

**Annual Performance Report  
for  
Lincolnshire Energy from Waste  
Facility**

**Permit No: EPR/FP3739FS**

**Year – 2016**

Report produced by

FCC Environment

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## Introduction

This report is required to be produced under the requirements of the Industrial Emission Directive on access to information and public participation, which requires the operator to produce an annual report to the Regulator on the functioning and monitoring of the plant and to make this available to the public.

The Lincolnshire Energy from Waste facility is located on a 5 hectare site in Lincolnshire about 1.5km Northwest of Lincoln City.

Within 2km of the EFW facility there is one site of special scientific interest (SSSI) – Swanholme lakes – and several local nature reserves and wildlife sites.

The EFW facility has a total capacity of approximately 49.7 MW (thermal input) and is capable of generating up to 13.1 MWe of electrical power, the majority of which is exported to the National Grid. Provision has been made to supply additional heat in the form of up to 10 MWth when a commercial scheme becomes available to take the heat.

The facility consists of one incinerator line with a total annual permitted capacity of 170,000 tonnes per year.

Waste material burned at the facility is residual municipal solid waste (i.e. waste that has had recyclable and re-usable materials source segregated) and commercial and industrial (C&I) waste derived from residential, commercial and industrial sources. All waste material for processing received at the facility is non-hazardous.

Waste material arrives by road and is weighed before proceeding into the tipping hall where it is tipped into the waste bunker of sufficient capacity to hold several days waste inputs.

Moving grate technology is used for burning the waste material. The furnace design ensures that a temperature of at least 850°C for a period of at least two seconds is achieved in the combustion chamber. To ensure that the temperature does not fall below 850°C auxiliary burners firing fuel oil are automatically triggered by online process monitoring equipment.

Hot gases from the furnace pass into a boiler. Steam raised in the boiler is passed to a turbine to generate electricity. Combustion gases are cleaned before they are released to atmosphere. There are four components to the gas cleaning abatement technique;

- Selective Non-Catalytic Reduction (SNCR) involving the injection of ammonia into the combustion chamber above the flame providing for the abatement of nitrogen oxides.
- Dry hydrated lime re-agent injected to neutralise acid gas compounds.

- Activated carbon injected to absorb heavy metals, dioxins and furans.
- Bag filtration to remove fine particulates. The residues of the bag filters are collected and directed to a residues silo. Part of the residues are recycled to the reagent injection points to ensure maximum usage of the lime content.

Cleaned flue gases exiting the abatement system of the incinerator line are discharged through the 75m tall stack. Gases are continuously monitored for particulate matter, oxides of nitrogen, sulphur dioxide, carbon monoxide, total organic carbon, hydrogen chloride and ammonia. Monitoring for heavy metals, dioxins, nitrous oxide and hydrogen fluoride is carried out periodically.

Under normal circumstances there are no liquid effluent emissions from the incinerator. Water arising from boiler blowdown and water treatment backwash is recycled to the Incinerator Bottom Ash (IBA) quench. Water surplus to the requirements of quenching is discharged to the sewerage system.

All plant areas are surfaced to the appropriate standards for the activities within those areas. All liquid tanks and drums whose emissions to water or land could cause pollution, are contained in adequate bunding constructed in line with industry best practice standards and sized to contain 110% of the contents of the largest tank or 25% of the total tonnage within the bund; whichever is the larger. Materials used for surfacing of process areas and bunds are resistant to the materials they may come into contact with.

There are no direct discharges to groundwater from the facility.

Odour problems are not expected from the facility. Any potential odours from storage of the waste materials are extracted from above the waste bunker and used as combustion air within the furnace, thereby destroying any potentially odorous compounds.

