

Zero Liquid Discharge (ZLD) Systems



HPD[®] Evaporation and
Crystallization

WATER TECHNOLOGIES

Why Zero Liquid Discharge?

Water scarcity and increasing focus of environmental impact from industrial use place a high degree of importance on recycling and reuse of this valuable resource.

Sustainability initiatives and regulation, coupled with water conservation efforts worldwide, are putting progressively strict limits on aqueous discharge and reuse standards for wastewater treatment.

Management of the entire water cycle for industrial applications drives efficiency and innovation towards zero liquid discharge (ZLD) in nearly every major industrial application.

Technical Expertise

Veolia Water Technologies, utilizing HPD® technology, is the largest provider of custom-engineered evaporation and crystallization systems with more than 1,000 installations worldwide.

This includes an offering of ZLD solutions for a wide range of industries. The solutions are often innovative, first-of-its-kind processes developed specifically to address challenging waste streams, new applications, and an evolving regulatory environment.

Veolia's project capabilities and technical expertise for industrial water reuse applications include:

- Highly integrated process systems
- Use of complementary Veolia technologies
- State-of-the-art, 50,000 sq. ft. Research & Development facility
- Worldwide Design-Build project execution capabilities

Zero Liquid Discharge Systems Experience

Power Generation

- Combined-cycle power plants
- Flue Gas Desulfurization (FGD) purge treatment and IGCC wastewater (CoLD® Process)
- Radwaste systems

Oil & Gas

- Oil & Gas refining effluents
- SAGD (Steam Assisted Gravity Drainage) produced water
- Produced water from shale gas and coal seam gas (CSG) production
- Synfuels processes (CTL, GTL)

Mining & Metals wastewater and process water

Chemical Processing

Landfill Leachate

Other Industrial Wastewaters

Fully Integrated Systems for a Variety of Effluent Streams

Each effluent stream presents its own unique challenge when designing an entire water treatment system to efficiently and effectively minimize waste or eliminate the discharge of wastewater. HPD® Evaporation and Crystallization systems are designed for a variety of configurations and capacities suitable to match the requirements of each specific ZLD project.

Complementary technologies such as filtration, softening, RO (reverse osmosis), drying systems, and clarification are often integrated upstream or downstream of the evaporation equipment that provides a total ZLD system solution capable of treating:

- Cooling tower blowdown
- RO Reject (industrial and drinking water)
- Scrubber blowdown
- Produced water
- IGCC gray water
- Landfill leachate
- Boiler blowdown
- Flue gas desulfurization (FGD) purge
- Demineralization waste
- Oil refinery effluent
- Radwaste



Shell Pearl GTL Ras Laffan Industrial City, Qatar

The Pearl project is the world's largest Gas-to-Liquid (GTL) facility with outputs of GTL products, condensate, liquefied petroleum gas and ethane.

Veolia was selected to provide an environmentally sound water treatment complex to treat the effluents with the highest efficiency of water reuse within the plant with no aqueous discharge.

HPD Evaporation and Crystallization technologies are the heart of the design for the world's largest zero liquid discharge system. Waste volumes from the overall process are minimized and the residual effluent stream produces solid residue.

The plant will rely on the water recovered from this system as a major portion of the overall makeup demand.

West Phoenix 5 Power Plant Phoenix, AZ USA

Located in southwest Phoenix, this natural gas-fired, combined-cycle power plant generates nearly 1,000 megawatts of electricity for the Southwestern United States.

Veolia supplied an HPD-ZLD system designed to treat the plant's effluents and produce high-quality condensate for boiler feed water.

A single, 500 gpm falling film evaporator recycles a majority of the water back into the process. This is followed by a 15 gpm brine crystallizer that concentrates the effluent solids to dry cake for landfill disposal.

Bayswater Power Station New South Wales, AUS

Bayswater Power Station, a 4 x 660 MW generation facility, is a vital producer of electricity for the people of New South Wales and is located 250 km north of Sydney. Veolia Water Technologies was awarded the project for an overall plant upgrade of the entire water plant including optimization of the existing ZLD system.

As part of this project, Veolia provided much needed process and equipment modifications to the brine concentration system to increase salt removal and treatment capacity. An additional falling film evaporator was integrated into the system to control operating conditions with a resulting improvement in power consumption, increased process efficiency, and extension of current equipment life.

A brine crystallizer was also incorporated into the process to remove more water from the waste stream to reduce the overall volume directed to the existing on-site brine decant basin.

Resourcing the world

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