

DUDLEY ENERGY FROM WASTE PLANT

PERMIT No AP3435SD

WASTE INCINERATION DIRECTIVE

ANNUAL REPORT

2016

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Annual performance report for MES Environmental Dudley EfW Plant – Permit No. AP3435SD – Year 2016

Introduction

This report is produced under the Waste Incineration Directive's Article 12(2) which requires the operator of an incineration or co-incineration plant to produce an annual report to the Regulator on the functioning and monitoring of the plant and to make this available to the public. In accordance with the requirements of the Directive, the following information is therefore provided:

<i>Name of Company</i>	<i>M E S Environmental</i>
<i>Name of Plant</i>	<i>Dudley EfW Facility</i>
<i>Permit Number</i>	<i>AP3435SD</i>
<i>Address</i>	<i>Lister Road, Dudley DY2 8YT</i>
<i>Phone</i>	<i>01384 457321</i>
<i>Contact name</i>	<i>Mr B Hurley</i>
<i>Position</i>	<i>Plant Manager</i>
<i>Further information, description of waste types burned and origin.</i>	<i>Constructed in 1998 to burn in the region of 105,000 tonnes per annum of local domestic refuse and generate a nominal 7.4MW of electricity for the local community.</i>
(If you would like to make any comment on this report or if you would like any further information or to arrange a visit to the plant please telephone Mr B Hurley on the above number)	

Table 1 – General information

The plant provides a sustainable method of waste disposal and recovery, predominantly for the area within the administrative boundary of Dudley Metropolitan Borough Council, with smaller quantities of waste accepted, where capacity and demand exists, from other local authorities within the general vicinity of the plant.

Household, commercial or industrial wastes, collected by the local authorities, their agents or contractors, comprise almost all of the wastes delivered to the plant at around 99.97% of all deliveries for 2016; this is up on previous years with 2015 being around 92.25%, 2014 around 86.19 % and in 2013 this figure was 85.2 % of all waste delivered.

Waste deliveries from other councils contributed to around 10.3% of the total waste delivered to the plant, waste that historically would have gone to landfill. Only 0.23% of wastes delivered came from private sector contracts.

Priority will always be given to the delivery of local authority wastes, as required by the terms of contractual arrangements, to ensure that safe, reliable, consistent and sustainable disposal and recovery facilities are available at all times.

This also reduces reliance on and quantities of wastes delivered for disposal to landfill with little or no beneficial outcome. It also contributes significantly to the diversion of biodegradable municipal waste away from landfill consistent with the European Union and Governments objectives under the terms of the EU Landfill Directive.

Non-Technical Plant Description

The installation comprises an energy from waste facility (EFW) processing a maximum of 105,000 tonnes per year of municipal and other specified wastes.

The plant contains two incineration lines with a combined design capacity to process up to 12 tonnes of waste per hour. Each line has separate waste feed systems, furnaces, boilers and flue gas treatment equipment but share a common electricity generation system.

Heat produced during the incineration process is converted to electrical energy by generating steam in high-pressure boilers and expanding the steam through a steam turbine. Air-cooled condensers re-circulate condensate back to the boilers..

By this means the plant, when operating at full load, will typically generate around 7.4 MW of electricity and, after satisfying its own power needs, exports approximately 6.5 MW of electricity to the local electricity network. This assists in contributing to the Government's target of providing 15% of electricity generation from renewable energy sources by the year 2020.

The combined effect of the plant's energy recovery process and the recycling activities of the local authorities in the area results in the recovery of value from around 80% of the municipal wastes produced in the area, either in the form of electricity production, recycling or composting.

This demonstrates that the two processes have a strong environmental synergy and work in common to treat waste as a resource to be put to beneficial use.

As recycling performance and capacity within the primary catchment area increases this provides further opportunity to divert additional materials away from landfill in conjunction neighbouring local authorities, who are more heavily reliant on landfill as their primary disposal route.

During the annual outage of the site utilised other facilities by diverting wastes to them reducing the traditional option of diverting to landfill.

