CASE HISTORY

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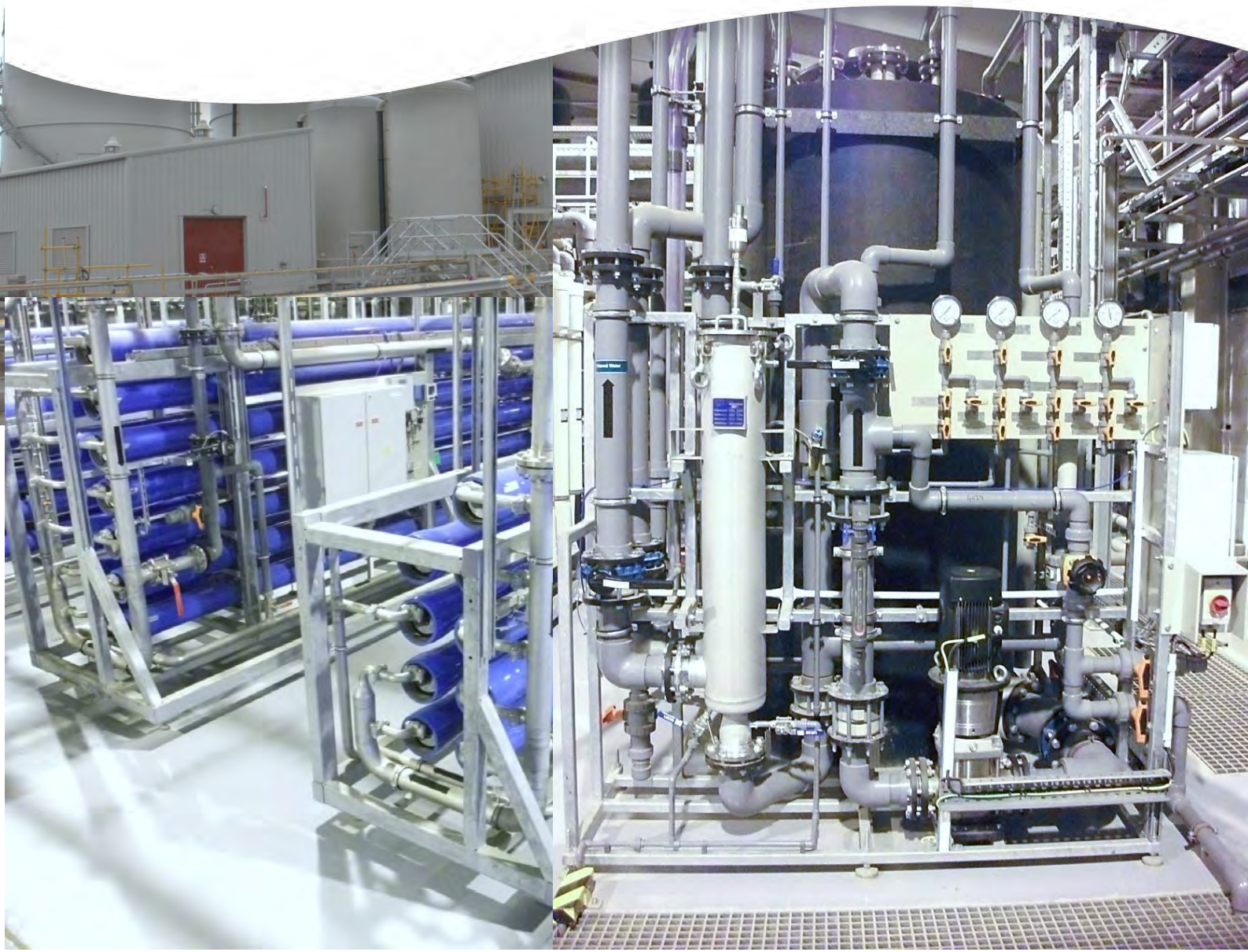
Deionised Water

For a Power Plant in Great Britain



The recently built power station at Pembroke in South Wales is, at 2,160MW, the largest combined cycle gas turbine (CCGT) power plant in the UK. It was recently built for RWE npower by Alstom Power Systems. Hager + Elsässer was contracted by Alstom to supply the process water system to feed the gas turbines.

H+ E designed and supplied the water treatment system for Pembroke CCGT. Since the supply of pure water is fundamentally important to the production of high quality steam to drive the gas turbines efficiently, the design and ability of the plant to perform efficiently in the long term is also of great importance.
The water treatment system therefore includes a number of treatment stages, each of which contributes to an ever improving water quality until the required purified water, in this case 10.0MΩ (0.10µS) is obtained.

These treatment stages include:

1. Pre-filtration
2. Sulphuric acid dosing
3. PAC dosing
4. Ultrafiltration
5. Sodium hypochlorite dosing
6. Anti-scale/bisulphite dosing
7. Primary RO system (stage 1)
8. Sodium hydroxide inter-stage dosing
9. Secondary RO system (stage 2)
10. Regenerable mixed bed polishers)
11. Wastewater Neutralisation system

Firstly, particles are removed from the feed water via a coarse pre-filter. The water is then conditioned by dosing with sulphuric acid (H_2SO_4) to reduce the pH, enabling the following polyaluminium chloride (PAC) dose to efficiently flocculate/coagulate dissolved organic matter and colloidal particles. Ultrafiltration with a nominal pore size of 0.02µm is then used to remove particles and is periodically backwashed with sodium hypochlorite (NaOCl) to maintain membrane performance.

