🌊 Seawater Desalination:

Enhanced Throughput & Operational Efficiency

Seawater desalination plants face persistent challenges from membrane fouling, mineral scaling, chemical dependency, and high energy costs. **Magnetic Water Treatment (MWT)** serves as an advanced physical pre-treatment solution that improves salt crystallization behavior and disrupts biofouling—enhancing the performance of **Reverse Osmosis (RO)** and **Multi-stage Flash (MSF) desalination systems** while reducing operating costs and increasing water output.

1

Membrane Performance & Longevity

MWT improves feedwater behavior, protecting critical desalination assets.

Key performance benefits

- Extends RO membrane life by **40–60%** by reducing calcium carbonate, calcium sulfate, silica, and mixed-salt scaling
- Lowers membrane fouling rates by **30–50%**, maintaining higher permeate flux
- Enables higher recovery operation (**5–8% increase**) without increased scaling risk
- Reduces differential pressure buildup across membrane stages, lowering mechanical stress
- Improves overall membrane permeability, reducing strain on pumps and pressure vessels.

2

Chemical & Energy Cost Reduction

MWT significantly reduces reliance on chemical dosing and energy-intensive maintenance.

Operational cost savings

- Reduces anti-scalant consumption by **50–70%**
- Lowers acid dosing for pH control by **30–40%**, reducing corrosion risk
- Cuts CIP chemical usage (acids, alkalis, detergents) by **40–60%** through extended cleaning intervals
- Reduces specific energy consumption by **8–15%** through improved membrane performance
- Lowers overall power consumption by **10–18%** by reducing pumping pressure and cleaning downtime
- Supports natural re-mineralization of product water, reducing post-treatment calcium and magnesium addition costs.

3

Operational Throughput & Reliability

MWT improves plant availability, uptime, and capacity utilization.

Reliability improvements

- Increases capacity utilization from **85–90% to 92–97%**
- Reduces unplanned shutdowns for membrane cleaning and replacement
- Extends membrane replacement cycles from **3–5 years to 5–8 years**
- Improves resistance to biological fouling, particularly in warm, high-organic coastal waters
- Enhances performance of pre-treatment systems (sand filters, cartridge filters) by reducing particulate agglomeration.

4

Strategic Value for Water-Stressed Regions

MWT strengthens the long-term viability of desalination as a water security solution.

Regional and policy relevance

- Critical for Gulf nations where desalination supplies **50–90%** of potable water
- Supports cost-competitive expansion in Mediterranean regions facing chronic water scarcity
- Enables economically viable small- and medium-scale desalination for islands and remote coastal communities
- Aligns with **UN SDG 6 (Clean Water and Sanitation)** by lowering the cost barrier to desalination
- Reduces carbon footprint per cubic meter of produced water, supporting national climate commitments

A More Sustainable Path to Desalination

As global water stress intensifies, Magnetic Water Treatment provides a proven pathway to make seawater desalination more efficient, resilient, and environmentally responsible—transforming seawater into freshwater at lower cost, lower energy, and higher reliability