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Success Story

DOUBLING CAPACITY WITHOUT NEED FOR NEW INTAKES OR OUTFALLS

Gradiant is delivering a unique solution to increase freshwater production without the need for new and costly infrastructure of seawater intakes and discharge outfalls. A bolt-on RO Infinity system for brine concentration will be added to the existing seawater desalination facility – total plant production will be almost doubled without increasing feedwater flow or pretreatment needs, while reducing discharge flows that would otherwise require disposal.

Municipal Desalination

Saudi Arabia

The Challenge

The Middle East is one of the most challenging regions in the world for seawater desalination. The high salinity and organics in the feedwater limit the design envelope for high flux and recovery in RO systems.

SAWACO is the leading provider of municipal and industrial potable water in the Kingdom of Saudi Arabia. The company has been experiencing unprecedented demand for water, but was unable to increase existing production capacity at its Store City Desalination Plant due to constraints on seawater intake and brine discharge capacities. Additional freshwater production was needed on a short timeline of less than 6 months.

With the lack of options to expand capacity and the high cost in time and money to build new intake and discharge infrastructure, Gradiant had the answer.

The Solution

To address the problem, SAWACO turned to Gradiant, who has been conducting a long-term demonstration of the RO Infinity CFRO technology at SAWACO's South Jeddah Corniche Plant. Gradiant's RO Infinity CFRO process works by applying saline water to the permeate side of the membrane, reducing the osmotic pressure differential and enabling desalination of high salinity streams at relatively low pressure. All using standard, commercially available RO membranes and equipment.

Fast Facts

Location:	Jeddah, Kingdom of Saudi Arabia
End-User:	SAWACO Water Desalination (Store City)
Solution:	Brine Concentration
Industry:	Municipal Desalination
Feedwater Source:	Seawater RO Brine Concentrate (150,000 mg/L)
Technology:	RO Infinity with CFRO
System Configuration:	Single-Train, 3-Stage
System Capacity:	1,920 m^3/day
System Recovery:	50% (Brine Concentration)
Online Date:	Q2 2023
Delivery Model:	Design-Build (DB) in collaboration with SAWACO, Pilot Testing (3 Years)

80%
More Freshwater Production

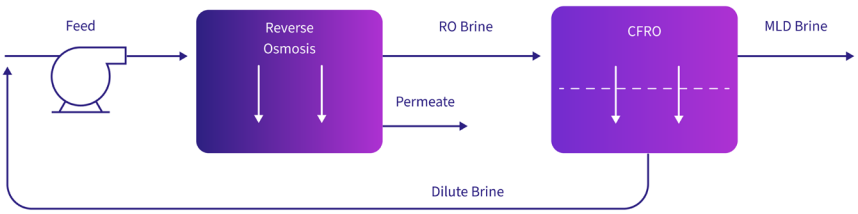
150,000 mg/L
TDS brine concentration

99.8%
System Availability

1,920 m^3/per day
System Capacity

3
Years
Continuous Pilot Testing

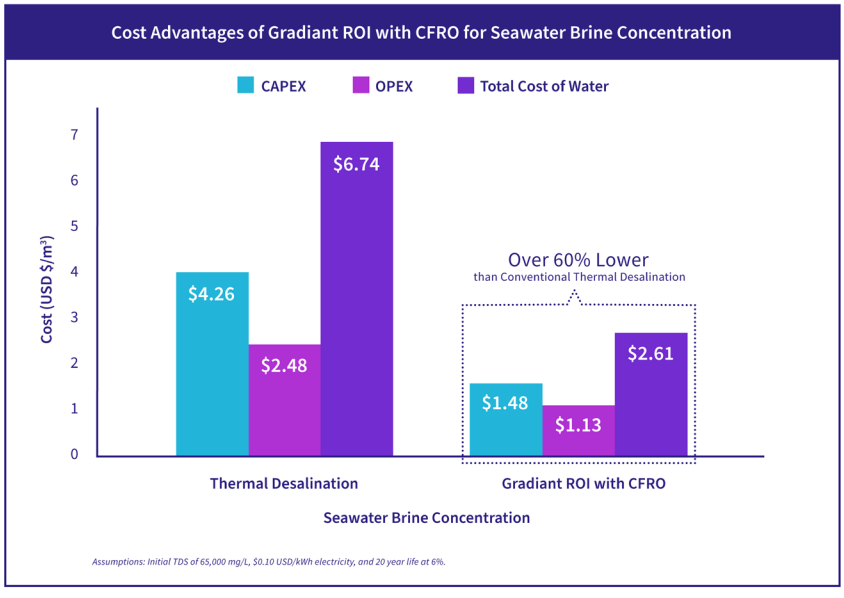
1/4
of the Energy Consumption
vs Conventional Technologies



RO Infinity with CFRO - Process Flow Diagram

The RO Infinity process was validated in an extended 3-year demonstration at SAWACO to prove continuous operation at 99.8% system availability, at 50% recovery, while using less energy than competing technologies.

The success of the RO Infinity demonstration led to award of a full-scale contract. Gradiant will design and deliver a new brine concentration system using the RO Infinity technology as a bolt-on addition to fit within the footprint of SAWACO's existing conventional seawater desalination plant at Store City. SAWACO, supported by Suido Kiko Middle East, will construct the overall facility. Gradiant's system will be fed only brine, nothing else, at 75,000 mg/L TDS, from the existing conventional desalination plant - water which would have otherwise been wasted, will be transformed into new, high-quality permeate. The final TDS concentration of the brine will be 150,000 mg/L.



Energy and Cost for Final Brine Concentrations using RO Infinity

The Benefits

The combined new Gradiant RO Infinity brine concentration system and existing conventional SWRO desalination facility will have an overall recovery rate of 69% - which nearly doubles current production, without increasing the feedwater or pretreatment requirements. Further, there will be reduced brine concentrate flows that would require discharge and disposal.

Besides the capital cost savings avoided, as no new infrastructure will be required, Gradiant's solution will bring major operational and total water cost savings to SAWACO. The RO Infinity technology's specific energy consumption is a fraction to that of brine concentration using conventional thermal technologies.

Demonstration Plant at SAWACO's South Jeddah Corniche Site

Learn More at gradiant.com/technologies/ro-infinity

Contact Gradiant today at: communications@gradiant.com

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