

# Developing Innovative Water Solution for a Power Station



Figure 1: Power Station

## Challenge

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

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

## Solution

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 hands-off approach and the

security of supply of demineralized (DI) water at the assured specification.

A combination of mobile wheel-based and containerized 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. Regular visits are made by a GE Field Service Representative (FSR) to ensure the plant is operating efficiently and within the design parameters.

## Results

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 polyamide membranes before being passed through a double-pass Gas Transfer Membrane (GTM) system to remove carbon dioxide.

Table 1: Power Station Specifications

Product Flow Rate	99 gpm (22.5 m <sup>3</sup> /hr)
Inlet TDS	500 µS/cm
Outlet TDS	0.1 µS/cm
Outlet Na	<10 ppb

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 97 gpm (22 m<sup>3</sup>/hr) continually from the MobileFlow DI into the customer DI storage tank.



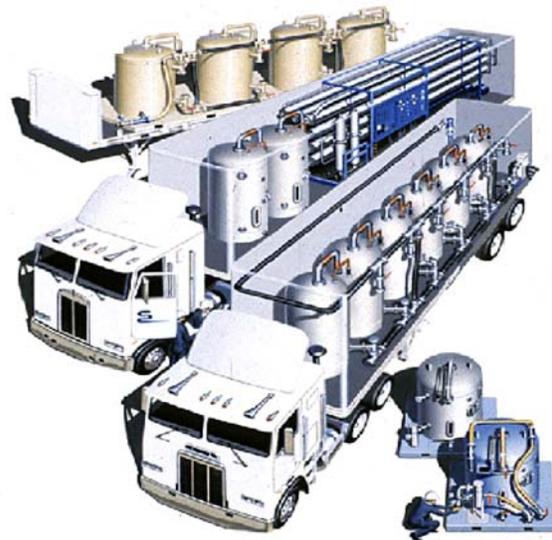
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## Design benefit

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 330 gpm (75 m<sup>3</sup>/h), if required.

Mobile back-up trailers are available to assist in the event of an emergency at the power plant. 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.

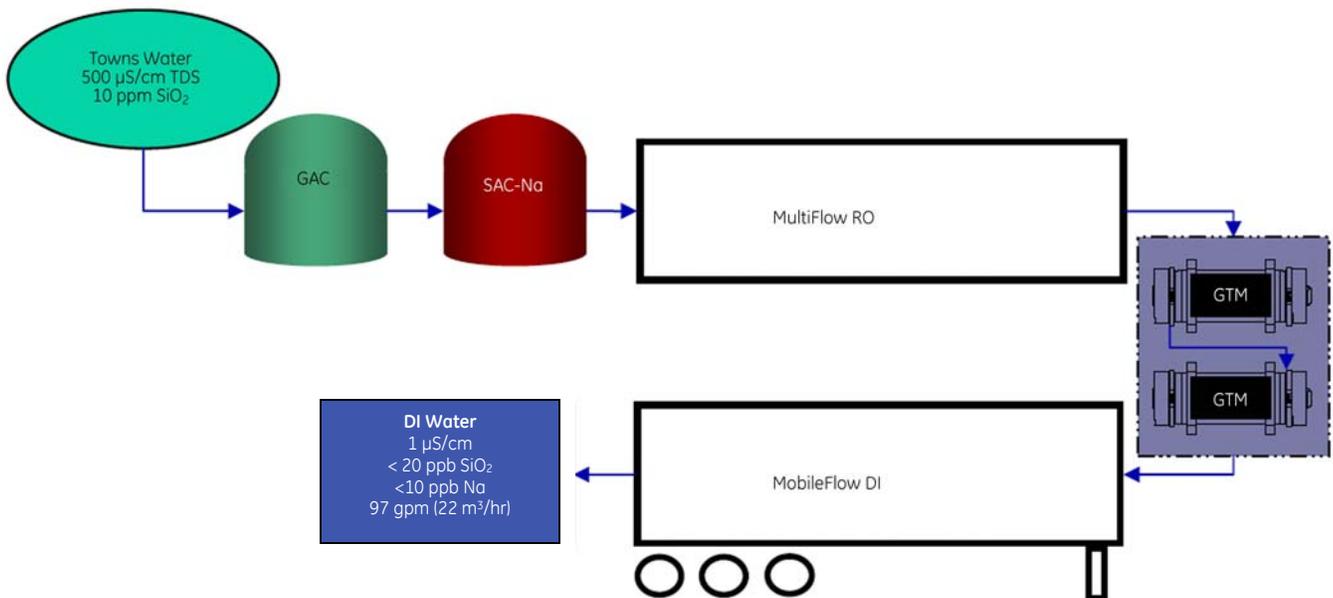
GE also provided wheel based, trailer mounted equipment during the commissioning phase to supplement the water treatment plant. During this phase a larger quantity of water is required than is needed for normal use. The trailers contain ion exchange resin to purify the water. Once exhausted the trailer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



**Figure 2: The GE Solution**

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.

GE also provides short term and emergency water treatment solutions worldwide. Depending on the nature of the project and need, a solution can be developed and on site within hours of the service being requested.



**Figure 3: GE Patented Mobile Systems**