.A. to replace the existing plant with a reverse osmosis (RO) water treatment facility to ensure an energy-efficient provision of high-purity water. The plant features a modern membrane system to remove contaminants, especially chlorothalonil products. Aiming to minimize the use of chemicals for higher water quality, the designers chose to eliminate the use of antiscalants.

However, removing these chemicals results in a lowered permeate yield from the RO system. Consequently, higher pressure and more energy are required to meet the desired permeate output. To save energy and associated costs, the designers implemented an energy recovery system using the Low-Pressure PX[®] Pressure Exchanger[®] (LP PX) from Energy Recovery.

The plant's final capacity with first phase and second phase will be 1,200 m³/h with an RO system of 600 m³/h resulting in production capacity of 14,400 m³/day of RO permeate, which will be blended with bypassed ultrafiltrated water. The RO is integrated in a complete treatment system (ultrafiltration, reverse osmosis for half of the flow, ozonation, GAC filtration). The first phase of RO includes two PX LP180 units into each train and the fully commissioned plant will have 16 low-pressure PXs installed.



LP PX: How it Works

The LP PX works by transferring the high-pressure energy from the reject stream to the incoming feed flow, thereby reducing the size of the high-pressure pump and increasing the energy efficiency of the reverse osmosis system. Incorporating a low-pressure PX can significantly reduce the specific energy consumption of systems compared to those without any energy recovery device.

Award-Winning BWRO System Design

- This plant is the first in the world to use an RO system to treat surface water without antiscalants, ensuring high-purity water is returned to the lake.
- The specific energy consumption of the facility's reverse osmosis stage falls below 0.6 kWh/m³.
- The plant features a patented cleaning system to remove [invasive quagga mussels](#).



With the contribution of the PX Pressure Exchanger technology, the energy consumption of reverse osmosis permeate falls below 0.6 kWh/m³ to ensure energy efficiency for cost-effective clean water production.

Each pressure exchanger transfers hydraulic power, allowing the system to reduce the energy consumption of reverse osmosis and the size of the high-pressure pump.



– Membratec S.A.

THE RESULT

LP PX Saves an Estimated 400 MWh Annually

Once fully commissioned, the BWRO facility will save an estimated 400 MWh/year, roughly equivalent to 30% of the energy consumption of the new system, and save an estimated \$120,000 USD in operating costs annually.* Integration of the LP PX is essential for saving energy, reducing operational costs,

and reduces the specific energy consumption of the permeate to below 0.6 kWh/m³.* The plant's new energy-efficient design integrates the PX with innovative features to reduce electricity consumption and support Switzerland's net-zero goals.

To learn more, visit energyrecovery.com



*Actual results may vary. Energy cost savings are calculated based on 8 lines in operation, with the cost of electricity being \$0.32/kWh.

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March 2025