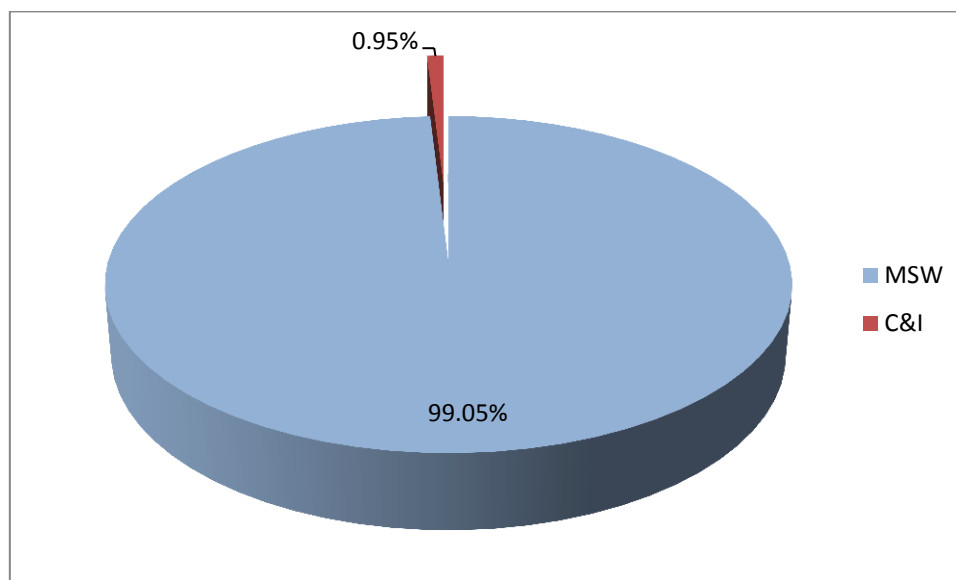
The solid residues produced by the EFW facility are Incinerator Bottom Ash (IBA) and Air Pollution Control (APC) residues. APC residues are hazardous and sent for treatment before landfill disposal. IBA is sent for separation and recycling of the metal content; with the remaining ash being used as a substitute aggregate.

## Summary of plant operation

### ***Annual Waste Throughputs***

The facility accepted 163,580 tonnes of waste in the reporting period; which is below the permitted limit of 170,000. The vast majority of this waste was municipal waste from the Lincolnshire area. A breakdown of the waste inputs is shown in Figure 1.

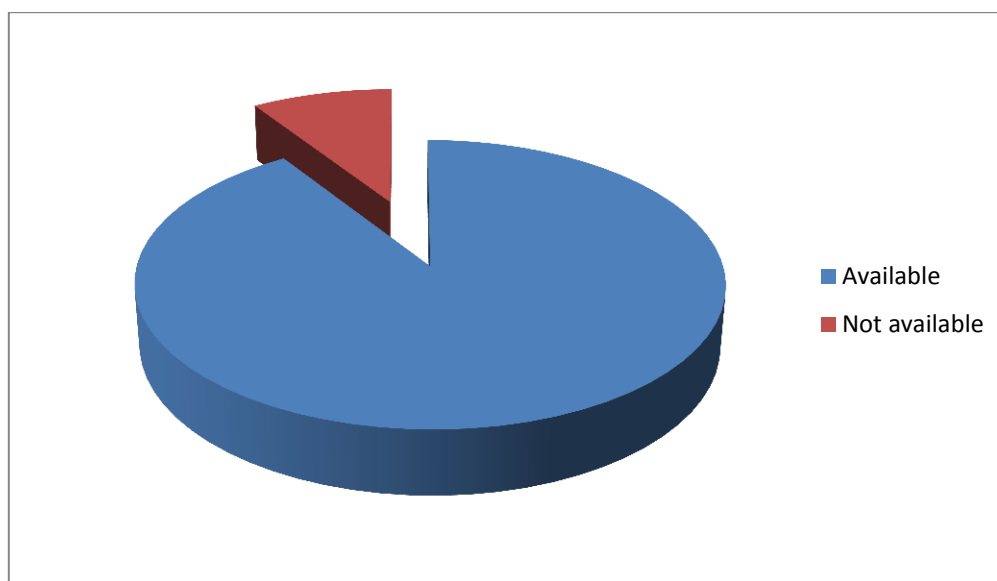
**Figure 1: Breakdown by category for waste input**



The term municipal is used to capture wastes which are defined within chapter 20 of the List of Waste codes. This figure is predominantly made up from household sources; but does include some wastes collected by commercial companies which are similar in nature to household waste.

## ***Total Plant Operational Hours***

**Figure 2: Plant availability**



Over the entire year the facility operated for 7,978 hours giving an availability figure of 91%; very similar to 2015 operating hours. The main period where the plant was not operational was for the planned annual shut down where significant planned maintenance work is undertaken.

