POWER INDUSTRY

TECHNOLOGY DATA SHEET

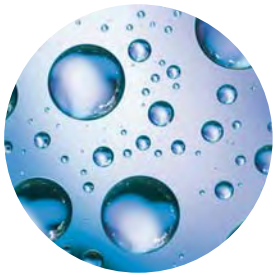
The CoLD™ Process

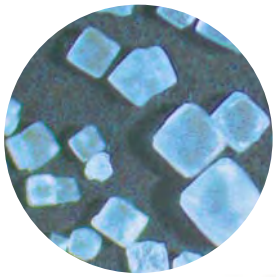
ZLD Wastewater Treatment for Coal-fired Generation

Innovative Process Solutions

Veolia Water Solutions & Technologies is the global leader for innovative process solutions which use HPD evaporation and crystallization as core technologies.

With more than 800 installations in more than 30 countries, Veolia has decades of process design experience in the power generation industry, providing wastewater treatment, volume reduction, and zero liquid discharge systems to fossil fuel and nuclear powered plants.





Process Background

Flue Gas Desulfurization (FGD) and Integrated Gasification Combined Cycle (IGCC) processes produce large volumes of saline wastewater containing toxic and hazardous constituents. Physical, chemical, and biological treatment methods can reduce the concentrations of these pollutants, but the volume and salinity of the wastewater is unchanged. Evaporation and crystallization, a proven method of treating these wastewaters, have been used for over forty years in the power industry to achieve zero liquid discharge (ZLD).

Veolia Water Solutions & Technologies has applied proven process designs based on HPD® evaporation technology for industrial crystallization and successfully utilized in the salt, fertilizer, and chemical industries to develop a simple and robust process to separate the wastewater from coal-fired power plants into clean water and a stable, non-hazardous solid for disposal and/or re-use.

The **CoLD™ Process** is a simple and economical approach to ZLD. It requires no chemical treatment of the wastewater and generates no additional sludge for disposal. The CoLD™ Process is an ideal solution to address stricter water reuse standards, mandated ZLD, and increasing regulation of discharge limits of total dissolved solids (TDS) facing the power industry.

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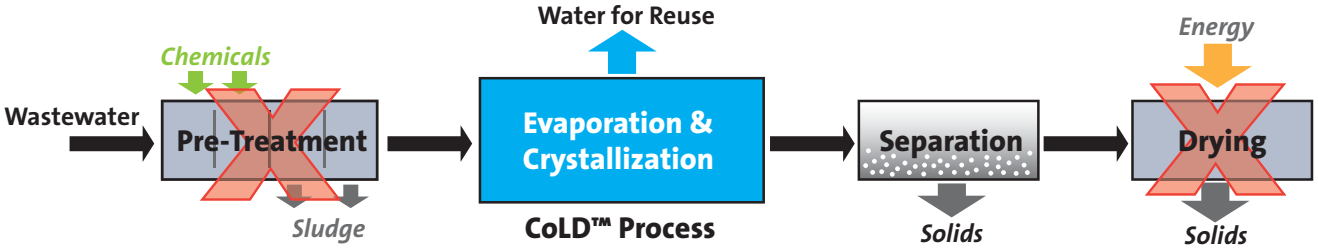
Coal-fired Wastewater Chemistry

Wet Limestone FGD Purge

Wastewater from wet limestone scrubbing contains toxins and hazardous constituents such as metals, mercury, and selenium. It is composed mainly of chloride salts of calcium and magnesium, and is saturated in calcium sulfate.

IGCC Process Wastewater

IGCC wastewater is comprised of toxic and corrosive components such as chlorides, ammonia, organic acids, cyanides, sulfides, and heavy metals including mercury and selenium.



Limitations of Conventional Methods

Conventional thermal processes for FGD and IGCC waste streams require clarification and extensive pre-treatment of the wastewater with lime, soda ash, caustic, and other chemicals to replace the calcium, magnesium, and ammonium ions in the wastewater with sodium ions in order to produce a crystalline solid to achieve ZLD.

In some cases, a final drying step is necessary to produce a stable solid suitable for disposal. Pre-treatment equipment includes chemical feed/storage facilities, solids settling or filtration equipment, and sludge dewatering equipment.

These additional facilities increase the footprint of the ZLD system as well as the capital costs and overall maintenance. The logistics of unloading, storing, and preparing chemicals and dewatering and transporting sludge for disposal substantially increase the OPEX.

The **CoLD™ Process** however, is operated at low temperature. The chemistries of FGD and IGCC wastewaters favor the formation of many hydrates and double salts which precipitate at low concentrations as the temperature of the solution is lowered. When concentrating the waste stream at low temperature, dissolved solids will crystallize at relatively low concentration, without the need for chemical pretreatment and resulting sludge production.

Benefits of the CoLD Process

- > Achieves Zero Liquid Discharge (ZLD) on difficult coal-fired wastewaters
- > Lowest CAPEX and OPEX
- > No chemical pre-treatment or sludge production
- > Produces clean water for reuse and stable solids for disposal
- > Simple, robust process with high reliability and availability
- > Operating experience in other industries

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