



RO Membranes'  
Protection



Power



Pinghu, China

# RO Membranes' Protection at Pinghu Power Plant, China

## Overview

A power plant in Pinghu, Zhejiang Province in China needed to replace the use of chemical biocides and protect boiler feed make-up water from anaerobic and aerobic bacterial growth and associated biofouling.

The Pinghu plant uses a multiple barrier treatment approach consisting of clarification, mechanical filtration, activated carbon filtration, micron filters, and reverse osmosis (RO) filtration to treat incoming source water from the Jiaxing Tang River with UV transmittance values of 80%. The plant injects NaOCl (sodium hypochlorite) before the clarifier and is used to inject biocide before the guard filter to protect the RO from biofouling.

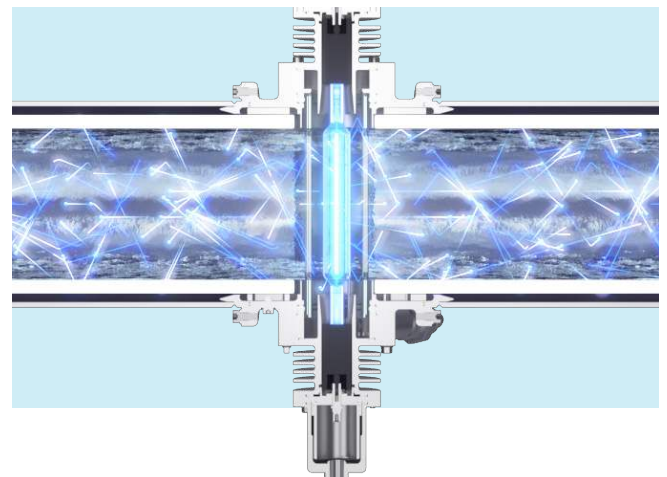
provides superior power (kW) efficiency compared to traditional UV, and achieves unprecedented biofouling prevention and micro organism inactivation.

The RO system consists of 4 trains (#A1, #A2, #B1, and #B2) with a capacity of 107.5 m<sup>3</sup>/hr each. The HOD UV RZB Series was installed in between the activated carbon filters and micron filters in advance of the RO trains. Protecting the RO membrane elements from fouling is essential to minimizing the operational impacts of biological contamination on operating costs; which include increased membrane element and microfiltration cartridge replacement costs, decreased water quality production, and increased operating pressure.

## The Solution

Atlantium's HOD™ (Hydro-Optic Disinfection) UV technology was installed in April 2018 to accommodate a flow rate of 430 m<sup>3</sup>/hr. Since then, the facility has achieved non-chemical boiler-feed make-up water disinfection, using this environmentally friendly and sustainable approach.

Atlantium HOD UV systems provide effective RO membrane protection and effectively treat bacteria. This is achieved by combining ultraviolet water disinfection technology with hydraulic and optic principles. The HOD UV system features the unique Total Internal Reflection (TIR) technology that recycles UV light energy, ensures homogenous UV dose distribution,



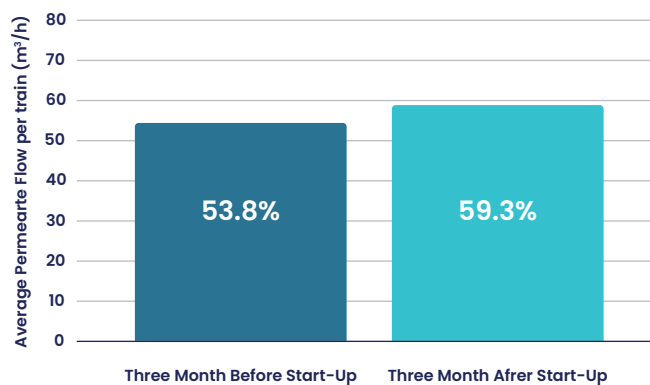
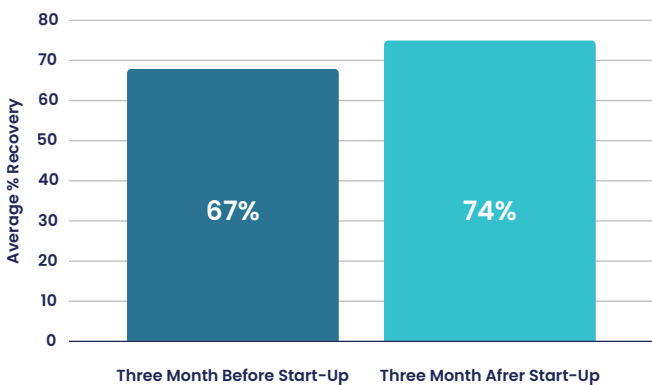
## Results

