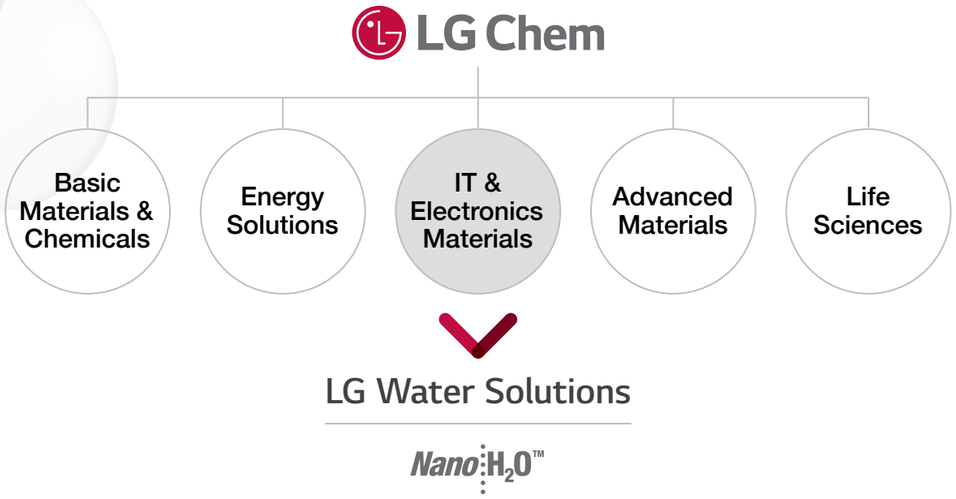
LG Chem

LG Water Solutions

Application Flyer

Nano H_2O™

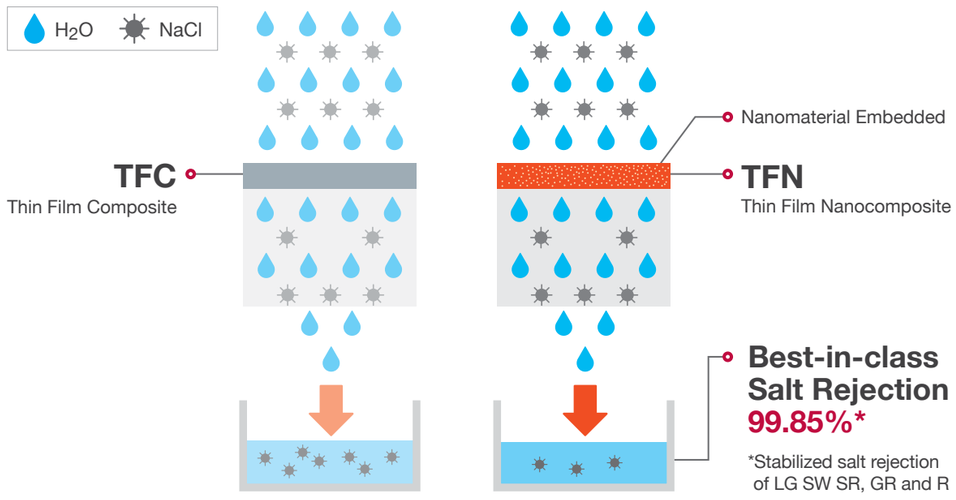
LG Water Solutions



LG Water Solutions, part of LG Chem, Ltd., manufactures the full line of NanoH$_2$O™ seawater, brackish water and residential reverse osmosis (RO) membranes. NanoH$_2$O™ RO membranes are developed based on innovative Thin Film Nanocomposite (TFN) technology.