In terms of plant operation the incineration processes have been designed against the background of a detailed assessment of the prevailing environmental conditions at the site location and are based upon the Best Available Technology as detailed both in the original Authorisation application and the application for the Permit issued under the Pollution Prevention and Control (England and Wales) Regulations 2000. These include but are not limited to the following:-

- Well proven process plant developed specifically for incineration of municipal solid wastes,
- Efficient, comprehensive process control and monitoring systems to ensure optimum conditions for complete combustion of the wastes and to minimise emissions from the processes.
- Operations confined within buildings under slight negative pressure in order to contain and minimise emissions such as dust and odour.
- Qualified and experienced operating and maintenance personnel to implement procedures to ensure that the required high standards are maintained. Operating and Maintenance Procedures are established according to an internationally recognised system of quality assurance.
- Multi-stage high efficiency flue gas cleaning systems comprising deNOx

Selective Non-Catalytic Reduction (SNCR) for the removal of oxides of nitrogen, activated carbon and lime semi-dry acid gas scrubbing for controlling acid gas, dioxins/furans and mercury emissions.

- Final stage flue gas abatement for particulate materials using fabric filtration.
- 47 metre chimney stacks for effective dispersion of the low emission concentrations
- Residues from the combustion process and from the flue gas cleaning system disposed of by approved means, maximising recycling wherever possible.
- Residues transported in appropriate vehicles, suitably enclosed and covered to ensure that no spillage occurs.
- Operation of the installation under an Environmental Management System, certified to ISO14001, a Quality Management System, certified to ISO9001, Health and Safety certified to OHSAS 18001 and a laboratory accredited by UKAS and certified to ISO17025. The organisation also maintains the globally recognised RoSPA Gold standard award
- Waste water from the process is neutralised and recycled as far as is practicable to minimise the quantities released to sewers.
- Provision of bunds or double skinned vessels for storage of fuel and chemicals to prevent accidental and inappropriate discharge to the public sewers and watercourse.

The Plant is regulated under the terms of a Permit issued by the Environment Agency (reference AP3435SD) and which contains conditions to ensure that the requirements of the Waste Incineration Directive are incorporated and will be met.

A variation to the permit (Variation Number CP3136XQ) was issued in 2008 and which amended the periodic emission limit values for particulate matter, hydrogen chloride, carbon monoxide, sulphur dioxide and oxides of nitrogen. The values in each case are now the same as the corresponding ½ hourly or 10 minute averages from continuous emissions monitors.

An approved application for an extension to the EWC waste acceptance codes was received from the Environmental Agency early January 2017. The additional EWC codes reflect the changes in the waste industry and wastes available after increased recycling and pre-processing as taken place. The latest additions have been added to enable local NHS trust hospitals to deliver their waste to the site, massively reducing the carbon foot print, establishing best practise when dealing with waste and reduce the cost of disposal.

Summary of plant operation:

The plant is designed to process a heterogeneous mix of municipal type wastes in two identical streams each burning up to 6 tonnes per hour.

Although this creates a technical capacity for around 105,000 tonnes per annum, in reality waste deliveries are typically less than the nominal capacity when taking into consideration periods of planned maintenance and are well within the permit limitations of 105,000 tonnes of mixed municipal waste including a maximum of 5,250 tonnes of separately collected fractions.

Separately collected fractions, if any, are generally wastes delivered by private sector customers with mixed municipal wastes predominantly comprising deliveries from local authorities. Total deliveries for 2016 are set out in Table 2 below.

Annual waste throughputs

Waste Types	EWC codes	Tonnes burnt	
<i>Mixed municipal wastes</i>	<i>20.03.01</i>	Stream 1	46165
		Stream 2	46910
		Total	93075
<i>Separately collected fractions</i>	<i>15.01.06 Packaging</i>	Total	217
	<i>20.01.01 Paper & card</i>		
	<i>20.01.08 Kitchen waste</i>		
	<i>20.02.01 Biodegradable</i>		
	<i>20.03.02 Market waste</i>		
	<i>20.03.03 Street sweepings</i>		
<i>Total burnt – all types</i>			93292

Table 2 - Incinerated Wastes 2016

Plant operational hours in the year and reasons for any significant outages

Each boiler is designed to operate continuously throughout the year, although regular routine preventative maintenance programmes are in place to ensure performance efficiency is maintained and to prevent the development of major problems resulting in significant plant outages.

Routine maintenance activities represent the principal reason for significant outages. Other stoppages tend to be short term shutdowns of individual streams, for one or two days, to deal with smaller scale issues such as tube leaks or minor repair works. These are generally relatively small jobs though the time taken to complete is often extended whilst waiting for boilers to cool down before work can commence and then controlled warming through to bring the system back up to operating temperatures.

Annual scheduled maintenance works for 2016 were carried out over a 23 day period with boiler 1 being out of service for 16 days from 15th May to 30th May and boiler 2 being out of service for 20 days from the 08th May to 27th May.

