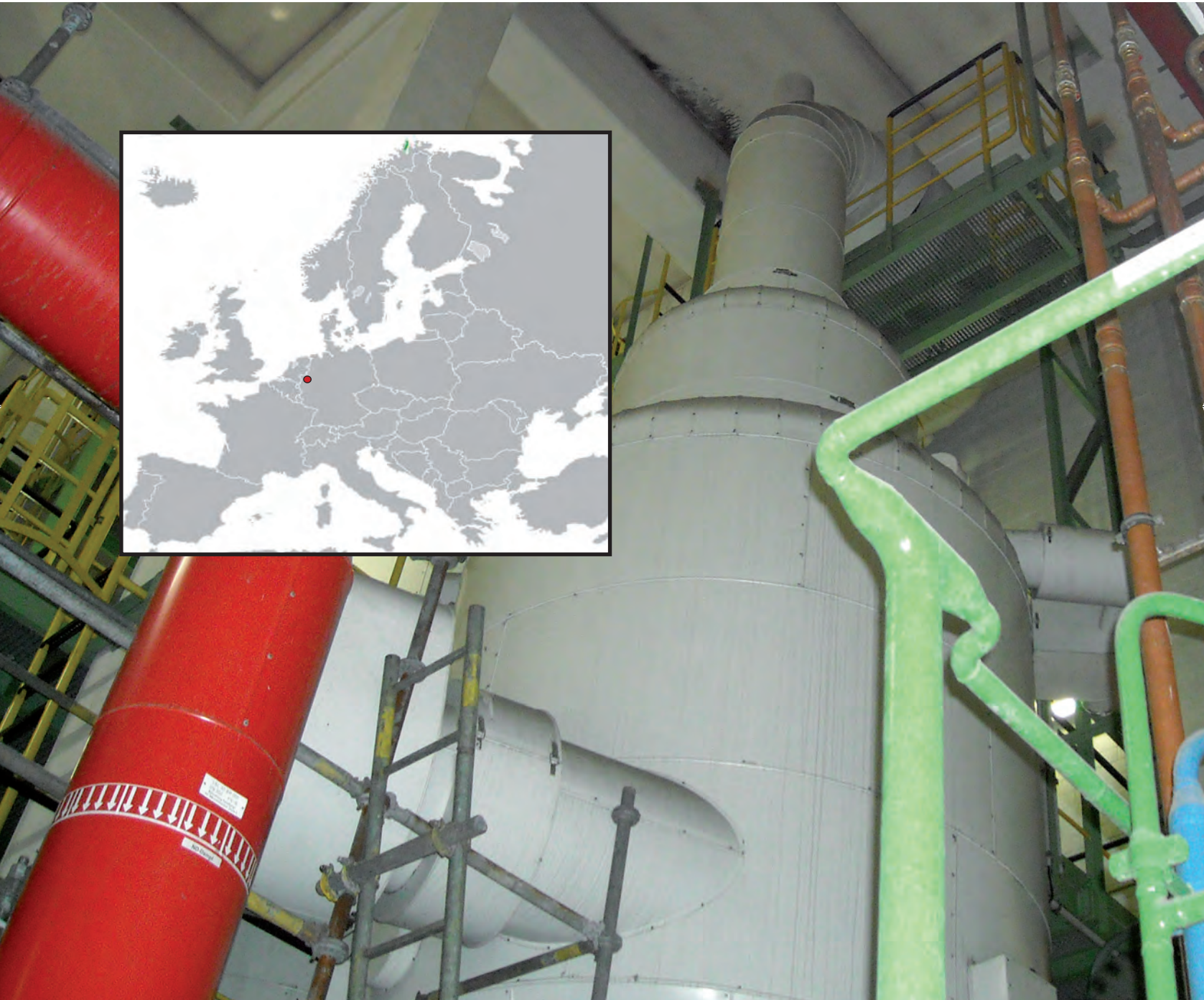
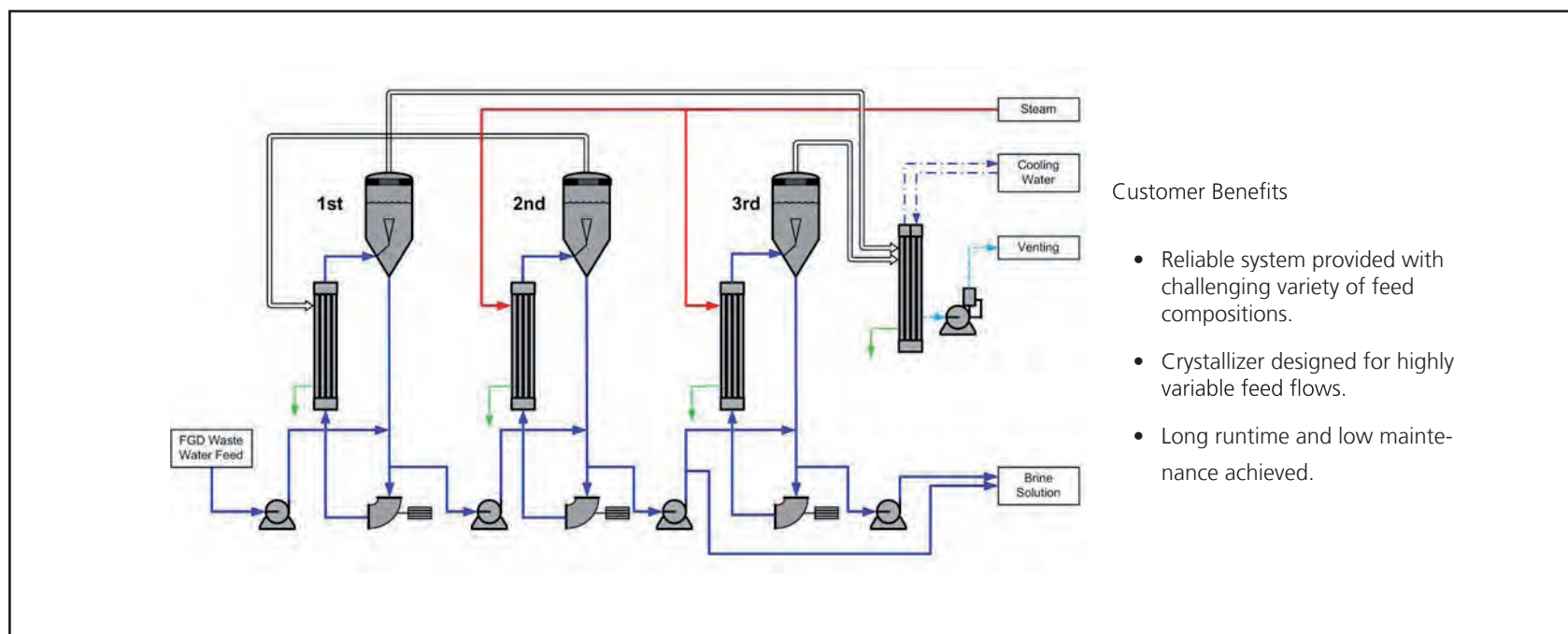