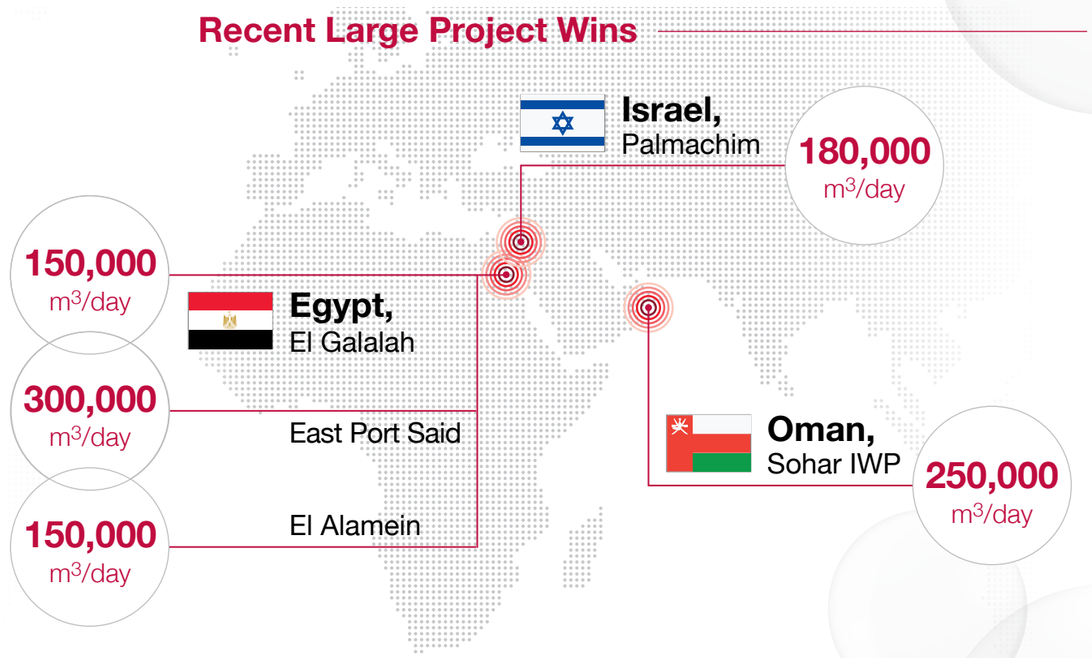
Technology

Thin Film Nanocomposite technology (TFN) improves membrane performance by embedding benign nanoparticles in the surface of the membrane. This innovative technology increases membrane flux without compromising salt rejection.



Global Project Wins Driven by Performance | SW

Recent Large Project Wins



Superior Quality Leads to Repeat Customers | BW

Semiconductor Display

- Panasonic
- Infineon
- LG Display

Power Generation

- الشركة السعودية للكهرباء Saudi Electricity Company
- KEPCO

Petrochemical Refinery

- PETROBRAS
- PEMEX
- IndianOil

Food & Beverage

- Coca-Cola
- pepsi

Wastewater Reuse

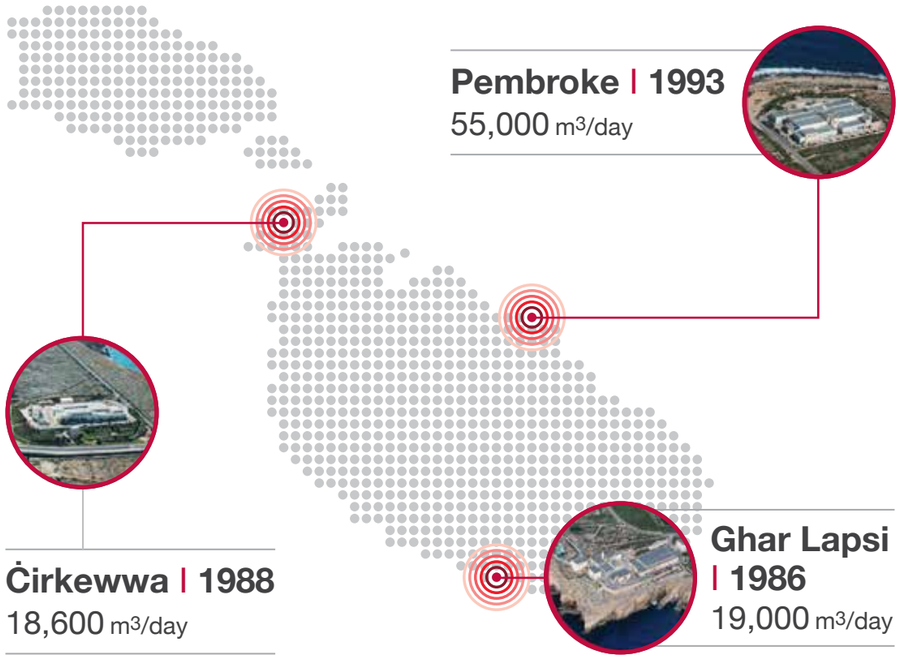
- Scottsdale Water Campus
  [City of Scottsdale, USA]