The “common week” in which the turbine and common systems are worked on lasted for 13 days between the 15th May and the 27th May.

The overall level of plant availability, in terms of operating hours, after taking in to account the additional work to be carried out, was consistent with expectations.

Boiler 1 and boiler 2 were available for 8011 and 8136 hours respectively.

This was equivalent individually to 91.19% and 92.62% of potential operating hours or 91.91% overall. This is comparable to previous levels of availability in 2008 average availability was 92.48%, 2009 average availability was at 92.93%, in 2010 average availability was at 94.28%, in 2011 average availability 92.84%, 2012 93.65%, 2013 89.09%, 2014 94.24%, last year the figure was 91.68%

Further details on plant performance are contained in Appendix 1

Residues produced.

There are two main sources of residues arising from the operation of the plant comprising:

- Bottom ash from the combustion process (including metals discharged within the ash: and
- Residues from the flue gas treatment system Air Pollution Control Residue (Fly ash)

Burned out bottom ash residues are discharged from the lower end of each grate into a water filled ash discharger, where it is quenched and then ejected onto a conveyor system. Larger items are screened out and ferrous metals removed by magnetic separation.

Residues from the flue gas treatment process are discharged in an enclosed system into double skinned heavy duty bags prior to removal from site for treatment and disposal.

The residual material represents approximately 10% of the original refuse volume and around 23% of its weight with bottom ash discharged into the residues storage bunker.

The storage capacity for bottom ash residues and separated ferrous metals is sufficient to ensure 4 days storage. Collections for delivery to disposal or treatment sites are made on Mondays to Fridays and are scheduled to ensure sufficient storage capacity is maintained at all times.

Bottom ash is now widely used in the UK and Europe as a substitute for valuable primary aggregate materials in the construction of roads and embankments. Bottom ash from the plant is currently reprocessed to remove additional and trace metals with the final residue being further processed and used as aggregate material.

Table 3 shows the total quantities of the various residues produced in 2016.

Residue	Annual tonnage	Percentage of input waste	Disposal destination.
	t	%	
Bottom ash	16052	17.21	Reprocessing – reuse
Fly ash	3216	3.45	Reprocessing acidic liquid residue neutralisation prior to use on landfill site
Ferrous metals	1452	1.56	Recycling

Table 3 - Residues produced & final destination 2016

Electricity Production

All deliveries to the plant are weighed and, in conjunction with the quantities of electricity produced, details used to determine the calorific values (CV) of wastes delivered. This can vary seasonally and is dependent upon the types of wastes delivered but, typically, are in the order of 8.5 MJ/kg.

In 2016 the average calorific value of wastes delivered over the year was 8.3 MJ/Kg. This is comparable with previous years (2015, 8.1 MJ/Kg).

The combustion of municipal waste at the plant not only produced sufficient electrical power to supply the majority of the plant's own power but sufficient also to meet the power demands for around 10,000 households during the year.

This reduces the demand for electricity produced in a conventional fossil fuel power stations and the use of a renewable energy source not only saves the depletion of an irreplaceable natural resource but also reduces the associated CO₂ production and pollution from the mining operation and transportation of the fossil fuel.

The Sector Guidance note IPPC S5.06 contains a guide value of 5 to 8 MWe exported per 100,000 tonnes of waste. Typically at design performance the plant exports 6.5 MWe from processing around 95,000 tonnes which is equivalent to 6.8MWe per 100,000 tonnes and within the range of guide values.

Details of electrical power produced, used and exported from the plant is set out in Table 4 below together with details of smaller quantities of power imported during the times when the plant or part of the plant is shutdown for servicing.

Electrical power production (in MWhrs)			
1 MWh = 10,000 X 100 watt light bulbs powered for 1 hour			
Imported	Production	Site use	Exported
272	44342	7641	36701

Table 4 - Electrical power production 2016

Plant emissions monitoring:

Emissions to air and water are continuously monitored in accordance with legal and regulatory requirements. Emissions to air are either combustion emissions from the stack or fugitive emissions from the storage of materials and chemicals on site.

Stack emissions (Particulates, Hydrogen Chloride, Sulphur Dioxide, Volatile Organic Carbons, Ammonia, Carbon Monoxide and Oxides of Nitrogen) are monitored and recorded continuously on site. Periodic (Bi annual) checks of these are also made by accredited external testing laboratories together with further quarterly or bi-annual checks as may be required by the permit of Dioxins, Mercury, Hydrogen Fluoride, Cadmium / Thallium and other metals.

