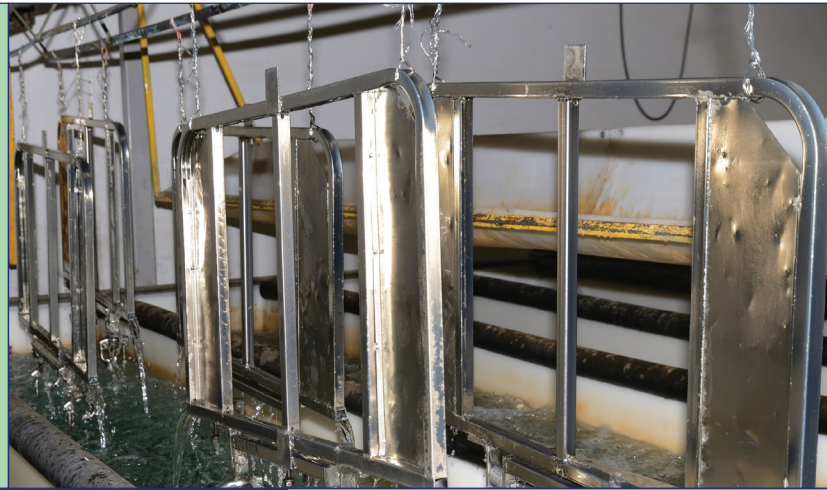


High Water Recovery for Cost-Effective Zero Liquid Discharge

A greenfield electroplating facility in Central Mexico needed to achieve zero liquid discharge without an oversized evaporator. Membrion's Electro-Ceramic Desalination (ECD) technology was evaluated to minimize the flow requiring thermal evaporation.



>90% WATER RECOVERY

69% TDS REDUCTION (1,950 → 600 MG/L)

<10% FLOW TO THERMAL EVAPORATION

PROJECT SNAPSHOT

Industry: Surface finishing / electroplating

Location: Central Mexico (greenfield facility)

Driver: Water-stressed, no discharge, ZLD required

Feed TDS: Variable, 1,950 mg/L avg., 3,000 mg/L max

Recovery target: >90% to achieve ZLD

THE CHALLENGE

Water scarcity and ZLD requirements demanded high water recovery while minimizing dependence on thermal evaporation.

The planned ZLD system needed to accommodate variable wastewater quality, including TDS concentrations of 1,500–3,000 mg/L, residual dissolved metals, and scaling potential. A thermal-only approach would have required a larger evaporator, increasing facility footprint and expected capital and operating costs.

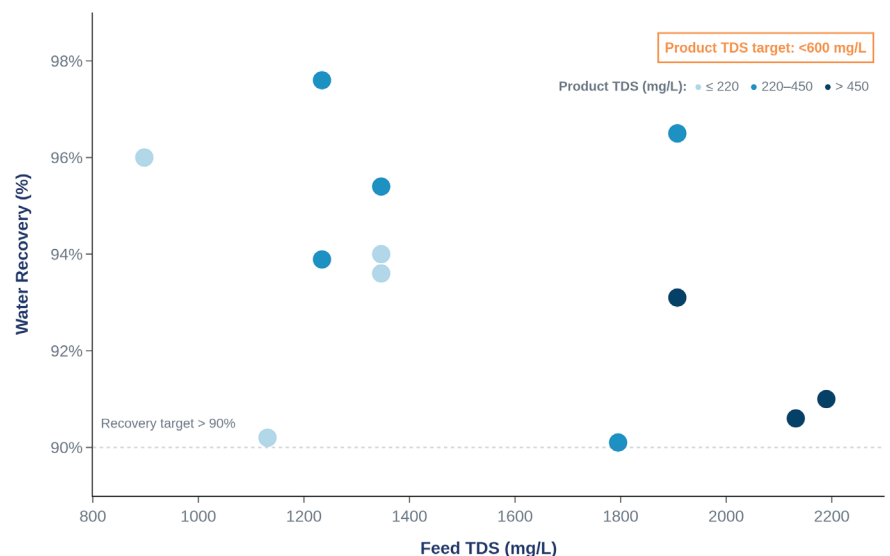
THE SOLUTION

Membrion's technology recovers water upstream, minimizing the size and duty of the downstream thermal evaporator.