Malta

Water Services Corporation(WSC)

Operates three water desalination plants
in Pembroke, Lapsi, and Cirkewwa

Plant Info



Pembroke | 1993
55,000 m^3/day

Ċirkewwa | 1988
18,600 m^3/day

Ghar Lapsi | 1986
19,000 m^3/day

In 2015 LG Chem won tender to retrofit all three sites

Major Challenges

Low permeate boron requirement :

≤ 0.9 ppm (5-year warranty)

Low feed water pH

No pH adjustment

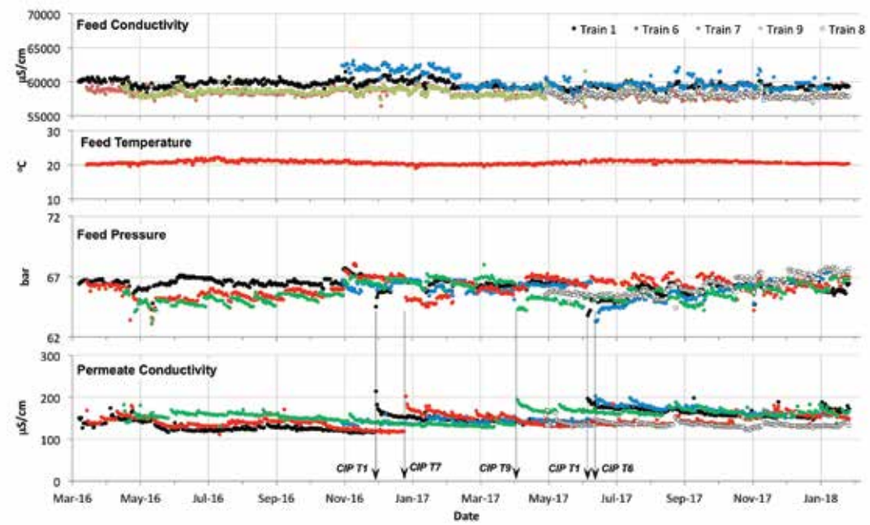
SW Case Study

Pembroke Desalination Plant

LG Chem NanoH2O™ membranes delivered excellent water quality water at low energy costs at the largest RO desalination facility in Malta

Client	Water Services Corporation
Start-Up Date	2016
Feed Water Intake	Sea water
Application	Potable water
Plant Configuration	8 trains (currently 6 in operation), 45 pressure vessels each, 7 elements per pressure vessel
Recovery	42%
Project Capacity	36,000 m^3/d (9.5 MGD)
Feed Temperature Range	20°- 22° C (68° - 72° F)
LG Chem NanoH$_2$O™ Membrane Model	LG SW 440 GR, LG SW 440 SR
Total Number of LG Chem NanoH$_2$O™ Elements	2,520 (1,890 installed)
Feed Pressure Range	65 – 67 bar (943 – 972 psi)
Permeate Boron	0.45 – 0.63 ppm

Operation Data | All Trains (Mar 2016 – Present)



SW Case Study

Spain

Carboneras Desalination Plant

LG Chem NanoH2O™ membranes delivered high quality water for potable use in one of the largest Europe desalination plants in Spain

Client	Desaladora Carboneras UTE
Start-Up Date	2016
Feed Water Intake	Beach well
Application	Potable water
Plant Configuration	One train, single-pass with 244 pressure vessels with 7 elements each
Recovery	48%
Project Capacity	20,000 m^3/d (5.3 MGD)
Feed Temperature Range	14°- 22° C (57° - 72° F)
LG Chem NanoH_2O™ Membrane Model	LG SW 400 R
Total Number of LG Chem NanoH_2O™ Elements	1,708
Feed Pressure Range	61– 63 bar (885 – 915 psi)

