



## **SELCHP Energy Recovery Facility**

Annual Performance Report: 2016

Environmental Permit: NP3738SY

Veolia ES SELCHP Ltd  
Landmann Way,  
Deptford  
London  
SE15 1AL

## **1. Introduction:**

Back in 1986, faced with the increasing scarcity and environmental problems of landfill, the London Boroughs of Lewisham, Southwark and Greenwich came together to search for a realistic alternative. In 1988, they formed a Consortium - South East London Combined Heat and Power - from which SELCHP now takes its name.

Bringing together a cross-section of public and private interests, SELCHP's members included not only the London Boroughs of Lewisham and Greenwich, but also the Regional Electricity Company and Energy from Waste design, construction and operation specialists.

From the outset, their approach to the project was based on consultation and co-operation. The first step was an in-depth feasibility study into the viability of an Energy Recovery Facility, followed by an Environmental Impact Assessment for the local community. Addressing concerns over atmospheric emissions, noise, traffic and visual impact, the E.I.A. was independently assessed on behalf of local residents, with favourable results.

Conditional Planning Permission was granted in 1990, and required further studies into noise, landscaping, architecture and traffic in order to satisfy planner's detailed requirements.

In 1991 site clearance began. A Design and Construct contract was awarded to Martin Engineering Systems Ltd.

During the winter of 1991/2 SELCHP prepared and publicly registered an application for an Authorisation under the Integrated Pollution Control provisions of the Environmental Protection Act, 1990. SELCHP was the first Energy from Waste scheme in the UK to hold this Authorisation. Also during 1992, SELCHP was awarded an Electricity Generation Licence by the Office of Electricity Regulation

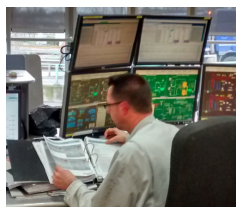
The plant was commissioned in December 1993 and was officially opened by HRH the Prince of Wales on 29th November 1994.

Today, SELCHP remains committed to understanding and meeting the needs of the locality.

## 2. How SELCHP works

SELCHP receives waste from households and some businesses. Waste is tipped into a bunker, where a crane grabs it and places it into the feed hopper. It then drops down a feed chute onto a sloped grate, where it is constantly turned to allow all combustion phases (such as drying, ignition and combustion itself) to happen simultaneously and a constant high temperature to be maintained.

Ash from the burning process is transferred by an ash discharger and residue handling system to the ash pit. During the transfer, ferrous metals are removed for recycling and the remaining ash is sent for reprocessing, where further ferrous metal and non-ferrous metal extraction takes place, the remaining aggregate material is recycled into material for road building or construction use.



Hot gases produced in the combustion process pass through a water tube boiler where they are cooled; the heated water is transformed into steam. A turbo-generator uses the steam to produce electricity for export to the National Grid.

The gases from the boiler go through a complex flue gas cleaning process, involving the injection of dilute ammonia solution to reduce nitrogen oxides to nitrogen and water; lime milk to neutralise acid gases and activated carbon to absorb heavy metals and any remaining dioxins.

Finally the particulate matter dust is removed from the gas stream by a bag filter before the cleaned gas is released to air. The resultant material known as Air Pollution Control Residue (APC residue) is sent for disposal at a licensed hazardous waste site.

### How the power is generated

Steam leaves the boilers at a temperature of 395°C and pressure of 46 bar, and is fed directly into a single 35 MW steam turbine generator. The turbine rotates the generator to produce electricity. Steam from the turbine is also used to pre-heat the combustion air for the waste burning process.



A bank of air cooled condensers condenses the exhaust steam from the turbine and recycles the water back into the process. Electricity is generated at 11kV and transformed up to 132kV for export to the London Electricity system which passes very close to the SELCHP facility.

During normal operation, no supplementary fuel is required to maintain combustion, just refuse and controlled addition of air.

### **District Heating**

In 2013 construction of a District heating network was completed at SELCHP. Over 5 km of underground insulated piping has been laid out of SELCHP into the neighbouring borough of Southwark. Connected to four boiler houses, fitted with multiple heat exchangers, supplying 16 residential blocks and 2,500 residents. Circulating pumps send water in a loop from heat exchangers at SELCHP, heated by bled steam from the turbine, to each of the boiler houses on the network. This system is backed up by pre-existing gas boilers located at Clements road boiler house. Export of heat from SELCHP began in February 2014 and is expected to be expanded in the coming years.