This semi-treated water is collected in an intermediate storage tank (also providing water for fire-fighting if ever necessary) before being re-pumped and further conditioned with sodium hypochlorite to remove free chlorine and anti-scalant to inhibit scale formation. The water is then fed to a primary (1st stage) reverse osmosis unit with sodium hydroxide inter-stage dosing followed by a secondary (2nd stage) reverse osmosis step.
The fully treated water is stored in a separate tank to ensure that large volumes are immediately available if required.

Ultrafiltration modules

Stage1 and 2 Reverse Osmosis Units

The product water from the twin-pass reverse osmosis system is then finally treated in two regenerable mixed bed deionisation polishers before flowing to a Deionised Water Storage tank designed to enable high flow rate and volume supplies at times of critical need.

The plant has been designed as a two-stream system, each delivering 60m³/hour of treated water and a final purified water quality in excess of 10.0MΩ (0.10µS) on a continuous 24/7 basis. In normal operation, the streams are used in duty / standby mode. However, in periods of high demand, they can be used in parallel.

Since the system was originally commissioned, we have provided continuous on-site technical and engineering support as well as training for the end-user's staff.

This mass balance diagram represents a typical H+E design approach for this type of water treatment plant. Great emphasis is placed on ensuring maximum overall plant efficiency.

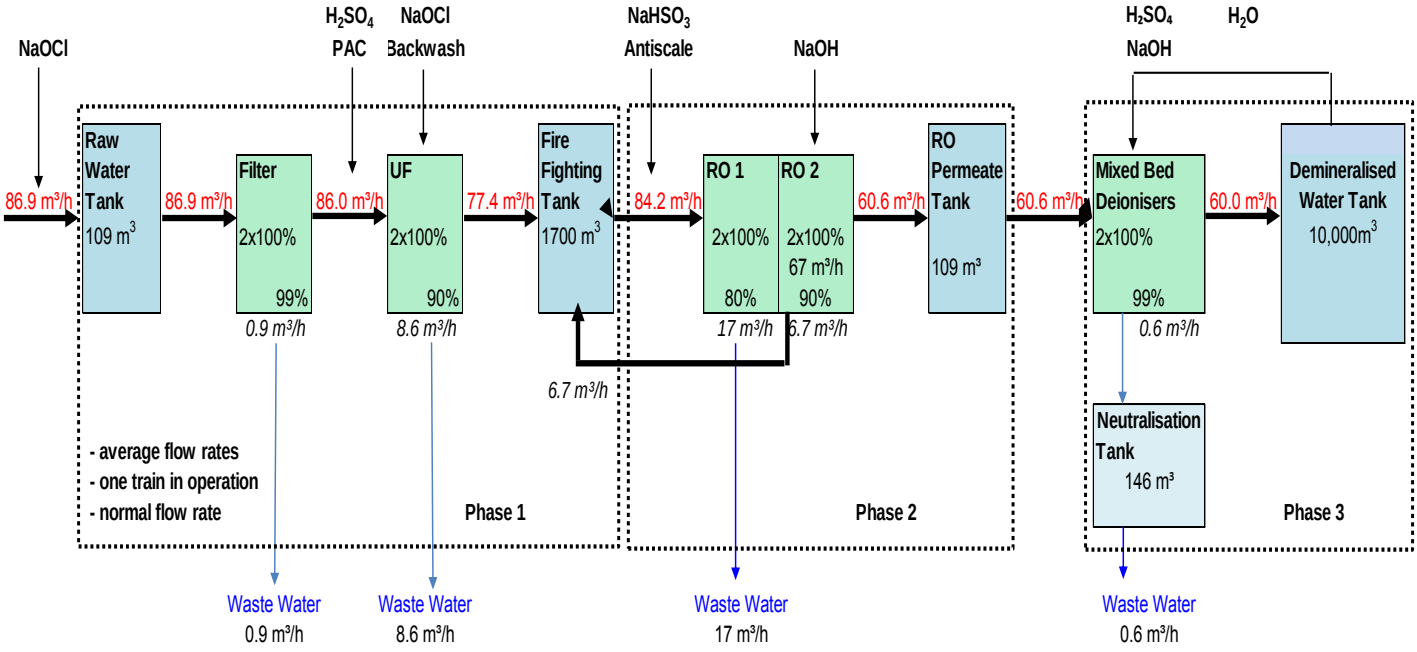
Clearly the most important aspect is that the plant delivers the required flow rate and treated water quality at all times. However, overall long term cost of ownership and the environmental impact are also increasingly important considerations.

Our Research and Development Department and Process Engineers are constantly striving to develop the wide range of technologies we use to be ever more efficient.

H + E's culture is to always offer process and maintenance support and spare parts to our clients throughout the life of the plant to ensure its efficient operation.

Over 75 years of experience shows that the end-user gains by maximising plant life and minimising long term cost of ownership. H+E benefits by ensuring that plants we build continue to operate properly, and our reputation as a supplier of reliable, high quality systems is maintained.

Overall Mass Balance for the Pembroke Plant



H+E ranks among the world's leading suppliers in the fields of: water & wastewater treatment, and energy efficiency. Based on its global presence, the **H+E GROUP** has completed projects in over 50 countries.

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