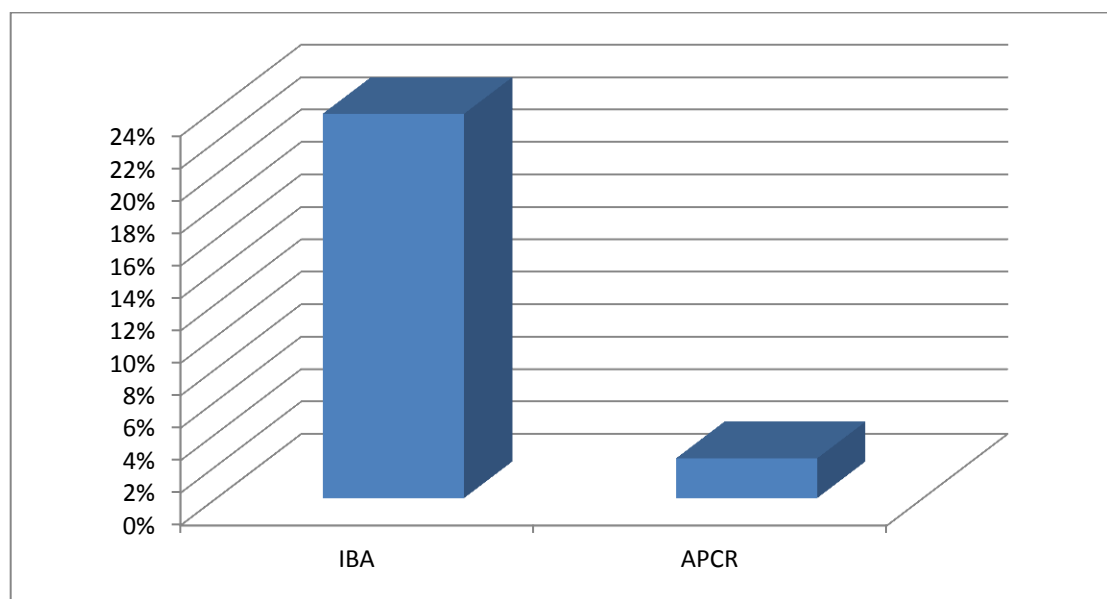
## ***Residue production***

The plant produces two types of residue;

- Bottom Ash – an inert material (including large volumes of metal content) left over from the combustion process. This was sent for further reprocessing to remove metals and for the ash to be used as a substitute aggregate.
- Air Pollution Control Residue – A mixture of lime and other particles that have been captured by the Flue Gas Treatment Facility. This material gets sent to a treatment facility where it is mixed with other waste before final disposal in a suitable landfill site

The quantities of residues produced as a percentage of the waste inputs are shown in Figure 3

**Figure 3: Quantity of residue produced as a % of waste burnt**



The quantities of residue when compared to input remain similar to the previous years' production levels. It should be noted that metal items which have been through the process are present within the IBA. This is sent to a third party facility where it is processed to remove metal items for recycling.

### ***Energy Production***

For the 2016 reporting period electrical export from Lincolnshire EfW totalled 94,260 MWh, with 78154 MWh exported to the national grid with the remainder used on site as parasitic load.

## Summary of plant emissions

The monitoring requirements are set out in Schedule 3 of the Environmental Permit.

The plant is required to carry out both continuous monitoring as well as periodic testing.

### ***Pollutants Measured***

Pollutants Measured	Continuously	Periodically
Particulates	✓	
Oxides of Nitrogen	✓	
Sulphur dioxide	✓	
Carbon Monoxide	✓	
Ammonia	✓	
Total Organic carbon	✓	
Hydrogen Chloride	✓	
Mercury		✓
Cadmium & Thallium		✓
Group III Metals		✓
PCDD & PCDF		✓
Hydrogen Fluoride		✓
Nitrous Oxide		✓
PAHs		✓
PCBs		✓

### ***Control of emissions***

The control of the emissions is explained in the introduction section although for ease of reference the control measures have been summarised below:

- The acidic gases (Sulphur Dioxide, Hydrogen Chloride and Hydrogen Fluoride) are controlled by the addition of lime to the flue gases.
- Carbon Monoxide and the Total Organic Carbons are controlled through the combustion controls which affect the amount of air in the combustion chamber
- Oxides of Nitrogen are controlled by adding sufficient amounts of ammonium hydroxide solution. The use of computer controls allows the system to react to the changing parameters within the boiler exactly controlling the levels of NO<sub>x</sub> and minimising the formation of ammonia.
- The particulates or dust are captured by the bag filters which are highly effective capturing around 99.9% of the particles generated from the process.