Fugitive emissions monitoring, for substances having no specific emissions limit value specified in the permit, is part of the general maintenance regime carried out on site.

Table 5 below sets out the frequencies of monitoring for the various substances specified within the permit and in order to comply with the requirements of the Waste Incineration Directive. Further details of associated plant performance are also shown in Table 6 and Appendices 1 and 2.

Pollutants measured	Continuously	Periodically
<i>Particulates</i>	✓	✓
<i>Oxides of Nitrogen</i>	✓	✓
<i>Sulphur Dioxide</i>	✓	✓
<i>Carbon Monoxide</i>	✓	✓
<i>Ammonia</i>	✓	✓
<i>Total Organic Carbon</i>	✓	✓
<i>Hydrogen Chloride</i>	✓	✓
<i>Mercury</i>		✓
<i>Cadmium and Thallium</i>		✓
<i>Group III metals</i>		✓
<i>PCDD and PCDF</i>		✓
<i>Hydrogen Fluoride</i>		✓

Table 5 - Emissions monitoring frequencies

Emissions to water are monitored by equipment built into the on-site effluent treatment plant which aims to recycle 100% of water from site for reuse on site excluding sewerage. In 2016 the cumulative volume of water discharged to sewer was 1090 m³.

Any emissions which exceed the limits that are imposed upon the operation are reported to the Environment Agency without delay along with plans for the prevention of further occurrences.

Continuous Emissions Monitors (CEMs) Operation

The CEMs equipment operated satisfactorily throughout the year with minor breakdowns on individual sampling streams being responded to by CBISS the company contracted to service the equipment. At no time was the plant shut down due to CEMs failure.

CEMs equipment continuously measures and records information on emission limits for the substances set out in Table 5 above with 10 minute, ½ hourly and daily average values recorded as required and compared with corresponding emission limit values set out in the permit. Monthly reports are prepared for each substance although these only need to be submitted to the Environment Agency every 6 months.

A summary of CEM data for all continuously monitored substances is shown at Appendix 2 with a summary of results for substances which are only monitored periodically shown below in Table 6

Pollutant	ELV	Stream	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Ave
Cd/Th (mg/m³)	0.05 mg/m3	1	0.0048	0.0021	0.0018	0.0249	
		2	0.0041	0.002	0.0017	0.0033	
		Annual Ave	0.00445	0.00205	0.00175	0.0141	0.005588
Hg (mg/m³)	0.05 mg/m3	1	0.0049	0.002	0.0022	0.0014	
		2	0.0067	0.0076	0.014	0.0011	
		Annual Ave	0.0058	0.0048	0.0081	0.00125	0.004988
Hf (mg/m³)	2 mg/m3	1	0.01	0.016	0.03	0.01	
		2	0.01	0.012	0.03	0.01	
		Annual Ave	0.01	0.014	0.03	0.01	0.016
Group III Metals (mg/m³)	0.5 mg/m3	1	0.078	0.0762	0.0812	0.2916	
		2	0.1101	0.1021	0.0665	0.0868	
		Annual Ave	0.09405	0.08915	0.07385	0.1892	0.111563
Dioxins (ng/m³)	0.1 ng/m3	1	0.0156		0.1007		
		2	0.0659		0.0495		
		Annual Ave	0.04075		0.0751		0.057925
		*0.1007 +/- 0.0212 (Annual average 0.052 ng/m3)					

Table 6 Emissions of periodically monitored pollutants 2016

Summary of plant compliance:***Description of non-compliances and abnormal operations notified to the Environment Agency.***

Set against the total operational hours on each stream plant performance is of an extremely high level. The numbers of occasions where emission limit values have been exceeded are comparatively small and when expressed as a percentage of operating time within limits equates to 1.57% for the whole year.

This is primarily based on the numbers of 10 minute or ½ hourly average readings taken by emissions monitoring instruments and, in reality, although each complete 10 minute or ½ hourly period has been considered in this evaluation the duration during which any limit was exceeded is usually for a much shorter length of time.

The permit also recognises that equipment can malfunction and allows, in certain circumstances, for the plant to remain in service under abnormal operating conditions with increased emission limit values. This allows for short term continuous emissions monitoring or purification equipment to be rectified.

Although the permit restricts the period of abnormal operating conditions above to a maximum of 4 hours on any one occasion, or no more than 60 hours of abnormal operation on each line per year, boilers are generally shutdown after the first ½ hour of abnormal operation.

