

The Industry Standard Solution

The efficiency and lifecycle costs of a plant's energy recovery technology is critical to both winning SWRO projects and achieving maximum plant profitability through the lowest operating costs. Leading international OEM's such as Acciona Agua, Aqua Engineering, Befesa, CH2MHill, Cobra Tedagua, Doosan Hydro Technology, Fisia Italimpianti, GE Water Process and Technologies, GEIDA, IASUR, INIMA, Metito, Siemens and Suez Degrémont have selected the ERI[®] PX modular technology for their recent projects because it consistently achieves real energy transfer efficiencies—up to 98%, making it the most efficient energy recovery device available today. At the core of the PX device is a single moving rotor made of tough engineered ceramic that is unaffected by chemicals, will not corrode, and requires no periodic maintenance. Over 80 OEMs are standardizing on PX technology with installations around the world, including plants such as Al Shuaibah III, Barcelona, Chennai, Hamma, Perth, Skikda, Torre Vieja and Yuhuan.

Perth SWRO Desalination Plant Perth, Australia



Perth, Western Australia Water Corporation

In November 2006, the 144,000 m³/day SWRO Plant in Western Australia began delivering desalinated water from the ocean into Perth's municipal water supply system. The vision of utilizing a combination of clean wind power and the highest efficiency ERD available for one of the most efficient and environmentally friendly desalination plants in the world became a reality.

A Thirsty Nation

The ongoing population growth in Australia's coastal communities combined with the worst drought in a century have unhappily converged, creating the necessity for the Australian government to find water sources that are located at or near large coastal communities in need. Most importantly, Australia needs a water source that is not subject to the whims of changing weather patterns.

A Proven Solution

Back in April 2005, facing impending water shortages, Western Australia's Water Corporation decided to form a public-private partnership with global water treatment company Degrémont. The two entities collaborated to build and operate Perth's first seawater desalination plant using reverse osmosis technology, the largest such plant in the southern hemisphere. The 144,000 m³/day (38 million U.S. gallons per day) plant, built at Kwinana, 25 kilometers south of Perth, will become the largest single source of water for Perth, supplying 17% of the city's needs.

To reduce energy and overall costs, ERI's industry-standard PX technology was selected by the Degrémont Multiplex Joint Venture as the advanced energy recovery solution for the project. The first of 12 trains of the Perth SWRO Plant started producing fresh water in November 2006.

Perth Project Facts - At a Glance

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| • Total 1 st Pass Capacity (PX's installed) | 160,000 m ³ /day [42 MGD] |
| • Permeate Capacity | 144,000 m ³ /day [38 MGD] |
| • SWRO Train Capacity | 13,500 m ³ /day [3.5 MGD] |
| • Number of SWRO Trains | 12 |
| • Membrane Water Recovery Rate | 43% |
| • SWRO Energy Consumption* | 2.32 kWh/m ³ * |
| • Total Plant Energy Consumption | 3.2–3.5 kWh/m ³ * |
| • Efficiency | 96.7% |
| • Total SWRO Plant Cost | USD 290 million |
| • Power Generation | Wind Farm Offset |

* Lowest energy consumption reported for large-scale SWRO desalination plant.

CASE STUDY



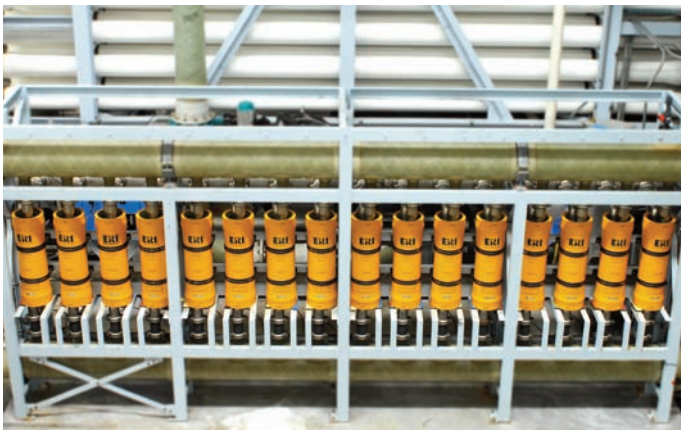
An Environmentally Green Plant Design

As part of Water Corporation's and WA's commitment to promote energy efficiency and reduce greenhouse gas emissions, the Perth SWRO Plant is the largest facility of its kind in the world to be powered by renewable energy. The plant buys its power needs from electricity generated by the Emu Downs Wind Farm, located 200 kilometers north of Perth. The 83 MW wind farm consists of 48 wind turbines and contributes over 272 GWhr per year into the grid, fully offsetting the Perth SWRO Plant's estimated electrical requirement of 180 GWhr per year. In addition, instruments that continuously monitor plant discharges automatically shut down the process in the event of an exceedance.

