

# Ion exchange plant reduces downtime costs for SELCHP, UK

## Power | Case Study

### The Client

SELCHP is an energy from waste (EFW) facility in Lewisham, London, operated by Veolia Environmental Services. The plant incinerates up to 420,000 tonnes annually of household waste from Lewisham, Greenwich, Westminster and Bromley.

The heat from the incinerator produces 395°C superheated steam in 46bar water tube boilers. This steam drives a turbine which generates 35MW of electricity for export to the National Grid.

The exhaust steam is condensed in air cooled condensers and returned to the boiler via a deaerator where demineralised make-up water is added to replace steam and water losses.



### Key Figures

- SELCHP operates 24/7
- Boiler downtime is expensive
- High flow rate of demineralised water needed to refill the boiler quickly after a shutdown

### The Client's Needs

The on-site make-up demineralisation plant had been installed in 1993. It was limited in output to 10m<sup>3</sup>/h and operated for about eight hours between regenerations. “The main issue with the old plant was the four hour regeneration time”, says VES Operations Manager, Graham Duff.

“After repairing a tube failure or similar boiler shut down we have to refill the boiler with 120m<sup>3</sup> of demineralised water. With 80m<sup>3</sup> production between regenerations and the long regeneration time this could take up to a day.”

A replacement plant was required to deliver high purity water meeting a 0.1µS/cm conductivity and 20µg/l silica specification. Graham wanted to ensure that the new plant incorporated the latest technology, so he turned to Veolia water Technologies for advice.

### The Solution

Veolia water Technologies's solution was a two-stream Rapide Strata+ 18m<sup>3</sup>/h packaged deioniser system together with conductivity, pH and silica monitoring, PLC controller and HMI. The two streams operate as duty and standby but, when demand is high, both can run together to deliver 36m<sup>3</sup>/h.



Rapide Strata+

The compact system has a user friendly control system that requires little operator involvement.

When demand for make-up water is low and the treated water tank is full, the duty unit automatically switches to recycle mode. In this mode, treated water is recirculated from the treated water tank, through the Rapide Strata+ and back. Recycle operates for 20 minutes every two hours and keeps the resin beds in good condition as well as polishing the water in the treated water tank to maintain quality.

## Process Description

The Rapide Strata+ is a three stage, reverse flow regenerated ion exchange demineralisation system, incorporating two of Veolia water Technologies's technologies: HiPol® and SCION™. HiPol® is a long established process which uses a high rate cation exchanger (the two small cylinders in the photograph) downstream of the conventional cation and anion exchangers to remove sodium leakage and produce treated water of 0.06µS/cm.



HiPol polisher

SCION™ is a short cycle ion exchange process using uniform sized resin beads to achieve high flow rate, high chemical efficiency and a regeneration time of **just 45 minutes**.

Both cation and anion exchangers have stratified resin beds of weak and strong resins which, by comparison with conventional designs, greatly improves both capacity and chemical efficiency.

## Results

The short regeneration time of the Rapide Strata+ means that the boiler can be back in service 6-8 hours earlier and, with boiler down time costing about £4,000 per hour in lost revenue, that is a saving of around £30,000. "In the two years that we've had the plant, the reduced down time alone has repaid the investment", says Graham.

By comparison with the old demineralisation plant, the treated water quality from the Rapide Strata+ is lower in conductivity and daily consumption of regenerant chemicals is about 40% lower. Hydrochloric acid consumption has reduced from 194 to 118 litre and caustic soda 164 to 87 litres. Regeneration wastewater is also about 20% lower, helping to reduce the facility's overall water footprint.

## The Benefits

- Continuous secure supply of make-up water, with low silica levels and conductivity
- Improved operational performance – 40% less chemical usage and 20% less wastewater
- Reduced boiler start-up time after tube repair, providing cost savings of £30k

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