Table 7; below sets out the percentage of time that the plant was operating within its permitted limits for each continuously monitored parameter, both on individual and combined streams. No figures are included below for NH₃ as, whilst this is continuously measured and monitored, there is no limit specified for emissions within the permit.

It is also important to consider that in addition to the high levels of performance indicated in terms of operating times actual emission levels were also considerably lower than prescribed daily averages. Across all parameters actual emissions were, on average 87% and 63% lower than 10 minute or ½ hourly and daily limits respectively.

Substance	Stream 1 (% operating time within limits)	Stream 2 (% operating time within limits)	Combined (% operating time within limits)
Hydrogen Chloride	99.68	98.5	99.09
Sulphur Dioxide	99.99	99.97	99.98
Oxides of Nitrogen	100	99.96	99.98
Volatile Organic Carbon	99.99	99.99	99.99
Particulates	99.7	100	99.85
Carbon Monoxide	99.4	99.7	99.55

Table 7 - Percentage of plant operating time within limits

Unauthorised releases / Schedule 1's

Unauthorised releases relate to circumstances in which permitted emission limit values have been exceeded in situations not considered to comply with the exceptions provided for in abnormal operation.

Levels of unauthorised releases are tightly controlled and prompt remedial action is taken to address the situation with boilers closed down as soon as is practicable where necessary.

Unauthorised releases are notified to the Environment Agency without delay and confirmed in writing by use of 'Schedule 1' Notices. Schedule 1 notices shall also be sent to the Environment Agency should any accident occur which has caused or has the potential to cause pollution.

In 2016, 10 schedule 1 incidents were reported 1 on stream 1 and 22 on stream 2.

Abnormal Operations

As with any type of plant or machinery there will inevitably be occasions where problems or breakdowns are experienced.

Abnormal operations are technically unavoidable stoppages, disturbances, or failures of the abatement plant or measurement devices, during which the concentrations into air and the purified water of the regulated substances may exceed normal emission limit values

As referred to earlier this is recognised within the permit which provides for the plant to continue to operate within limited circumstances for up to 4 hours to enable restoration of normal operations or failed equipment or its replacement as quickly as possible.

In practice, MES Environmental have adopted a policy to initiate the shut down process after only ½ hour of any abnormal operation unless it is clear that the problem can be resolved well within the 4 hour period. Whilst this does not necessarily affect the level of incidence of abnormal operation it significantly reduces the number of operating hours in this situation.

During 2016 stream 1 had 0.5 hrs of abnormal periods of operation and for stream 2 this figure was 2 hrs

Non reportable incidents

In addition to unauthorised releases and abnormal operations there are also situations where incidents will occur that are not required to be reported to the Environment Agency if these either result in no emission being made to atmosphere or occur during start up or shut down mode.

As a responsible operator if such situations occur MESE, always submit a report to the EA describing what occurred and including supporting evidence.

Enforcement Notices.

No enforcement notices were issued by the Environment Agency in respect of any aspect of plant operations during 2016.

6. Summary of plant improvements:

The major plant improvement in 2016 was the investment in refractory. Experts were employed to assess the current situation and report their findings. From this report a different application of refractory technology was employed, a solution that has reduced the tile and refractory failure to a minimal number of occasions. The increased focus on control of the waste inputs and preventative maintenance has also helped reduce the overall emission breaches by over 50%.

Notwithstanding this the operational and environmental efficiency and effectiveness of the plant infrastructure and systems are constantly monitored to identify potential areas for improvement.

Key performance indicators are considered at regular management meetings to identify trends and variations in performance, not only at an individual plant level but in comparison with sister plants at Wolverhampton and Stoke.

This provides a focus for Managers to consider possible areas for improvement and/or situations where action may be necessary in the future.

7. Summary of information made available:

MES Environmental operate an inclusive policy of involving the public in their Operations by encouraging escorted tours of their facilities by interested groups. Last year numerous schools, colleges and industry or environmental groups visited sites and the same will happen this year.

For information about the facility or to arrange a visit, please contact the Operations Manager Mr. B Hurley on 01384 457321

All information sent to the Environment Agency including the operation permit details are available on the public register which is accessible on the Environment Agency website.