Zero Liquid Discharge System
Flue Gas Scrubber Wastewater Treatment System
GMVA Oberhausen, Germany
Reliable, Proven Technology, Experienced





Customer Benefits

- Reliable system provided with challenging variety of feed compositions.
- Crystallizer designed for highly variable feed flows.
- Long runtime and low maintenance achieved.

Background

In 1998, GMVA Oberhausen constructed a second 25 MW municipal solid waste-to-energy power plant near to Duisburg, Germany. In support of this project, GEA Messo PT provided their Zero Liquid Discharge System for FGD which dated from its first installation in 1982. The ZLD system generates a brine solution that is utilized for the mandatory stabilization of underground salt mines in Germany.

GEA's Solution (see Block Diagram)

GEA's solution for the 67 gpm (15.3 m³/hr) SO₂ (FGD) scrubber blow down (wastewater) was a 2-effect Forced Circulation (FC) Crystallizer System. A third Crystallizer (stand-by) was installed as a back-up for boiling point elevations, which couldn't be handled by the 2-effect system. This was necessary since during the design phase the feed composition was difficult to be defined by the customer. GEA's installed design proved to be reliable without needing to use the third Crystallizer in the process. The FC Crystallizer System is utilized to evaporate and concentrate the incoming wastewater. The blow down has the following primary characteristics:

- Total Dissolved Salts (TDS) 10 – 12 % (CaCl₂, CaSO₄, NaCl); Temperature 86°F

The blow down enters an Equalization/Forward Feed Tank from which it is pumped into the recirculation line of the 1st-effect FC Crystallizer, where evaporation of water occurs. Steam is fed to a tube and the shell heat exchanger to increase the temperature of the re-circulated concentrated blow down. By leaving the central funnel in the crystallizer head, the blow down starts to adiabatically flash/evaporate. This evaporation causes a blow down solution to become supersaturated with dissolved salts, thus causing the crystallization of the salts to occur in the crystallizer vessel. The evolved vapors are condensed in a water cooled shell and tube condenser. The concentrated blow down (a 40% CaCl₂ solution) is collected in a waste storage tank for the mandatory disposal off-site.

Operating Parameters

- Steam Consumption - 8.3 tons/hour
- Concentrate Waste - 2.6 gpm - 35% Salt Solution

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