CASE STUDY

ENVIROGEN'S WATER TREATMENT SOLUTION TO PROTECT NEW ENERGY-FROM-WASTE POWER STATION

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In 2019, a leading engineering consultancy company won a contract to build and operate an energy-from-waste (EfW) plant on behalf of a major UK energy firm. The 18-megawatt (MWe) plant will process 169,000 units of refuse-derived fuel (RDF) each year to supply the UK's National Grid while having the capability to send heating and hot water to nearby residential and commercial properties. To protect the steam generator, a continuous supply of purified water will be needed.

HIGH-PURITY WATER PROTECTS STEAM GENERATION

At the heart of this EfW plant, will be an 18MWe turbine that will be driven by steam created from burning refuse otherwise destined for landfill and converting it to a low-carbon source of electricity. Steam turbines are expensive and sensitive technology, highly susceptible to corrosion and scale build-up. This means that the incoming mains water quality poses a considerable risk with scale-forming ions and suspended solids, such as silica, depositing on the turbine blades and within pipework and vessels. Just a few millimetres of scale can unbalance a turbine blade, leading to costly repairs or replacement.

ALL-IN-ONE, MULTI-TECHNOLOGY, RO-EDI SOLUTION – TAILORED TO MEET EXACT REQUIREMENTS

The single steam turbine will require three steam-generating streams with a total ultra-pure water requirement of up to 11m³/hr in duty and assist mode. Key to the successful design was the offering of a proven, modular water treatment solution: Eco MultiPro.

Eco MultiPro RO-EDI
Augmented reality immersive product visualisation: Scan this code to open the 3D model on your device.

THE SOLUTION INCLUDES:

- **A primary water treatment system** – including granular activated carbon filters and duplex water softeners to remove free chlorine and reduce total organic load.
- **A duplex RO-EDI Eco MultiPro solution**, including:
    - The latest reverse osmosis (RO) membrane technology to remove 96-99% of dissolved ions and 99.9% of all organic compounds and suspended solids.
    - Gas transfer membranes to remove carbon dioxide, reducing the ionic load on downstream systems.
    - Continuous electrodeionisation (EDI) system to remove dissolved ions that might cause corrosion or scale build-up in the boiler, pipework or steam generator.
- **Polishing mixed-bed, ion exchange vessels** – to provide the final barrier against silica or sodium breakthrough.

The final water stream will have a conductivity of less than 0.1 micro siemens (µS) and contain less than 20 parts per billion (ppb) silica and less than 10ppb sodium.

KEY OUTCOMES:

A complete water treatment plant design based on tried and tested modular water purification technology:

- Easily installed and commissioned with small footprint.
- The adaptability of the Eco MultiPro and pre-treatment and polishing technology means that the water streams can be tailored to the exact water purity standards needed.
- No hazardous chemicals will be required for the regeneration of the system, reducing the health and safety risk and storage requirements on-site.
- Duplex design provides failsafe flow and ensures continuous operation and supply, even during routine service and maintenance.
- HMI and PLC with digital monitoring software ensure the system can be monitored and adjusted for operating efficiency and remote monitoring can be used to provide servicing or maintenance advice.
- 90% water recovery rates will be achieved.
- Wastewater streams will be collected and used for ash quenching.
- No hazardous regeneration chemicals mean safer operating environments and a reduced footprint.
- Water quality will be delivered with less than 0.1µS conductivity, less than 20ppb silica and less than 10ppb sodium, ensuring complete protection for the steam generator and associated boilers and pipework.
- Flow rates of up 11m³/hr can be provided at times of high demand with a duty/standby configuration used to ensure continuous flow during normal operation, even during service and maintenance.
- Multi-stakeholder engagement and specialist water treatment support provided throughout the project in collaboration with our client.

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ABOUT THE CLIENT

The client is an energy supply, generation, management, and distribution company based in the UK, and are focused on driving low-carbon projects that generate heat and power from waste.

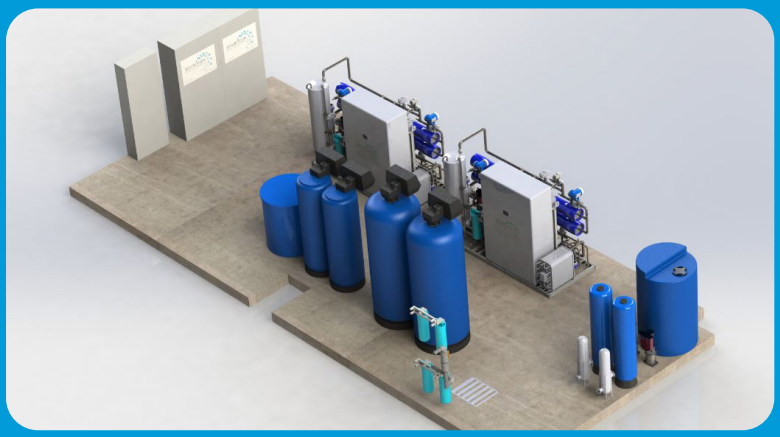
INTERESTED IN OTHER EFW PROJECTS?

For more information on other water treatment and process filtration solutions for the power & energy industry:

Learn how a combined reverse osmosis and electrodeionization system helps Eco Park Surrey process 40,000 tonnes of kitchen waste and 50,000 tonnes of general refuse waste a year:

CLICK HERE TO LEARN HOW

www.envirogengroup.com/surrey/cc



Discover how demin water helps Energy Works Hull generate enough energy from waste to power 47,000 homes:

CLICK HERE TO DISCOVER HOW

www.envirogengroup.com/bioenergy

ABOUT ENVIROGEN

Envirogen is a leading international provider of water and wastewater treatment solutions. We solve complex challenges relating to water availability and quality, and help our customers to increase productivity, reduce costs and meet environmental and sustainability targets.

We do this through offering:

- Best in class water and wastewater treatment and process filtration technology
- Expertise in design, project management and engineering
- World class manufacturing and servicing capability

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