Following the installation of the HOD UV system in April 2018, an evaluation study was undertaken to compare operating parameters for 3 months before and after the use of the technology. The HOD UV system has made a positive impact on membrane performance compared to the use of chemical biocide treatment. With HOD UV, the permeate recovery went from 67% to 73%, a 7% increase. The pressure drop across the micron filters is still zero. By contrast, with the use of chemical biocides, the cartridges were replaced every 1 to 1.5 months.

**Pinghu Plant Recovery Rate (m<sup>3</sup>/h) and Pressure Drop (Bar) Before and After HOD UV**

			#A1 RO	#A2 RO	#B1 RO	#B2 RO	Average
Permeate	Average	Before HOD UV	51.6	52.0	52.2	59.5	53.8
		After HOD UV	57.7	56.9	59.5	63.2	59.3
	STDV	Before HOD UV	8.1	6.5	8.1	10.4	8.3
		After HOD UV	7.5	5.6	8.5	9.5	7.8
Pressure Drop	Average	Before HOD UV	0.39	0.27	0.38	0.26	0.33
		After HOD UV	0.35	0.23	0.35	0.23	0.29
	STDV	Before HOD UV	0.07	0.05	0.07	0.04	0.06
		After HOD UV	0.04	0.04	0.05	0.04	0.04

**Comparison of Average Recovery Rate and Permeate for 3 months Before/After HOD UV Installation**



Given the improvement the facility has experienced since the installation of the HOD UV technology, the facility can expect increased water production since a 47,520-ton increase was seen in just 3 months. The facility has eliminated the use of biocides (1 ton/month) and cut costs from the reduction of biocide consumption. Additionally, the facility has reduced the frequency of micron filter replacement (cartridge filters were replaced monthly before the HOD UV installation). It has also extended RO membrane life by improving performance and reducing biofouling.



A detailed analysis of the expected ROI at the Pinghu Plant appears below.

**Pinghu Plant Expected ROI After Year 1 of Operation**

Item	Unit Price (USD)	Consumption Before HOD UV	Consumption After HOD UV	ROI (USD)
Biocide	3,427	1.5	0	34,266
Cartridge Replacement	4.5	322	161	4,827
Increased Permeate (ton)	0.5	-	22,348-28,307	78,216-99,076
Decrease Brine (ton)	0.5	-	22,348-28,307	71,514-90,584
RO Membrane (pcs) RO	447	7.7	3.9	11,621
CIP	1,490	0.6	0.3	2,980
<b>Total savings on one train per year</b>				<b>&gt;203,422</b>

USD/RMD exchange rate of 1/6.71206

Incorporating the non-chemical HOD UV technology into full-scale operations at the Pinghu Plant has proven favorable for disinfection efforts at the facility. The operational efficiencies achieved due to eliminating chemical biocides and minimizing micron filter replacement are expected to result in a net savings of 1,365,400 RMB/year (approximately 202,000 USD/year), providing a very short-term return on investment. As power plants look to reduce the transportation, handling, and use of hazardous chemicals, the HOD UV technology provides an environmentally friendly and economical solution for protecting boiler feed make-up water from anaerobic and aerobic bacterial growth and associated biofouling.



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## About us

For more than two decades, Atlantium Technologies has helped to ensure water safety with its innovative HOD™ (Hydro-Optic Disinfection) UV technology and novel approach to performance, monitoring, and control. Atlantium's superior, environmentally friendly water treatment solutions ensure stable, efficient, and dependable production.

With thousands of full-scale installations for leading brands in various industries globally, we're committed to consistently meeting our customers' water quality needs, ensuring pure results.

