# Revolutionizing Brine Management

FTS H2O's RecovOAR™ Pilot Validates Salt Recovery at the World-leading Desalination Hub

**In 2021, FTS H2O, an Aquatech company, validated a RecovOAR™ system at Saudi Arabia's Jubail seawater desalination hub, one of the largest desalination facilities in the world. The system enabled the production of sodium chloride from concentrated seawater through the use of osmotically assisted reverse osmosis (OARO). Over more than three years of continuous operation, RecovOAR™ proved its energy efficiency, consistently producing high-purity brine at concentrations above 20% and validating the technology's long-term reliability.**

## At A Glance

- **Location:** Al Jubail
- **Industry:** Desalination
- **Solution:** RecovOAR™
- **End-User:** Oil Producer

## Challenge

Saudi Arabia's Jubail seawater desalination facility produces more than 1.4 million $m^3$/day of potable water, alongside a significant volume of high-salinity brine. This constitutes a largely untapped opportunity for resource recovery and a substantial potential source of high-purity sodium chloride for use in a wide variety of industries. In 2021, Aquatech's FTS H2O, in collaboration with Saudi Arabia's Desalination Technology Research Institute, launched a proof-of-technology system to validate how desalination concentrate can be transformed into industrial-grade salt.

## Solution

Aquatech's FTS H2O implemented RecovOAR™, its high-recovery RO technology, to demonstrate the viability of reject brine and to establish a scalable, sustainable model for brine valorization that fosters the recovery of salts, nutrients, and critical minerals. RecovOAR™ is a low-energy, membrane-based full flowsheet solution engineered to produce high-concentration, high-purity brine from challenging, high-salinity feed streams.

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## Process

At the Jubail plant, seawater brine is first treated with nanofiltration to remove hardness and impurities. The pretreated stream is then concentrated to 220 g/L (22% salinity) using RecovOAR™. This high-concentration brine is further processed through thermal crystallization to produce high-purity salt— ideal for chlor-alkali applications such as water treatment processing and pharmaceutical manufacturing. Unlike conventional thermal concentration or high-pressure RO technologies that demand significant energy input, RecovOAR™ operates efficiently without the need for steam. This translates into substantially lower CAPEX and OPEX, offering a cost-effective solution for industrial salt recovery and advanced brine management.

**Key Results**

| Parameter | Value |
|---|---|
| Feed TDS | 75 g/L |
| Final brine TDS | Avg. 235 g/L (220-255 g/L) |
| System recovery | 75-78% |
| Energy consumption | 4.5 kWh/m³ of processed brine |
| Membrane flux | 14-15 lmh |
| Permeate TDS | 40 g/L (recycled back to SWRO feed) |
| Concentrated brine (Sodium) | 82 g/L |
| Concentrated brine (Chloride) | 136 g/L |

## Result

The system, operational since 2021, consistently achieved 75-78% recovery, producing 0.5 m³/h of high-purity brine with an energy consumption of <10 kWh/m³ of permeate produced.

RecovOAR™ provides a low-energy alternative to conventional thermal brine concentration and enables the recovery of high-quality sodium chloride from desalination reject. By shifting brine management from disposal to an opportunity for resource recovery, RecovOAR™ delivers measurable environmental benefits while creating industrial and economic value to the consumer.