Figure 4 shows the single maximum daily and half hourly value recorded for each continuously monitored substance in the reporting period (not the



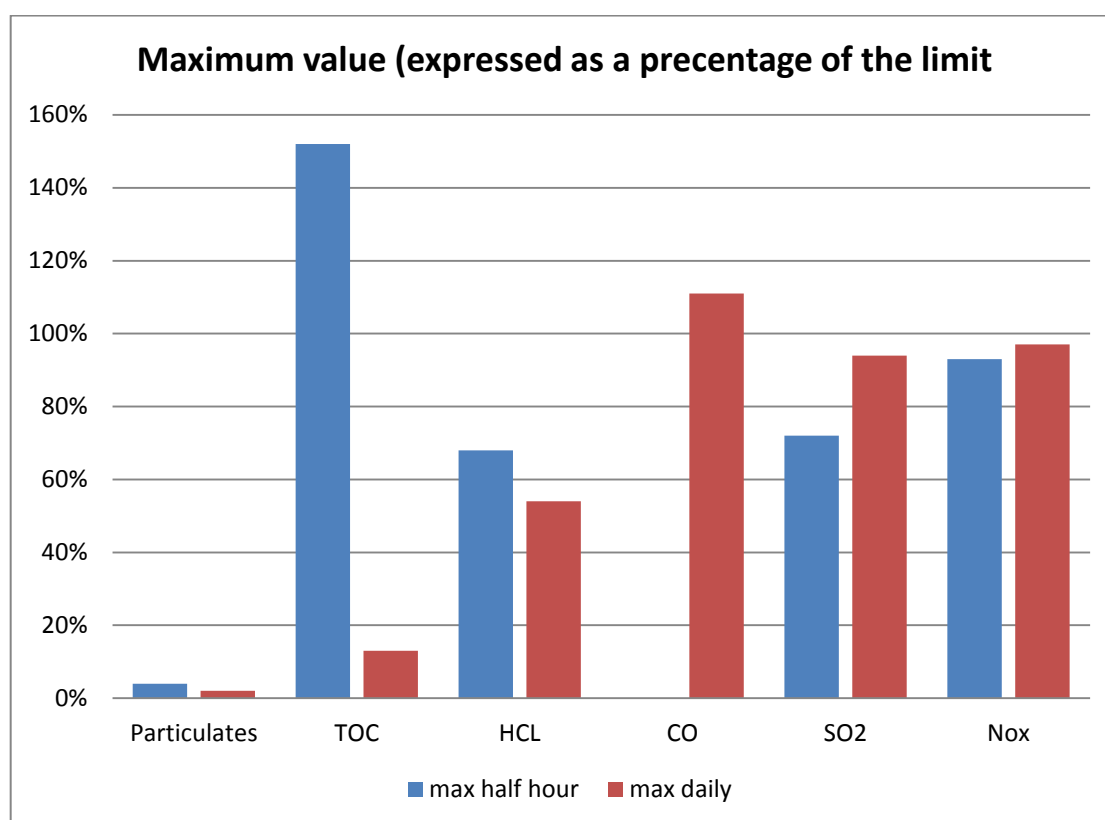
average value). Carbon monoxide is measure over 10 minute periods with a 95% compliance requirement against 150mg/m<sup>3</sup> and thus short term results are not displayed in figure 4.

During 2016 there were 2 reportable events that occurred and were reported to the Environment Agency as Schedule 5 notifications. Both incidents resulted in unstable combustion for short periods resulting in emission exceedances for TOC and CO.

Following both instances; a detailed investigation was undertaken leading to plant modifications to prevent re-occurrence. Details of the investigations and actions taken were submitted to the Environment Agency.

A more detailed set of graphs showing the plants performance on a month by month basis for each substance can be found in Appendix 1.

**Figure 4: Continuous emissions monitoring**



## ***Periodic Monitoring***

### **Emissions to Air**

Within the permit there is an obligation to carry out periodic tests on the substances emitted from the stack and quality assurance of the installed Continuous Emissions Monitoring System. A UKAS certified company is required to carry out these tests and submit a report to FCC Environment. The results from the tests are included in the reports submitted to the Environment Agency and held on the public register.