Membrion's ECD technology was applied upstream of thermal evaporation to recover water and concentrate dissolved salts, allowing thermal evaporation to be reserved for the concentrate stream.

FIGURE 1 – RECOVERY VS. FEED TDS

Water recovery remained above the 90% design target across a wide range of feed TDS conditions (approximately 1,500–3,000 mg/L). Colors indicate the treated water TDS achieved under each operating condition. **The treatment objective was to produce treated water with less than 600 mg/L TDS.**



THE RESULTS

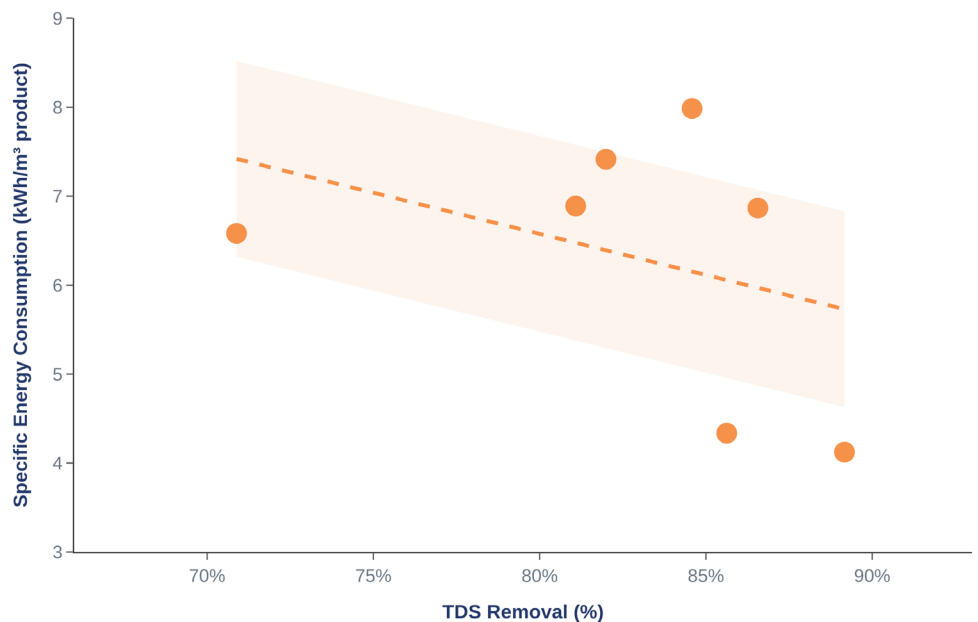
The pilot reduced thermal evaporation load and established the design basis for full-scale implementation.

The pilot demonstrated that ECD can achieve more than 90% recovery, enabling a significantly smaller downstream thermal evaporation system with a reduced footprint and lower capital and operating costs.

The pilot established the design basis for the commercial system, and the site subsequently advanced to full-scale implementation.

FIGURE 2 – ENERGY VS. TDS REMOVAL

Pilot testing demonstrated how water recovery, TDS removal and energy consumption can be balanced to meet project-specific treatment requirements.



ABOUT MEMBRION

Membrion partners with industrial facilities to solve complex wastewater challenges that conventional treatment systems weren't designed to handle.

With Electro-Ceramic Desalination (ECD) at the core, our solutions selectively remove dissolved salts and metals from difficult wastewater streams, helping facilities recover more water, reduce wastewater volume and get more from existing infrastructure.

Every engagement begins with a clear understanding of the facility's wastewater conditions, treatment goals and operational constraints.

From technical evaluation and pilot testing through full-scale deployment, Membrion works alongside customers to prove performance and design the right solution for real-world conditions.