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**The Environmental Permitting (England  
and Wales) Regulations 2010**

**Permit: EPR/TP3836CT  
Beddington Energy Recovery Facility**

**Annual Performance Report  
1<sup>st</sup> January– 31<sup>st</sup> December 2018**

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## Quality Assurance

This report has been prepared with all reasonable skill, care and diligence. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

### **Report Details**

Report Title: Beddington Energy Recovery Facility –  
Annual Performance Report 2018

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### **Report Generated By**

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## **1. Introduction**

Beddington Energy Recovery Facility (ERF) facility is located in Beddington, Croydon. The facility has a design capacity to process 300,000 tonnes per year of residual municipal waste and has the capability of generating 26.1MW of electricity.

In accordance with the requirements of Schedule 4 and Table S4.3 of Permit EPR/TP3836CT issued by Environment Agency to Viridor Waste Management Limited (Viridor) on 19 August 2013, Viridor is required to submit a summary of the environmental monitoring works undertaken at the site on a quarterly basis. Such reports will form the basis of this annual environmental review report, which is to be submitted to the Environment Agency each year, in accordance with Condition 4.2 of the Permit.

This report summarises the environmental and performance data collected at the site 1<sup>st</sup> January – 31<sup>st</sup> December 2018 and fulfils the requirement of Chapter IV Article 55(2) of the Industrial Emissions Directive.

The report will cover the following areas of environmental and performance monitoring:

Section 2 – Point Source Emissions to Air

Section 3 – Residue Quality Monitoring Requirements

Section 4 – Performance Parameters

## **2. Point Source Emissions to Air**

### **2.1 Introduction**

Permit Condition 3.5.1(a) and Tables S3.1 and S3.1(a) require Viridor to undertake performance monitoring of the point source emissions to air arising at sample points A1 and A2.

A summary of the point source emissions to air monitoring data at sample point A1 and A2 for the period is included as Table 1 and 2.

Viridor note, in line with Permit variation application number EPR/TP3836CT/V002; 30-minute carbon monoxide (CO) average monitoring will be replaced with CO 10 minute average monitoring.

The facility was in commissioning throughout this quarter, with first waste acceptance on 18th July 2018. Combustion of waste on-site was to complete hot commissioning of the ERF and associated equipment. The emissions from the site were monitored against commissioning limits outlined in Procedure: 47900202\_40M0002 – A BPE COMMISSIONING PLANT FOR EMISSIONS DURING COMMISSIONING' which was agreed by the Environment Agency to allow for optimisation through the commissioning phase.

### **2.2 Commentary on Data**

The recorded concentrations remained compliant with the limits set out in: 47900202\_40M0002 – A BPE COMMISSIONING PLANT FOR EMISSIONS DURING COMMISSIONING'

The tables below refer to the emissions limits within the environmental Permit Table S3.1 Although these limits are not applicable during site commissioning; we work hard to remain below these limits.

Tables 1 and 2 below give continuous monitoring data collected by the sites own Continuous Emissions Monitoring equipment (CEMs). Tables 3 and 4 give external data collected by a third party MCERTS accredited test-house and laboratory.

### **2.3 Schedule Notices Issued**

No scheduled notifications were submitted during the period.

**Table 1: Emissions to Air from A1 - CEMS**

Emissions to Air from ERF – Continuous Monitoring												
Parameter	Limit & units *	Reference Period	A1 – Q1		A1 – Q2		A1 – Q3		A1 – Q4		Test Method	Uncertainty <sup>(1)</sup>
			Max	Avg	Max	Avg	Max	Avg	Max	Avg		
Oxides of nitrogen	165 mg/m³	Daily average	N/A	N/A	N/A	N/A	137	126	146	130	BS EN 15267-3	
	400 mg/m³	½ hourly average	N/A	N/A	N/A	N/A	340	126	311	131		
Particulate Matter	10 mg/m³	Daily average	N/A	N/A	N/A	N/A	1	0	0.6	0.45		
	30 mg/m³	½ hourly average	N/A	N/A	N/A	N/A	1	0	1	0		
TOC	10 mg/m³	Daily average	N/A	N/A	N/A	N/A	1	0	0.5	0.1		
	20 mg/m³	½ hourly average	N/A	N/A	N/A	N/A	7	0	3	0		
Hydrogen chloride	10 mg/m³	Daily average	N/A	N/A	N/A	N/A	5	3	8.41	5.15		
	60 mg/m³	½ hourly average	N/A	N/A	N/A	N/A	24	3	22	7		
Sulphur dioxide	50 mg/m³	Daily average	N/A	N/A	N/A	N/A	58	21	29.52	16.3		
	200 mg/m³	½ hourly average	N/A	N/A	N/A	N/A	74	17	81	17		
Carbon monoxide	50 mg/m³	Daily average	N/A	N/A	N/A	N/A	61	11	14.92	5.5		
	150 mg/m³	10 minute average	N/A	N/A	N/A	N/A	121	7	335**	7		