**Figure 5: Periodic emission monitoring**

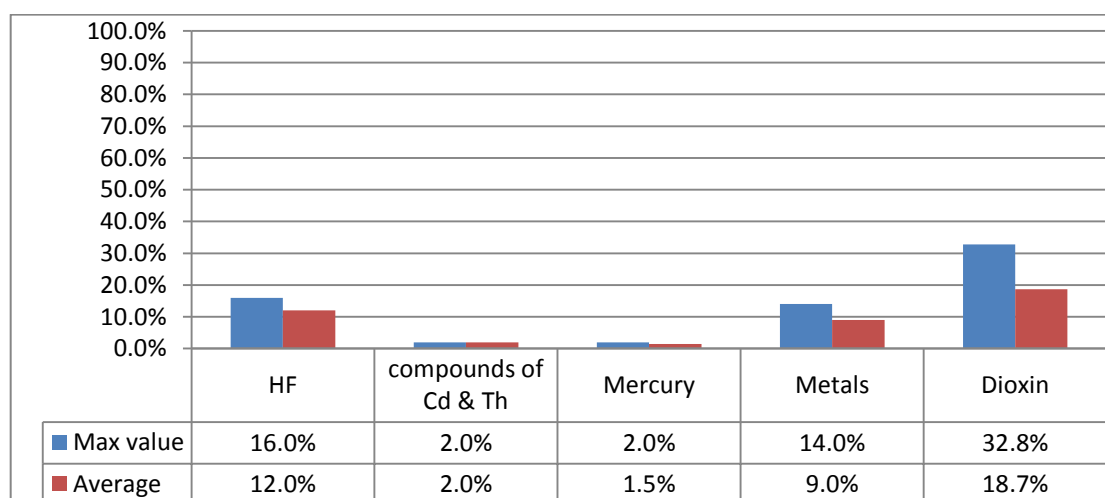


Figure 5 above shows the maximum recorded value and the average value for each substance as a percentage of the permit emissions limit value.

As can be seen from figure 5; full compliance has been achieved with periodically monitored substances, with all values significantly below the emission limit value.

## Summary of plant compliance

### *Compliance with emissions to air*

**Figure 6: Continuous emissions monitoring compliance**

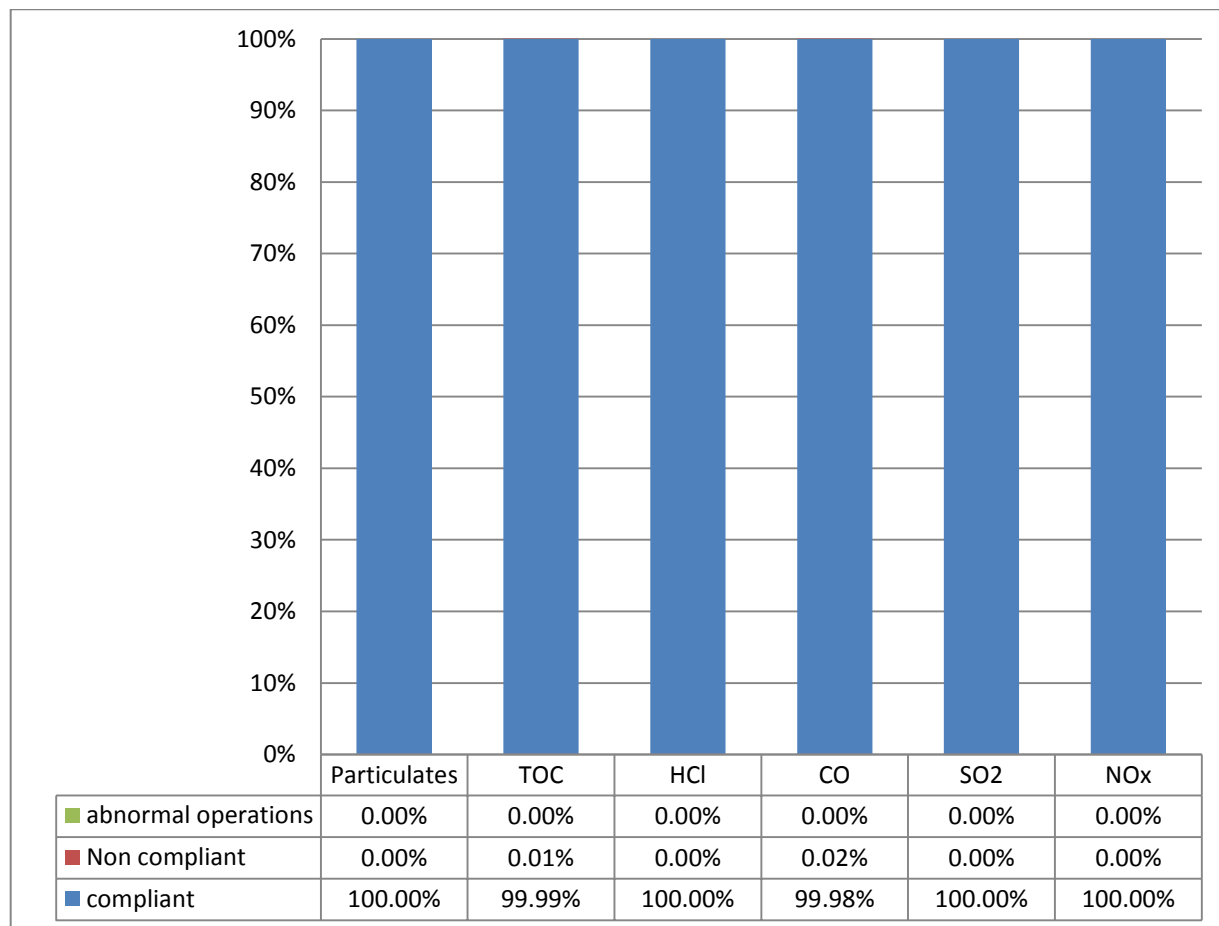


Figure 6 shows compliance with continuous emissions limit values for 2016.

