Developing An Innovative Water Solution For A New Power Station

Challenge

GE Water & Process Technologies presented a pioneering concept for power station construction and operation in the UK, to the developers of a new 850MW Combined Cycle Gas Turbine (CCGT) power station. The concept was to build the power station without its own water treatment plant and to instead outsource this resource.

This innovative step allows a reduction in investment required to build and operate the plant. GE was able to progress the concept with the station owners, the Engineer, Procure and Construct (EPC) contractor and the investment banks to ensure confidence in the initiative and for a successful outcome.

Outsourcing provides the power station with the opportunity to purchase and use all the ultra pure water it needs without incurring the expense of owning, operating and maintaining the hardware to produce the water. Based on an economic solution of the plant life cycle, rather than outright purchase, GE is able to provide a long-term commitment to retain ownership and operation of the plant. This offers the customer a complete hands-off approach and the security of supply of demineralised (DI) water at the assured specification.

Solution

A combination of mobile wheel-based and containerised modular equipment is used to build and operate the permanent water treatment plant. The plant is designed for maximum reliability and the flexibility to overcome any feed flow or quality changes. The plant is fitted with an automated system to regulate the production of water.

Product Flow Rate	22.5m³/hr (6000 gpm)
Inlet TDS	500 µS/cm
Outlet TDS	0.1 µS/cm
Outlet Na	<10 ppb

The site is fed with local towns-water from the customer water in-take storage tank. This is treated with Granular Activated Carbon (GAC) for de-chlorination and polishing filtration. Following this, the ion exchange softening resin removes 'hard' cations from the water, to prevent scaling of downstream equipment. The softened water is fed to a double-pass Reverse Osmosis (RO) unit containing double-pass Gas Transfer Membrane (GTM) system to remove carbon dioxide.

After the pre-treatment the water passes through a GE MobileFlow* DI trailer for ion exchange polishing, to meet the required specification. The system is designed to produce up to 22m³/hr (6000 gpm) continually from the MobileFlow DI into the customer DI storage tank.

Regular visits are made by a GE Field Service Representative (FSR) to ensure the plant is operating efficiently and within the design parameters.

The plant is designed to accommodate potential needs for increases in flow rates, increase in quality requirements or other such changes. By-passing the RO system would allow water production to continue even in the event of a power failure with the plant able to increase production to 75m³/hr (20,000 gpm), if required.

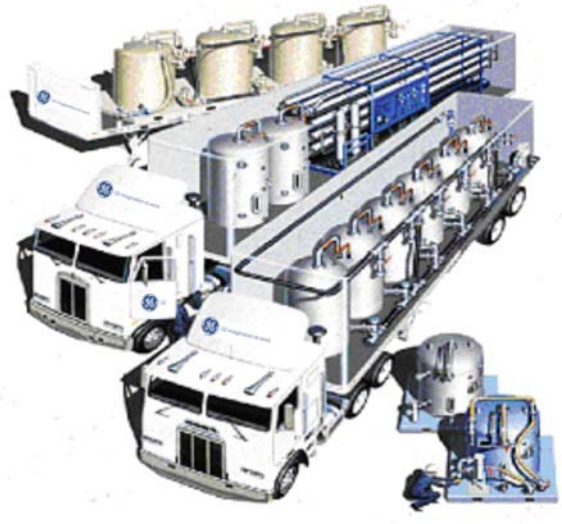
Find a contact near you by visiting www.ge.com/water and clicking on "Contact Us".

Mobile back-up trailers are available to assist in the event of an emergency at the power station. With a small footprint, the trailers can come and go easily without causing disruption. Additionally, with the ion exchange resin being regenerated off site, this means no hazardous chemicals are required and thus extra environmental permits are unnecessary.

Results

GE also provided wheel-based, trailer mounted equipment during the commissioning phase to supplement the water treatment plant. During this phase a larger quantity of water is required than is needed for normal use. The trailers contain ion-exchange resin to purify the water. Once exhausted the trailer is replaced by another and the exhausted resin is taken off site for regeneration.

GE in-house specially trained and university graduated FSR's commissioned the site. Over a period of almost four months, the trailers provided a quantity of water equivalent to that produced by almost five, continually operating, water treatment plants sized to meet the daily needs of the power station.



Mobile Water Treatment System Process Flow