



## MICROELECTRONICS

# Reclaiming Clean Water from Optoelectronic Manufacturing Wastewater

Product type: **Highest Rejection BWRO**  
 RO model: **LG BW 400 R G2**



Application:  
**Industrial Wastewater Reuse**

## Background

Due to recent droughts in Taiwan, the government began enforcing water conservation policies to regulate water-intensive industrial end-users to reuse 70–85% of their wastewater. To comply and remain commercially viable, global optoelectronic company in Taiwan (TFT-LCD panel production) implemented a zero liquid discharge (ZLD) process to maximize water recovery. Using an advanced MBR-RO-EDR\* membrane treatment system, the company has successfully recycled an average of 91% of its process water in recent years.

## System Information

The wastewater influent is a mixture of waste streams collected from various stages of the panel production line. The water quality, as a result, is a complex makeup of contaminants (Table 1) and creates a challenging scenario for treatment. However, once the MBR reduces suspended solid levels, the RO and EDR ensure ultrapure water quality for reuse.

**Table 1: Feed water makeup**

Item	Feed water range
BOD	200–400 mg/L
COD	600–1,000 mg/L
Total Nitrogen	30–50 mg/L
TSS	50–200 mg/L
TDS	750–1,500 mg/L
pH	2–12

**Table 2: System information**

RO feed water	MBR treated effluent
RO system	3 trains with 12:8 system array (4M)
System recovery	75–78%
System capacity	2,880 m <sup>3</sup> /d (760,900 GPD)
Feed temperature	25–30 °C
Feed pressure	7–9 bar (100–130 psi)

\*MBR – Membrane Bioreactor, RO – Reverse Osmosis, EDR – Electrodialysis

Figure 1: Normalized Permeate Flow

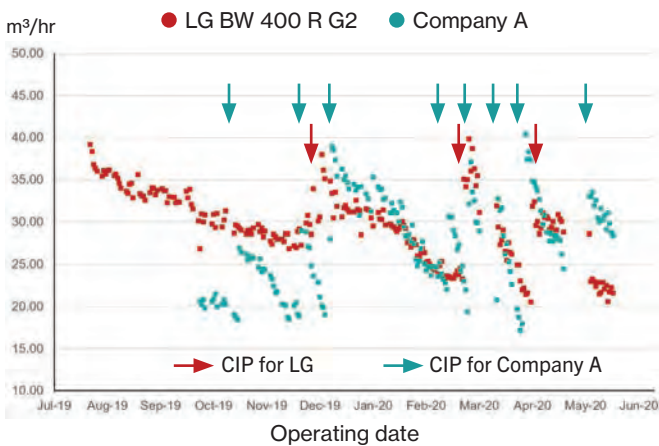
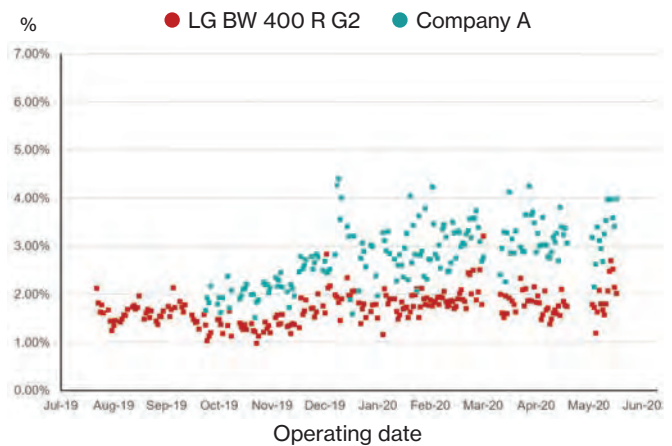


Figure 2: Normalized Salt Passage



LG BW 400 R G2, LG Chem's highest rejection brackish water membrane with the new L feed spacer for reducing differential pressure, was selected as part of the optoelectronic company's technology procurement strategy to deliver long-term stable production of high-quality permeate with minimal fouling, cleaning requirements, and energy consumption. The operating conditions are listed in Table 2.

### Membrane Performance

Compared to the alternative RO (non-TFN membrane) product operated at the plant, NanoH<sub>2</sub>O™ membranes showed better and more reliable normalized permeate flow (Figure 1) and salt passage (Figure 2). Furthermore, NanoH<sub>2</sub>O™ membranes required more than half fewer cleaning frequencies versus the non-TFN membrane, leading to notable savings in labor, chemical use, and plant downtime (Figure 1). Despite the complex ionic species composition of the wastewater, NanoH<sub>2</sub>O™ membranes achieved high-quality permeate requirements for reuse (Table 3).

LG BW 400 R G2 is a robust RO membrane element that helped lower the O&M costs of the wastewater recycling facility and realize the water conservation goals of the optoelectronic company.

Table 3: Water Quality Analysis

Item	Unit	Feed	Permeate	Rejection %
Al	mg/L	0.482	<0.025	>94.0
Mg	mg/L	1.75	0.082	95.3
Ca	mg/L	4.44	0.486	89.1
Na	mg/L	223	3.65	98.4
Cl	mg/L	47.6	0.27	99.4
F	mg/L	23.6	1.01	95.7
NO <sub>3</sub>	mg/L	41.1	1.36	96.7
SO <sub>4</sub>	mg/L	88.5	ND	>99.9
PO <sub>4</sub>	mg/L	415	ND	>99.9
CO <sub>3</sub>	mg CaCO <sub>3</sub> /L	<1.0	<1.0	
HCO <sub>3</sub>	mg CaCO <sub>3</sub> /L	93.0	4.0	95.7
SiO <sub>2</sub>	mg/L	4.63	0.288	93.8
TOC	mg C/L	5.1	<0.5	>90.2

[www.lgwatersolutions.com](http://www.lgwatersolutions.com)

Please visit our website for regional contact information or email us at [waterinfo@lgchem.com](mailto:waterinfo@lgchem.com)



The information contained herein are deemed to be accurate and reliable and are offered in good faith, but without guarantee of performance. LG Chem assumes no liability for results obtained or damages incurred through the application of the information contained herein. Customer is responsible for determining whether the products and information presented are appropriate for the customer's use and for ensuring that customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Specifications subject to change without notice. NanoH<sub>2</sub>O is the Trademark of LG Chem. All rights reserved. © LG Chem, Ltd.

