

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

### The Facility

The Brindisi Sud Power Plant is equipped with four coal-fired units each of 660 Mwe capacities. These units normally fire imported coal with < 1% Sulphur. The flue gases are treated sequentially by SCR-DeNOx with ammonia as reagent, High efficiency ESP to remove fly ash and wet limestone gypsum forced oxidation DeSOx. Each unit is equipped with a 2 x 50% DeSOx lines each with a prescrubber for final dedusting and gas saturation and an absorber. The blow down from both prescrubber and absorber along with other wastewaters are sent to a wastewater treatment plant. In the first stage lime and sodium sulfide are added to remove metals. In the second stage ferric chloride is added to remove suspended solids and in third stage hydrogen peroxide is added to remove oxidizing agents. The prescrubbers are fed with seawater and at the WWTP; the brine was treated and discharged into the Adriatic Sea.

### The Problem

Wastewaters from the FGD treatment plant 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 feed the prescrubbers with fresh and recirculated waters and install the Zero Liquid Discharge (ZLD) plant. This is 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, and commissioned the ZLD plant as an EPC contractor with local associates.

The SEC plant comprises of 2 x 50% Softener Clarifiers (calcium reduction by soda ash dosing), 2 x 50% Falling Film type Brine Concentrators (each equipped with two Vapor Compressors operating in series), 1 x 100% 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), and controls & instrumentation.



The Zero Liquid Discharge (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 a 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 # 51

## DESIGN FGD WASTEWATER ANALYSIS

Design Flow ..... 140 m<sup>3</sup>/hr (PT Plant)

Calcium.....4200 ppm

Magnesium.....200 to 250 ppm

Potassium.....Balance

Sodium.....1757 ppm

TSS.....80 ppm

pH.....9.5 to 10

Bicarbonate.....80 ppm

Phosphates.....25 ppm

Chlorides.....22800 ppm

Nitrates.....300 ppm

Sulfate.....1700 ppm

SiO<sub>2</sub>.....10 ppm

## PROCESS FLOW DIAGRAM