## **3. Summary of Plant Operations**

SELCHP consists of two incineration lines, each capable of processing approximately 29 tonnes per hour, allowing for a nominal refuse throughput of 420,000 tonnes per year, but this is dependent on two factors: actual operating hours and calorific value of the waste being burnt.

The average calorific value of mixed municipal waste for 2016 was 9,070 kJ/Kg.

Plant operational details for 2016 are included in the table below.

Operating Hours (2 lines)	16,360	Hours
Waste Incinerated	448,235.72	Tonnes
Electricity Produced	242,359	MWh
Metals Recovered	8,799	Tonnes
Incinerator Bottom Ash	88,446	Tonnes
APC residues	12,264	Tonnes

Ash residues (known as Incinerator Bottom Ash or IBA) are currently transported to a processing plant where further ferrous and non-ferrous metal is recovered and the screened IBA prepared as a substitute aggregate for building roads and car parks. Ferrous metal removed from the IBA is sent to a steel manufacturer for recycling.

Fine particulate matter, known as Air Pollution Control (APC) residue, removed from the flue gases by the fabric filter is collected and sent to specialised treatment works where it is treated with acid wastes prior to disposal at a licensed non-hazardous landfill site. A small amount of the total APC is sent to a deep storage facility.

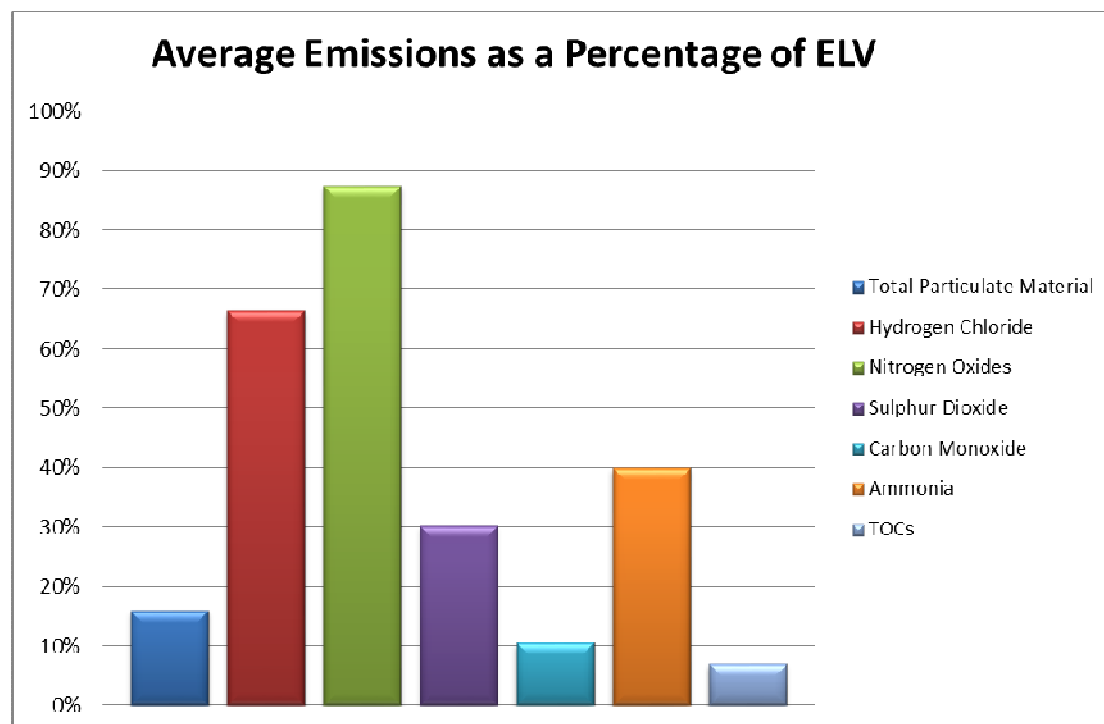
## 4. Summary of Plant Emissions

### 4.1. Emissions to air

#### Point Source Emissions

All emissions to air from the 100m high chimney are controlled to meet the emission limits included in the PPC Permit. The flue gases released into the atmosphere are continuously monitored.

The following bar chart shows the average annual emissions from SELCHP in 2016 expressed as average of the Emission Limit Value.