Israel

Palmachim Desalination Plant

LG Chem NanoH_2O™ membranes delivered lower system feed pressure to reduce energy consumption and improved permeate quality for one of the 10 largest SWRO plants in the world

Client	Via Maris Desalination Ltd.
Start-Up Date	2012 / 2013 / 2015
Feed Water Intake	Sea water
Application	Potable water
Plant Configuration	Five trains, single-pass with 352 pressure vessels each, 8 elements per pressure vessel
Recovery	50%
Project Capacity	180,000 m^3/d (48 MGD)
Feed Temperature Range	17°- 31° C (63° - 88° F)
LG Chem NanoH_2O™ Membrane Model	LG SW 400 SR, LG SW 440 SR
Total Number of LG Chem NanoH_2O™ Elements	14,080
Feed Pressure Range	63 – 70 bar (914 – 1,015 psi)

Curacao

Santa Barbara Desalination Plant

LG Chem NanoH2O™ membranes have reduced the SWRO train size by 29% when compared to the original SWRO trains

Client	Degremont
Start-Up Date	2012 / 2014 / 2015
Feed Water Intake	Beach well
Application	Potable water
Plant Configuration	Single pass, four trains, 72 pressure vessels each, 7 elements per each pressure vessel
Recovery	44%
Project Capacity	28,400 m^3/d (7.4 MGD)
Feed Temperature Range	25°- 26° C (77° - 79° F)
LG Chem NanoH_2O™ Membrane Model	LG SW 400 R, LG SW 400 SR
Total Number of LG Chem NanoH_2O™ Elements	2,016
Feed Pressure Range	54 – 55 bar (783 – 798 psi)

Oman

Barka II Desalination Plant

Largest RO desalination plant in Oman uses LG Chem NanoH_2O™ membranes for replacement

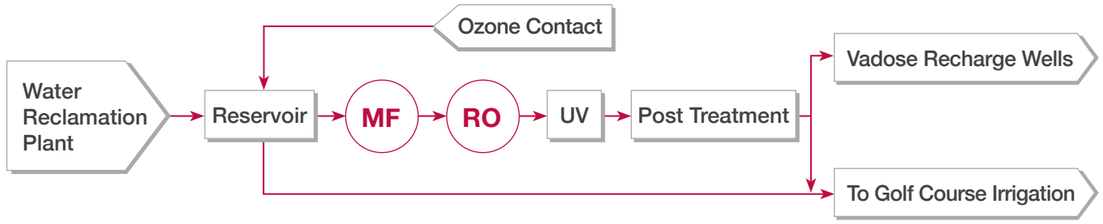
Client	ENGIE - STOMO (SUEZ-Tractebel)
Start-Up Date	2017
Feed Water Intake	Sea water
Application	Potable water
Plant Configuration	2 trains, 125 pressure vessels each, 7 elements per pressure vessel
Recovery	43%
Project Capacity	21,000 m^3/d (5.6 MGD)
Feed Temperature Range	25°- 38° C (77° - 100° F)
LG Chem NanoH_2O™ Membrane Model	LG SW 440 GR
Total Number of LG Chem NanoH_2O™ Elements	1,750
Feed Pressure Range	57 bar (825 psi)

USA | Water Treatment for Indirect Potable Reuse, Scottsdale Water Campus

LG Chem NanoH_2O™ BWRO membranes delivered lower system feed pressure to reduce energy consumption and improved permeate quality in one of the largest wastewater reuse plants in the US.

Project Overview

Scottsdale Water Campus commissioned in 1999. Currently it produces 20 MGD of treated water for ground water aquifer injection.