The plant, with 12 SWRO trains with a first-pass capacity of 160,000 m³/day and six BWRO trains delivering a final product flow rate of 144,000 m³/day, will have one of the world's lowest specific energy

consumption rates, due in part to the use of Energy Recovery, Inc.'s (ERI's) PX Pressure Exchanger[®] energy recovery devices (ERDs). The PX device is an isobaric-chamber ERD that recovers pressure energy from the brine reject stream and delivers it to fresh seawater going to the SWRO membrane feed at a net transfer efficiency of up to 98%, making it the world's most efficient ERD. PX technology saves the Perth SWRO Plant 15.6 MW of energy.

The combination of unheralded environmental protection and monitoring, low specific energy consumption and the use of a renewable energy make the Perth SWRO Plant a world model for providing water in an environmentally sound and sustainable manner, almost magically converting wind to fresh water. The Water Corporation has demonstrated that a well-planned alliance approach can produce a desalination plant that is environmentally responsible, well designed, and very cost effective all at once.



SWRO train of 16 PX-220 PX Pressure Exchangers.



Environmental protection and monitoring is a real concern.

Perth SWRO Desalination Plant



Why ERI PX Technology?

Simply put, ERI's PX Technology offers the highest available net energy transfer efficiency and the lowest lifecycle costs of any ERD as well as maximum design flexibility, reduced high-pressure pump costs and operational flexibility.

Among the commercially available isobaric ERDs, the PX Pressure Exchanger isobaric ERD also provides the following added advantages:

- Highest available Net Transfer Efficiency – up to 98%
- No bearings, seals, valves - maintenance free operation
- No wetted metal parts that are subject to corrosion
- No required complicated computer controls
- No vibration, lateral loads, or pulsation
- Installed redundancy for maximum on-line time
- Only 80 kg per PX-220 and no special skid or foundation requirements
- Smallest footprint by a factor of 6 or more
- Local support and service in Europe, Australia, Asia Pacific, Middle East and North Africa, and the Americas

Guaranteed.



Membrane racks tower over the small footprint of the PX array train racks.



Gary Crisp stands by the first of 12 SWRO train of 16—PX-220 Pressure Exchangers.



Inside view of the Perth SWRO Desalination Plant.

"I sincerely believe that the MDJV (Municipalities of Degrémont Joint Venture) Alliance and consequently the PRO Alliance have produced a design that is unmatched and will result in the most sophisticated seawater desalination plant in the world, the Perth Seawater Desalination Plant. It will no doubt be the world's model desalination plant incorporating some of the most advanced components including the highly efficient - simple to operate - with low maintenance isobaric energy recovery devices from ERI."

Gary Crisp,
Principal Engineer, Desalination
Water Corporation of Western Australia

BIG BREAKTHROUGH TECHNOLOGY

REDUCING ENERGY AND OVERALL COSTS

Perth SWRO Desalination Plant

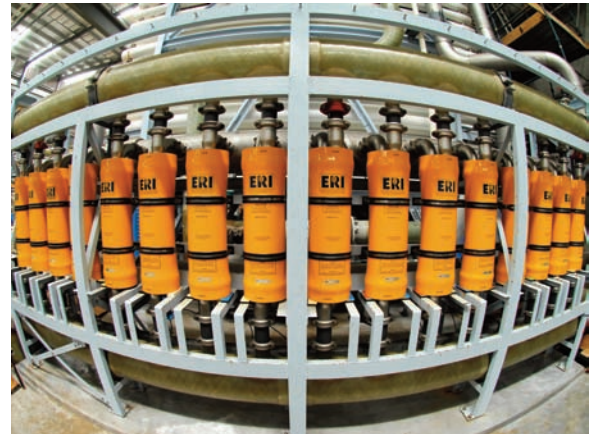
Energy Recovery, Inc. (ERI) is the global leader in high efficiency energy recovery products and technology. Our PX Pressure Exchanger® (PX®) energy recovery device is making desalination affordable. The PX device is a rotary positive displacement pump that recovers energy from the high-pressure waste stream of SWRO desalination systems at up to 98% efficiency with no downtime or scheduled maintenance. Since its introduction in 1997, PX technology has emerged as the industry standard solution for SWRO desalination. There are currently over 5,400 PX units installed or contracted in SWRO plants worldwide, significantly reducing the cost to produce over 4.5 million cubic meters of fresh water per day, and saving customers an estimated 502 MW of energy or \$264 million a year in operating costs and reducing CO₂ emissions by nearly 4 million tons over a 20 year life of a plant the size of Perth.

Contact us today to find out how you can start saving, or to learn more about ERI and the PX technology solution, visit us at:

www.energyrecovery.com



Aerial view of the Perth Desalination Plant in Kwinana, Western Australia.



Wide angle fisheye view of ERI's SWRO Train of 16 PX-220 Pressure Exchangers



A perspective view of ERI's SWRO Train of PX-220 Pressure Exchangers



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Making Desalination Affordable™



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