The monitoring equipment was in service during 2016 for 100% of the plant operating time. This equipment is stringently monitored with routine calibration checks and is standardised to BS EN14181 with a full range of standby equipment available should an unexpected failure occur.

Bi-annual monitoring checks of these emissions are carried out by approved contractors, Exova Catalyst, using standardised extractive reference methods. Emissions of metals, dioxins and other substances are also monitored quarterly. Table 1 below shows the pollutants monitored and its frequency.

*Table 1: Emissions monitoring at Selchp and frequency*

<b>Pollutant</b>	<b>Monitoring frequency</b>
Particulate matter	Continuously
Hydrogen chloride	Continuously
Oxides of nitrogen	Continuously
Carbon monoxide	Continuously
Sulphur dioxide	Continuously
Total VOCs	Continuously
Ammonia	Continuously
Arsenic	Quarterly
Cadmium	Quarterly
Chromium	Quarterly
Copper	Quarterly
Mercury	Quarterly
Nickel	Quarterly
Manganese	Quarterly
Antimony	Quarterly
Lead	Quarterly
Thallium	Quarterly
Hydrogen fluoride	Bi-annually
Nitrous oxide	Bi-annually

Dioxins and Furans	Bi-annually
Dioxin-like PCBs	Bi-annually
PAHs	Bi-annually

### **Fugitive Emissions**

All waste processing takes place under cover within buildings to assist in preventing fugitive emissions of dust and particulates. All operational areas are fitted with fast acting doors and segregated from processing equipment by means of floor to ceiling fabric curtains.

The waste bunker is maintained at a negative pressure to prevent odour or dust from escaping SELCHP's site perimeter.

## **4.2. Emissions to Controlled Waters**

The on-site drainage has been designed to take into account requirements of the Local Planning Authority and the Environment Agency. Accordingly, the design implemented at SELCHP aims to recycle within the process as much water as possible.

The gas scrubbing system installed at SELCHP does not result in a liquid effluent and therefore waste water originates only from domestic and cleaning operations and from the regeneration of the water softener and de-ionising water treatment plant.

The installation of an evaporative condenser in 2010 resulted in a significant increase on effluent discharged to sewer during the summer months.

All water entering the SELCHP's drainage system is collected on a series of decantation pits, with the aim of reducing solids contents before discharge to the sewerage system for further treatment.

Monthly samples of effluent are collected and send for analysis to ensure contamination levels remain within the parameters specified by Thames Water in the Trade Effluent Discharge Consent. Thames Water also collects samples independently to verify the quality of the effluent from SELCHP.



## **5. Complaints and queries**

The operator maintains a complaints log and any complaint received are recorded and investigated. Procedure SYS07 of the Veolia Business Management System (BMS) details the actions to be taken upon receipt of a complaint.

During 2016, three valid complaints were received. All concerned a single incident relating to noise. Modifications to the air ejector system to improve electrical efficiency resulted in an unappreciated increase in plant noise levels. The modifications were bypassed as soon as the complaints were received, this immediately resolved the issue. A silencer was fitted at later date and the modified system reinstated. All three complainants were contacted by the Environmental Technician who issued an apology and explanation regarding the incident. No further issues have been observed.

## **6. Environmental Compliance**

SELCHP takes great diligence to ensure compliance with all the conditions of the Environmental Permit at our facilities.

This is achieved through constant monitoring of the process during all of the stages, with detailed procedures in place to enable trained staff to carry out their work in an environmentally responsible manner. The plant operates within a Quality, Health and Safety and Environmental Management System compliant with ISO 9001, OHSAS 18001 and ISO 14001 and it is independently audited.

During 2016, there were no exceedance of permitted Emission Limit Values (ELVs).

## **7. Plant Improvements**

During 2016, the following plant improvements were made;

The air ejector system was optimised to increase the turbine vacuum, resulting in increased electrical efficiency. Reducing demand on the Air Cooled Condenser (ACC) and the Water Cooled Condenser (WCC) during the summer months.

On the Water Cooled Condenser (WCC); feed flow was fitted with a strainer, the cooling tower hanging pack replaced with a block fill packing and access ports added to the condensing vessel. Mechanical cleaning of the condenser tubes and packing replacement have resulted in significantly improved energy efficiency.

The combustion control Programmable Logic Controller (PLC) was replaced during the May-June outage on boiler 2.



Replacement of strip lights with LED equivalents continues across the site. Lighting in the residue hall, ACME hall and the boiler house ground floor were replaced.

**End of the Report**