Combined Heat & Power Plant

Power | Case Study

The Client

Our client is the owner and operator of a combined heat and power (CHP) plant at the Port of Liverpool, generating 30 MWe and 55 MWth for third parties at the port. The facility can produce up to 55 tonnes of steam per hour, and energy generated in excess to customer demands is fed back to the grid.

Key Benefits

Benefits to the new system

- Compact, pre-assembled containerised solution
- Minimal on-site commissioning and testing

Benefits to the existing demineralising system

- Reduced frequency of regeneration and use of regeneration chemicals
- Less chemical-containing wastewater effluent
- Operational cost savings

The Client's Needs

The client's existing ion exchange plant provides high purity water as a boiler feed for the CHP plant. Historically, the water feed to the ion exchange plant had an average conductivity of 300 µS/cm, and consequently the plant required daily regeneration. This involved significant chemical consumption and generated large volumes of chemical-containing wastewater, which needed treatment prior to discharging to the drain.

To reduce the frequency of regeneration and operating costs, the client decided to pre-treat the feed water using reverse osmosis (RO) technology.

The Solution

The project team drew on Veolia's extensive experience in this field and recommended a pre-assembled, containerised plantroom. This solution uses two 20 m^3/hr RO units operating in parallel to provide a peak flow of 40 m^3/hr feed water, with a conductivity of ≤20 µS/cm, for the existing ion exchange system.

Anti-scalant dosing was included as a low cost, space saving alternative to base exchange softeners, with sodium bisulphite dosing to eliminate residual free chlorine in the mains feed water, and a five-micron cartridge filter to remove particulate matter, maximising the RO membrane lifetime and system efficiency.

Results

The installation of an RO plant improved the quality of the feed water to the ion exchange system, increasing its run length from daily to monthly as a result of reduced feed conductivity. The number of regenerations was significantly reduced, from 365 to 12 per year, with a corresponding decrease in chemical usage. This, in turn, led to a reduction in the production and treatment of wastewater containing regeneration chemicals, with further associated cost savings. The resulting improvement in operational running costs led to a relatively short payback period and a clearly demonstrated return on investment.

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