Extra copies of this report are available by request from either the above referenced persons or by writing to:

Stuart Thompson
Environmental Manager
MES Environmental
Crown Street
Wolverhampton
WV1 1QB

Appendices

Appendix 1 Performance Reports 2016

Permit Reference Number: AP3435SD
Installation; Dudley Waste Services Limited

Operator: MES Environmental Limited
Form Number: Agency Form / R1

Reporting of Waste Disposal and Recovery for the year2016

Wates description	Disposal route	Tonnes	Recovery tonnes
2016			
1) Hazardous Wastes			
Named haz. Waste (Specify each separately)	Reprocess Fly ash (APC)	3216	0
Other hazardous wastes			
Total hazardous waste			0
2) Non-Hazardous Wastes			
Named non-haz. Waste (Specify each separately)	Reprocess IBA	16052	0
Other non-hazardous wastes	Recycling (Fe)	1452	1452
Total non-hazardous waste		17504	
TOTAL WASTE	-	20720	

Wates description	Disposal route	Tonnes	Recovery tonnes
2015			
1) Hazardous Wastes			
Named haz. Waste (Specify each separately)	Reprocess Fly ash (APC)	3215	0
Other hazardous wastes			
Total hazardous waste			0
2) Non-Hazardous Wastes			
Named non-haz. Waste (Specify each separately)	Reprocess IBA	16758	0
Other non-hazardous wastes	Recycling (Fe)	1194	1194
Total non-hazardous waste		17952	
TOTAL WASTE	-	21167	

Signed
(Authorised to sign as representative of Operator)

Date.....

Permit Reference Number: AP3435SD

Operator: MES Environmental Limited

Installation; Dudley Waste Services Limited

Form Number: Agency Form / AP3435SD / WU1

Reporting of Water Usage for the year2016

2016 - Water source	Usage (m ³)	Usage (m ³ /t)
Mains water	45795	0.49
Site borehole		
River abstraction		
Canal abstraction		
TOTAL WATER USAGE	45795	0.49

2015 - Water source	Usage (m ³)	Usage (m ³ /t)
Mains water	58160	0.49
Site borehole		
River abstraction		
Canal abstraction		
TOTAL WATER USAGE	58160	0.49

Signed
(Authorised to sign as representative of Operator)

Date.....

Permit Reference Number: AP3435SD

Operator: MES Environmental Limited

Installation; Dudley Waste Services Limited

Form Number: Agency Form / AP3435SD / E1

Reporting of Energy Usage for the year2016

2016 - Source		Calculated	CO ₂ Produced (tonnes)
Electricity	MWh	7913	3402.6
Natural Gas	tonnes	N/A	
Gas Oil	tonnes	42	154.3
Recovered Fuel Oil	tonnes	N/A	
TOTAL	-		3556.9

2015 - Source		Calculated	CO ₂ Produced (tonnes)
Electricity	MWh	7879	3388
Natural Gas	tonnes	N/A	
Gas Oil	tonnes	33.37	122.6
Recovered Fuel Oil	tonnes	N/A	
TOTAL	-		3510.6

Signed
(authorised to sign as representative of Operator)

Date.....

Permit Reference Number: AP3435SD

Operator: MES Environmental Limited

Installation; Dudley Waste Services Limited

Form Number: Agency Form / AP3435SD / PI1

Reporting of Performance Indicators for the period ...01/01/2016..... to ...31/12/2016

Annual Production/Treatment	
Total municipal waste incinerated (excluding separately collected fractions)	93075 tonnes
Total other wastes Incinerated	217 tonnes
Electrical energy generated and exported	36701 MWhrs
Electrical energy generated and used on installation	7641 MWhrs

Signed
(authorised to sign as representative of Operator)

Date.....

Environmental Performance Indicators

2016

Parameter	Average	Units
Electrical energy imported to site	2.92	kWhrs/ tonne of waste incinerated (dry basis)
Fuel oil consumption	0.54	kg/ tonne of waste incinerated (dry basis)
Mass of bottom ash produced	172	kg/ tonne of waste incinerated (dry basis)
Mass of APC residues produced	34.47	kg/ tonne of waste incinerated (dry basis)
Mass of other solid residues produced	15.56	kg/ tonne of waste incinerated (dry basis)
Urea consumption	1.8	kg/ tonne of waste incinerated (dry basis)
Activated carbon consumption	0.043	kg/ tonne of waste incinerated (dry basis)
Lime consumption	9.97	kg/ tonne of waste incinerated (dry basis)
Water consumption	0.49	m ³ / tonne of waste incinerated (dry basis)