There were 5 non-conformances against the emission limits set within the permit; 3 related to Carbon Monoxide vales; while 2 related to Total Organic Carbon (TOCs). The non-conformances related to specific issues with combustion and have been extensively investigated leading to mechanical modifications being made to the process.

Results of these incidents; their investigations and modifications have been submitted to the Environment Agency through the Schedule 5 submission process. Resulting assessments/enforcement actions by the Environment Agency against their compliance classification scheme have been taken.

### ***Compliance with Ash Limits***

Full compliance relating to limits on ash content was achieved in 2016. Analysis also continues to demonstrate that the Incinerator Bottom Ash should be considered as a non-hazardous waste.

### ***Formal Enforcement Notices***

No enforcement notices were received during 2016. 1 complaint was received for odour; which has led to further investigation and procedural changes.

## **Summary of plant improvements**

### ***Improvement Conditions***

The majority of the permit improvement conditions were completed in 2014; however 2 following the revision to the permit; a further improvement condition was added requiring additional monitoring for groundwater and soil. During 2016 additional boreholes were installed on site, with the soil from this sampling sent for analysis and groundwater is currently being samples on a monthly basis. Upon completion of a series of further monitoring visit; the results will be submitted to the Environment Agency and the improvement condition closed within 2017.

## Summary of information made available

General information about FCC Environment and the Lincolnshire Energy from Waste Facility can be found at <http://www.fccenvironment.co.uk/lincoln-efw.html> alternatively written enquiries can be sent to the following address:

Lincolnshire Energy from Waste Facility  
Paving way; off Whisby Road  
North Hykeham  
Lincoln  
LN6 3QW

Information held on the public register can be found at:

Environment Agency  
Waterside House  
Waterside North  
Lincoln  
LN2 5HA

03708506506

Members of the public are advised to phone to arrange a viewing. This is to allow the sites time to make the information requested more accessible. This information can be viewed during normal working hours e.g. 09:00 to 17:00.