[1] Note: CEMS data figures are adjusted for the method uncertainty

\* Permitted limits, which will take effect following the conclusion of commissioning activities. The facility was operating against commissioning limits which varied depending on the commissioning activity being undertaken (reference should be made to 47900202\_40M0002 – A BPE COMMISSIONING PLANT FOR EMISSIONS DURING COMMISSIONING)

\*\* The increase was for a single 30-minutes during steam-blowing with waste so falls below commissioning limits set out in (PO) 4

**Table 2: Emissions to Air from A2 - CEMS**

Emissions to Air from ERF – Continuous Monitoring												
Parameter	Limit & units *	Reference Period	A2 – Q1		A2 – Q2		A2 – Q3		A2 – Q4		Test Method	Uncertainty <sup>[1]</sup>
			Max	Avg	Max	Avg	Max	Avg	Max	Avg		
Oxides of nitrogen	165 mg/m <sup>3</sup>	Daily average	N/A	N/A	N/A	N/A	148	129	144	134	BS EN 15267-3	
	400 mg/m <sup>3</sup>	½ hourly average	N/A	N/A	N/A	N/A	373	131	314	134		
Particulate Matter	10 mg/m <sup>3</sup>	Daily average	N/A	N/A	N/A	N/A	1	0	10.73**	0.5		
	30 mg/m <sup>3</sup>	½ hourly average	N/A	N/A	N/A	N/A	1	0	424**	0		
TOC	10 mg/m <sup>3</sup>	Daily average	N/A	N/A	N/A	N/A	1	0	0.5	0.1		
	20 mg/m <sup>3</sup>	½ hourly average	N/A	N/A	N/A	N/A	2	0	1	0		
Hydrogen chloride	10 mg/m <sup>3</sup>	Daily average	N/A	N/A	N/A	N/A	6	2	7.45	3.6		
	60 mg/m <sup>3</sup>	½ hourly average	N/A	N/A	N/A	N/A	11	2	12	4		
Sulphur dioxide	50 mg/m <sup>3</sup>	Daily average	N/A	N/A	N/A	N/A	44	18	42.94	21		
	200 mg/m <sup>3</sup>	½ hourly average	N/A	N/A	N/A	N/A	72	14	182	26		
Carbon monoxide	50 mg/m <sup>3</sup>	Daily average	N/A	N/A	N/A	N/A	27	8	9.6	6		
	150 mg/m <sup>3</sup>	10 minute average	N/A	N/A	N/A	N/A	60	7	68	8		

[1] Note: CEMS data figures are adjusted for the method uncertainty

\* Permitted limits, which will take effect following the conclusion of commissioning activities. The facility was operating against commissioning limits which varied depending on the commissioning activity being undertaken (reference should be made to 47900202\_40M0002 – A BPE COMMISSIONING PLANT FOR EMISSIONS DURING COMMISSIONING)

\*\* This was investigated and found to be an instrument failure – the instrument was removed and cleaned, and the reading went back to normal. The next highest 30-minute average was 4 mg/m<sup>3</sup> and next highest daily average was 1 mg/m<sup>3</sup>

**Table 3: Emissions to Air from A1 - Periodic**

Substance / Parameter	Emission Limit Value & units	A1 Result Q1	A1 Result Q2	A1 Result Q3	A1 Result Q4
Nitrous oxide	-	N/A	N/A	N/A	19
Hydrogen fluoride	1 mg/m <sup>3</sup>	N/A	N/A	N/A	1.4
Cd and Th and their compounds	0.05 mg/m <sup>3</sup>	N/A	N/A	N/A	0.001
Hg and its compounds	0.05 mg/m <sup>3</sup>	N/A	N/A	N/A	0.001
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	0.5 mg/m <sup>3</sup>	N/A	N/A	N/A	0.017
Dioxins & Furans (I-TEQ)	0.1 ng/m <sup>3</sup>	N/A	N/A	N/A	0.0010
PCBs (WHO-TEQ Humans / Mammals)	None set ng/m <sup>3</sup>	N/A	N/A	N/A	0.0001
PCBs (WHO-TEQ Fish)	None set ng/m <sup>3</sup>	N/A	N/A	N/A	0.000
PCBs (WHO-TEQ Birds)	None set ng/m <sup>3</sup>	N/A	N/A	N/A	0.0005
Anthanthrene	None set µg/m <sup>3</sup>	N/A	N/A	N/A	<0.0116
Benzo(a)anthracene	None set µg/m <sup>3</sup>	N/A	N/A	N/A	0.06