2015

Parameter	Average	Units
Electrical energy imported to site	3.092	kWhrs/ tonne of waste incinerated (dry basis)
Fuel oil consumption	0.44	kg/ tonne of waste incinerated (dry basis)
Mass of bottom ash produced	184.4	kg/ tonne of waste incinerated (dry basis)
Mass of APC residues produced	35.4	kg/ tonne of waste incinerated (dry basis)
Mass of other solid residues produced	13.14	kg/ tonne of waste incinerated (dry basis)
Urea consumption	1.05	kg/ tonne of waste incinerated (dry basis)
Activated carbon consumption	0.033	kg/ tonne of waste incinerated (dry basis)
Lime consumption	11.84	kg/ tonne of waste incinerated (dry basis)
Water consumption	0.64	m ³ / tonne of waste incinerated (dry basis)

Operator's comments :

Signed
(Authorised to sign as representative of Operator)

Date.....

APPENDIX 2

Continuously Monitored Emissions to Air (mg/m³*) from Emission Point A1 – 2016

HCL	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 60	Annual ½ Hrly Max	198	Monthly ½ Hrly Max	61	51	80	42	41	31	52	45	42	42	24	198
	Annual ½ Hrly Mean	5	Monthly ½ Hrly Mean	6	5	6	5	6	5	4	5	4	5	4	4
Daily Ave ELV 10	Annual Daily Max	11	Monthly Daily Max	8	7	8	8	7	7	6	6	6	6	6	11
	Annual Daily Mean	5	Monthly Daily Mean	6	5	6	5	6	5	4	5	4	5	4	4

SO₂	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 200	Annual ½ Hrly Max	230	Monthly ½ Hrly Max	230	138	131	206	135	95	157	64	95	124	63	65
	Annual ½ Hrly Mean	16	Monthly ½ Hrly Mean	16	19	21	20	18	17	14	14	13	15	14	13
Daily Ave ELV 50	Annual Daily Max	32	Monthly Daily Max	21	26	27	32	24	25	21	17	17	22	18	16
	Annual Daily Mean	16	Monthly Daily Mean	16	19	21	20	18	17	14	14	13	15	14	13

NO_x	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 400	Annual ½ Hrly Max	309	Monthly ½ Hrly Max	291	293	306	246	264	309	269	208	252	246	209	255
	Annual ½ Hrly Mean	164	Monthly ½ Hrly Mean	181	180	180	179	179	168	154	141	156	149	155	143
Daily Ave ELV 200	Annual Daily Max	192	Monthly Daily Max	192	185	185	184	181	178	181	155	174	177	180	179
	Annual Daily Mean	164	Monthly Daily Mean	181	180	180	179	179	168	154	141	156	149	155	143

VOC	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 20	Annual ½ Hrly Max	100	Monthly ½ Hrly Max	34	100	31	4	81	58	15	30	3	4	9	10
	Annual ½ Hrly Mean	1	Monthly ½ Hrly Mean	1	4	2	1	1	1	1	1	1	1	1	1
Daily Ave ELV 10	Annual Daily Max	7	Monthly Daily Max	1	1	3	1	4	4	7	2	1	1	2	1
	Annual Daily Mean	1	Monthly Daily Mean	1	4	2	1	1	1	1	1	1	1	1	1

NH₃	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av No ELV	Annual ½ Hrly Max	539	Monthly ½ Hrly Max	36	539	503	20	188	69	19	16	5	8	19	24
	Annual ½ Hrly Mean	2	Monthly ½ Hrly Mean	3	2	3	2	3	2	1	1	1	1	1	1
Daily Ave No ELV	Annual Daily Max	15	Monthly Daily Max	5	15	12	4	8	4	2	2	2	2	1	3
	Annual Daily Mean	2	Monthly Daily Mean	3	2	3	2	3	2	1	1	1	1	1	1

Particulates	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 30	Annual ½ Hrly Max	58	Monthly ½ Hrly Max	4	5	23	4	14	35	13	4	58	7	49	9
	Annual ½ Hrly Mean	3	Monthly ½ Hrly Mean	2	2	3	2	2	4	4	2	3	3	3	4
Daily Ave ELV 10	Annual Daily Max	10	Monthly Daily Max	2	3	5	3	5	10	7	2	4	3	4	5
	Annual Daily Mean	3	Monthly Daily Mean	2	2	3	2	2	4	4	2	3	3	3	4

CO	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10 min Av ELV 150	Annual 10 min Max	937	Monthly 10 min Max	23	15	26	21	792	937	131	315	15	42	23	140
	Annual 10 min Mean	10	Monthly 10 min Mean	8	7	11	7	19	20	10	8	5	6	7	5
Daily Ave ELV 50	Annual Daily Max	87	Monthly Daily Max	13	40	64	11	64	87	30	37	14	16	16	27
	Annual Daily Mean	10	Monthly Daily Mean	8	7	11	7	19	20	10	18	5	6	7	5

* Figures reported to the nearest whole number.