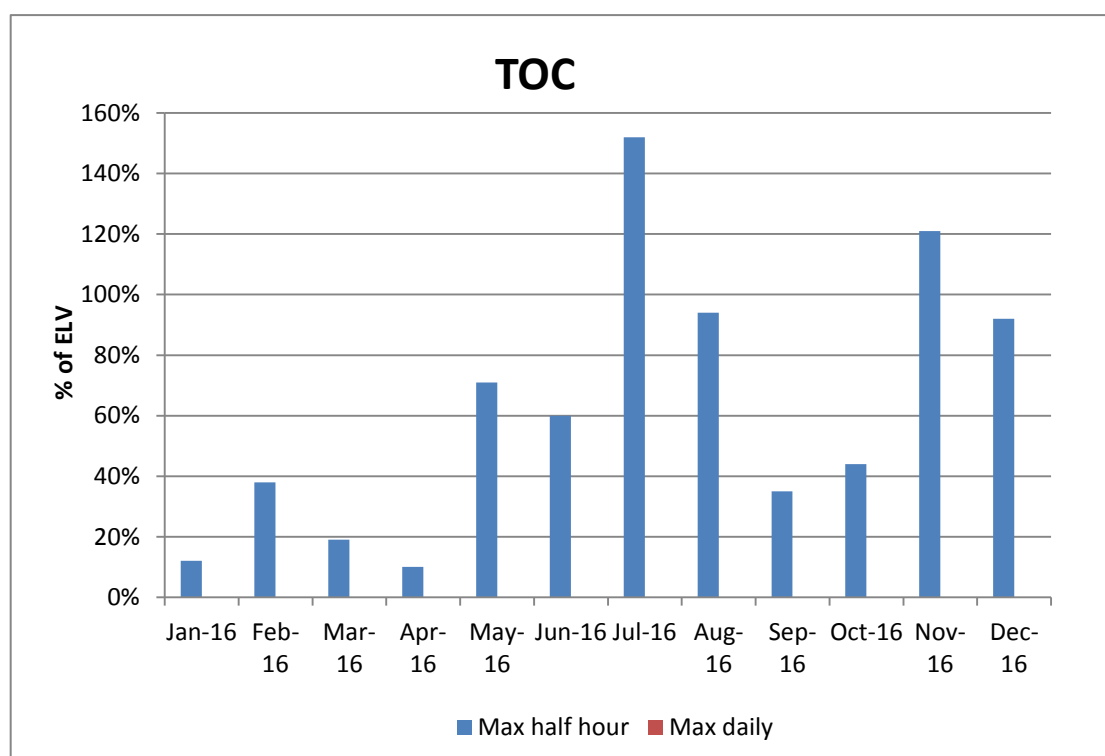
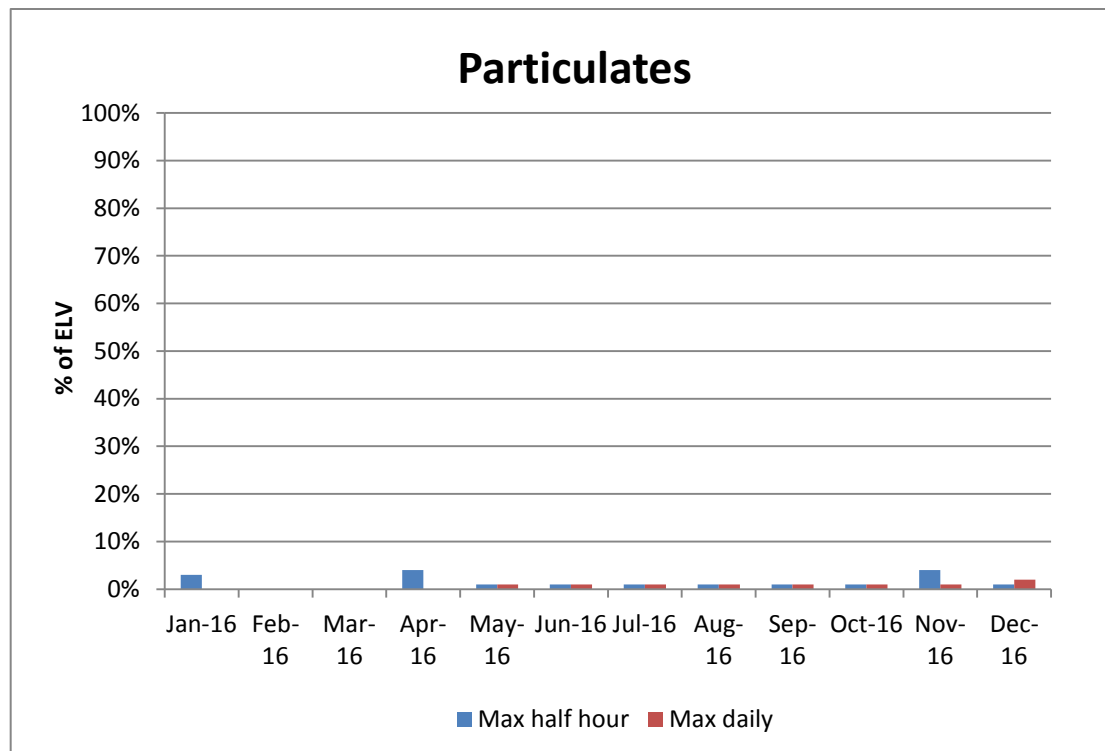
- The Lincolnshire Energy from Waste facility has a liaison group which involving a range of representatives from the local community and other interested parties

