

ENEL Power, Italy – Torrealvaldliga Project – ZLD Plant for FGD Wastewater Treatment

The Facility

The Torrealvaldliga Nord Power Plant is being converted (torn down and rebuilt) to three coal-fired units each of 660 Mwe capacity. The plant is equipped with fabric filters for flue gas dust removal, DeNOx system (for flue gas denitrification), FGD systems for sulphur oxides removal. The FGD system is equipped with a common wet limestone milling, three limestone-gypsum forced oxidation absorbers and a common gypsum dewatering system of three hydro cyclone-vacuum belt filter configuration.

The Problem

Wastewaters from FGD treatment plants can no longer be discharged into the sea due to tough Italian and EU environmental regulations. In order to overcome this major environmental problem, ENEL decided to install the Zero Liquid Discharge (ZLD) plant so that no industrial wastewater discharges are allowed by the entire power plant.

The Solution

To overcome the problem, ENEL selected the Softening – Evaporation – Crystallization (SEC) process to treat the wastewaters and reuse/conserves fresh waters. Aquatech supplied, installed, commissioned the ZLD plant as an EPC contractor with local associates.

The SEC plant comprises of 1 x 100% Softener Clarifier for removal of suspended solids, temporary hardness, and precipitation of metal hydroxides. This is followed by 1 x 100% Softener Clarifier (calcium reduction by soda ash dosing) for removal of permanent hardness, 2 x 50% Falling Film type Brine Concentrators (each equipped with two Vapor Compressors operating in series), 2 x 50% Crystallizer (equipped with Thermocompressors) and 2 x 50% Belt Filter Presses. The plant also includes several chemical dosing systems, storage tanks, pumping systems, electrical works (MCC, cable trays, cabling etc), controls & Instrumentation.

The ZLD plant is a fully integrated automated system. The Brine Concentrators operate in seeded slurry mode. Each Brine Concentrator is equipped with external mist eliminator for ease in maintenance. The Crystallizer operates in forced circulation method.

The industrial grade soft water and high purity distillate produced in the system will be used in the main power plant.



PROJECT PROFILE SERIES # 55

DESIGN FGD WASTEWATER ANALYSIS

Design Flow50 m³/hr (PT Plant)
Calcium.....12000 ppm
Magnesium.....2350 ppm
Sodium + Potassium.....Balance
TSS.....80 ppm
pH.....3 to 6
Bicarbonate.....600 ppm
Phosphates.....25 ppm
Chlorides.....30000 ppm
Nitrates.....300 ppm

Sulfate.....17700 ppm
SiO₂.....20 ppm
Boron.....500 ppm
Ammonia.....75 ppm
Iron
Aluminum.....10 ppm
Vanadium.....10 ppm
Arsenic.....10 ppm
Manganese.....10 ppm

PROCESS FLOW DIAGRAM