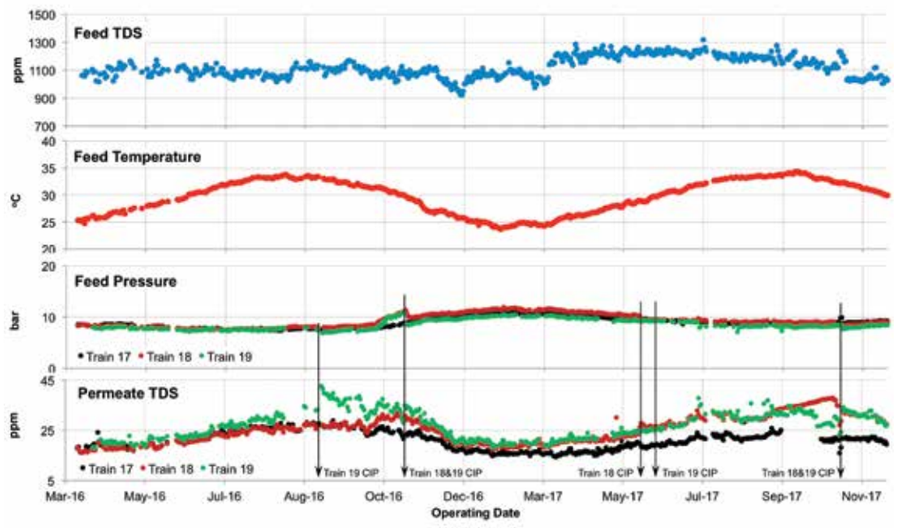


Client	City of Scottsdale, Arizona
Start-Up Date	Phase 1: 2016, Phase 2: 2017
Feed Water	24°- 34°C (Wastewater plant tertiary effluent)
Application	Indirect potable reuse water
Plant Configuration	6 trains, 35 (Phase 1 three trains) and 39 (Phase 2 three trains) pressure vessels per train
Recovery	85%
Project Capacity	19,600 m^3/d (5.2 MGD)
Feed Temperature Range	25°- 32° C (77° - 90° F)
LG Chem NanoH_2O™ Membrane Model	LG BW 400 R
Total Number of LG Chem NanoH_2O™ Elements	1,332
Feed Pressure Range	7.4 – 8.3 bar (106 – 120 psi)

BW Case Study

- Performance at start-up and after 21 months of operation is stable and on target.
- LG Chem BWRO membrane shows high rejection on most ions.
- Permeate quality is well within the three-year target set by the client.
- Stable permeate TOC concentration and well within California's 0.5 mg/L target for Soil Aquifer Transfer (SAT) application.
- LG Chem BWRO membranes perform better than competitors' products previously installed at the client's site.

Operation Data | Phase 1: Train 17, 18, and 19(March 2016 – Present)



BWRO | Selected References in Various Industrial Applications

Semiconductor / Display (Ultra-Pure Water)

Client	LG Group (LG Electronics, LG Chem, LG Display, LG Innotek)
Location	Multiple
Project Capacity	130,000 m^3/d (34.3 MGD) in total
LG Chem NanoH_2O™ Membrane Model	LG BW 400 R, LG BW 440 R, LG BW 400 ES, LG BW 400 AFR

Petrochemical / Refinery

Client	Quimica Apollo / PEMEX Refinery
Location	Minatitlan Veracruz, Mexico
Project Capacity	10,350 m^3/d (2.73 MGD)
Plant Configuration	3 trains, 38 pressure vessels per train
LG Chem NanoH_2O™ Membrane Model	LG BW 400 R

BW Case Study

Petrochemical / Refinery

Client	Indian Oil Corporation Limited (Naphtha Cracker) (IOCL)
Location	Panipat, Haryana - India
Project Capacity	18,000 m^3/d (4.76 MGD)
Plant Configuration	Stage 1: 5 trains, 36 pressure vessels per train Stage 2: 3 trains, 16 pressure vessels per train
LG Chem NanoH_2O™ Membrane Model	LG BW 400 AFR