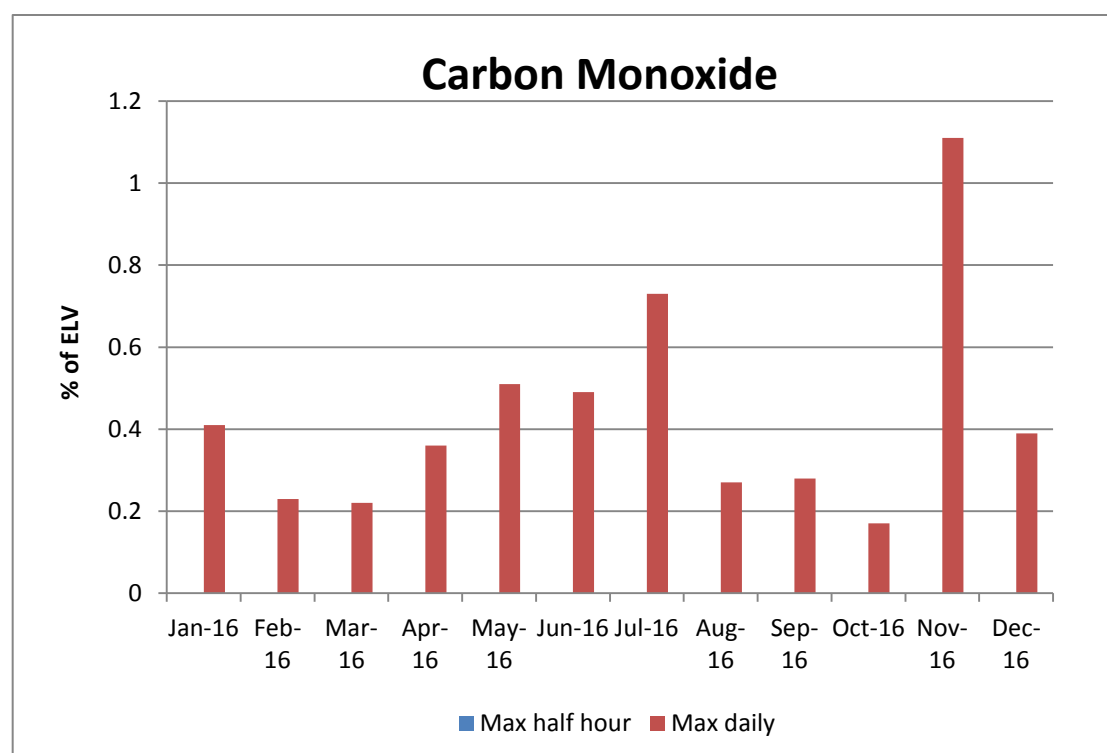
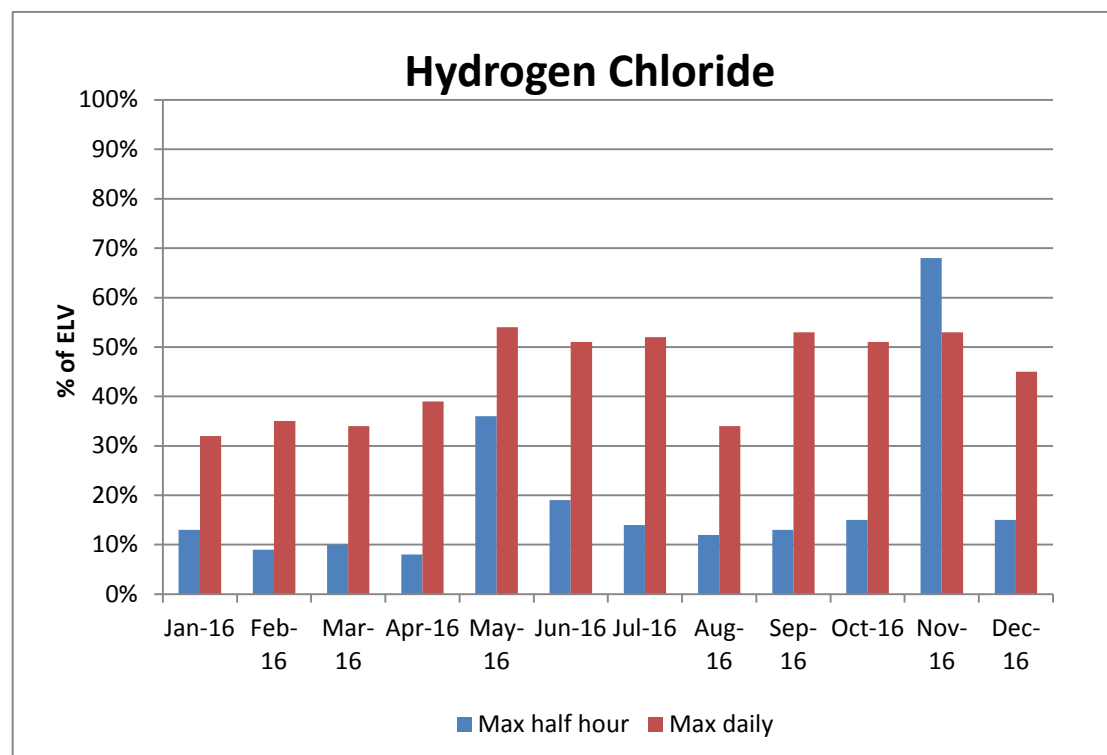
The liaison group meets to discuss the performance of the installation and future activities. If you are interested in the activities of the liaison group please contact:

Sally Hood  
Visitor Centre Manager  
Lincolnshire Energy from Waste Facility  
Paving way; Off Whisby Road  
Lincoln  
LN6 3QW

Email: [sally.hood@fccenvironment.co.uk](mailto:sally.hood@fccenvironment.co.uk)

## Appendix 1





NB 10 minute reporting for CO and no half hourly emission limit value.