Continuously Monitored Emissions to Air (mg/m3*) from Emission Point A2 – 2016

HCL	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 60	Annual ½ Hrly Max	229	Monthly ½ Hrly Max	66	30	36	79	35	58	66	123	130	69	167	229
	Annual ½ Hrly Mean	5	Monthly ½ Hrly Mean	6	5	6	5	6	5	5	6	5	6	5	5
Daily Ave ELV 10	Annual Daily Max	19	Monthly Daily Max	8	7	12	7	7	7	8	12	12	7	7	19
	Annual Daily Mean	5	Monthly Daily Mean	6	5	6	5	6	5	5	6	5	6	5	5

SO₂	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 200	Annual ½ Hrly Max	267	Monthly ½ Hrly Max	113	234	215	111	164	267	202	162	203	106	114	126
	Annual ½ Hrly Mean	20	Monthly ½ Hrly Mean	15	21	23	20	26	27	21	17	16	18	16	16
Daily Ave ELV 50	Annual Daily Max	41	Monthly Daily Max	17	28	33	29	41	37	36	24	32	23	19	20
	Annual Daily Mean	20	Monthly Daily Mean	15	21	23	20	26	27	21	17	16	18	16	16

NO_x	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 400	Annual ½ Hrly Max	482	Monthly ½ Hrly Max	346	423	327	482	377	442	361	377	358	324	315	422
	Annual ½ Hrly Mean	184	Monthly ½ Hrly Mean	184	183	184	183	187	187	181	181	183	185	181	190
Daily Ave ELV 200	Annual Daily Max	237	Monthly Daily Max	193	191	197	194	193	202	197	203	195	198	190	237
	Annual Daily Mean	184	Monthly Daily Mean	184	183	184	183	187	187	181	181	183	185	181	190

VOC	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 20	Annual ½ Hrly Max	109	Monthly ½ Hrly Max	62	7	45	6	57	109	6	4	5	10	6	39
	Annual ½ Hrly Mean	1	Monthly ½ Hrly Mean	1	1	1	1	2	3	0	1	1	1	1	1
Daily Ave ELV 10	Annual Daily Max	5	Monthly Daily Max	3	2	1	1	1	5	1	1	1	1	1	1
	Annual Daily Mean	1	Monthly Daily Mean	1	1	1	1	1	3	0	1	1	1	1	1

NH₃	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av No ELV	Annual ½ Hrly Max	140	Monthly ½ Hrly Max	114	139	140	51	30	76	17	69	20	90	19	48
	Annual ½ Hrly Mean	4	Monthly ½ Hrly Mean	5	4	5	3	5	9	1	1	2	3	4	4
Daily Ave No ELV	Annual Daily Max	21	Monthly Daily Max	16	7	12	8	6	21	8	4	3	6	7	6
	Annual Daily Mean	4	Monthly Daily Mean	5	4	5	3	5	9	1	1	2	3	4	4

Particulates	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 30	Annual ½ Hrly Max	100	Monthly ½ Hrly Max	3	9	24	4	23	100	3	2	5	5	3	1
	Annual ½ Hrly Mean	0.5	Monthly ½ Hrly Mean	1	1	1	0	1	1	0	0	0	0	0	0
Daily Ave ELV 10	Annual Daily Max	1	Monthly Daily Max	1	3	1	1	0	0	1	1	1	1	0	0
	Annual Daily Mean	0.5	Monthly Daily Mean	1	1	1	0	0	1	0	0	0	0	0	0

CO	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10 min Av ELV 150	Annual 10 min Max	1358	Monthly 10 min Max	809	43	30	42	281	1358	26	26	20	44	20	64
	Annual 10 min Mean	12	Monthly 10 min Mean	14	9	10	10	17	42	6	6	6	8	8	10
Daily Ave ELV 50	Annual Daily Max	202	Monthly Daily Max	106	22	18	51	22	202	21	24	16	19	22	27
	Annual Daily Mean	12	Monthly Daily Mean	14	9	10	10	12	42	6	6	6	8	8	10

* Figures reported to the nearest whole number.