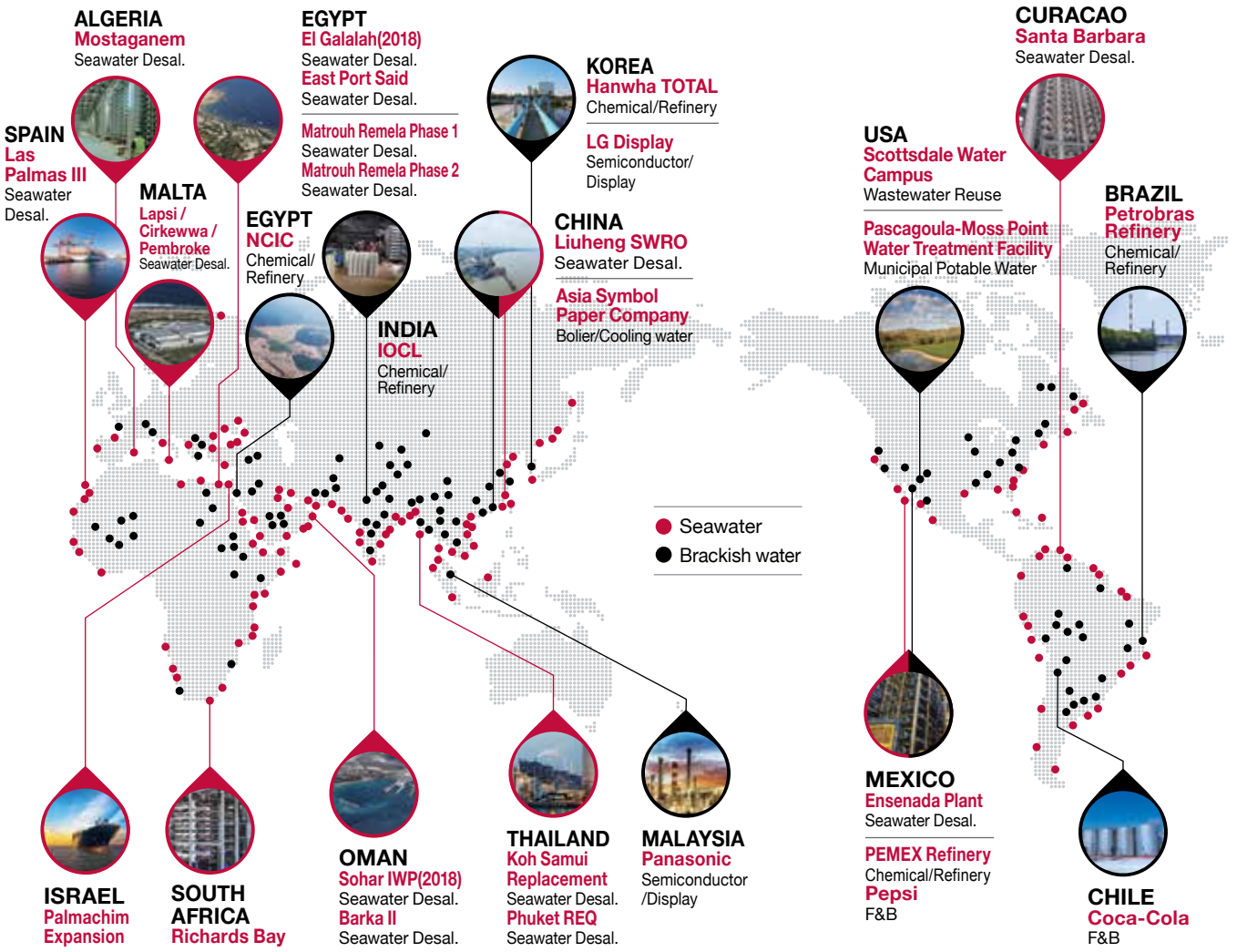
Pulp and Paper

Client	Asia Symbol Paper
Location	Jangmen, Guangdong - China
Project Capacity	30,000 m^3/d (7.9 MGD)
Plant Configuration	5 trains, 48 pressure vessels per train
LG Chem NanoH_2O™ Membrane Model	LG BW 400 R

LG Chem

Proven Track Record
of Performance and Quality

Selected Global References



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