Benzo(a)pyrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.02
Benzo(b)fluoranthene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.03
Benzo(b)naphtho(2,1-d)thiophene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	<0.0116
Benzo(c)phenanthrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.02
Benzo(ghi)perylene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.08
Benzo(k)fluoranthene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.03
Cholanthrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	<0.0116
Chrysene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.1
Cyclopenta(cd)pyrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.02
Dibenzo(ai)pyrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	<0.0116
Dibenzo(ah)anthracene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	<0.0116
Fluoranthene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.42
Indeno(123-cd)pyrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.02
Naphthalene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	1.20



**Table 4: Emissions to Air from A2 - Periodic**

Substance / Parameter	Emission Limit Value & units	A2 Result Q1	A2 Result Q2	A2 Result Q3	A2 Result Q4
Nitrous oxide	-	N/A	N/A	N/A	25
Hydrogen fluoride	1 mg/m <sup>3</sup>	N/A	N/A	N/A	1.2
Cd and Th and their compounds	0.05 mg/m <sup>3</sup>	N/A	N/A	N/A	0.001
Hg and its compounds	0.05 mg/m <sup>3</sup>	N/A	N/A	N/A	0.001
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	0.5 mg/m <sup>3</sup>	N/A	N/A	N/A	0.04
Dioxins & Furans (I-TEQ)	0.1 ng/m <sup>3</sup>	N/A	N/A	N/A	0.0023
PCBs (WHO-TEQ Humans / Mammals)	None set ng/m <sup>3</sup>	N/A	N/A	N/A	0.0001
PCBs (WHO-TEQ Fish)	None set ng/m <sup>3</sup>	N/A	N/A	N/A	0.0000
PCBs (WHO-TEQ Birds)	None set ng/m <sup>3</sup>	N/A	N/A	N/A	0.0006
Anthanthrene	None set µg/m <sup>3</sup>	N/A	N/A	N/A	< 0.013
Benzo(a)anthracene	None set µg/m <sup>3</sup>	N/A	N/A	N/A	0.03

Benzo(a)pyrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	< 0.013
Benzo(b)fluoranthene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.03
Benzo(b)naphtho(2,1-d)thiophene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	< 0.013
Benzo(c)phenanthrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	< 0.013
Benzo(ghi)perylene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	< 0.013
Benzo(k)fluoranthene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.03
Cholanthrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	< 0.013
Chrysene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.04
Cyclopenta(cd)pyrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	< 0.013
Dibenzo(ai)pyrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	< 0.013
Dibenzo(ah)anthracene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	< 0.013
Fluoranthene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.18
Indeno(123-cd)pyrene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	< 0.013
Naphthalene	None set $\mu\text{g}/\text{m}^3$	N/A	N/A	N/A	0.23

### **3. Residue Quality Monitoring Requirements**

#### **3.1. Introduction**

Permit Condition 3.5.1(c) and Tables S3.4 and S4.1 require Viridor to undertake residue quality monitoring at quarterly intervals (monthly in first year of operation) for both bottom ash and air pollution control residues.

#### **3.2 Commentary on Data**

##### **Incinerator Bottom Ash**

Figures shown in Table 5 detail the analysis undertaken during 2018 which has followed the criteria laid out in the ESA protocol.

##### **Air Pollution Control Residues**

Figures shown in Table 6 detail the analysis undertaken during each quarter.

#### **3.3 Schedule Notices Issued**

No Permit limit exceedances were recorded during the review period for residue quality.

**Table 5: IBA Quality**

IBA Quality					
Parameter	Limit	Q1	Q2	Q3	Q4
Total Organic Carbon	3%	N/A	N/A	N/A	1.5
		<b>Composite</b>	<b>Composite</b>	<b>Composite</b>	<b>Composite</b>
Antimony (mg/kg)	---	N/A	N/A	N/A	101
Cadmium (mg/kg)	---	N/A	N/A	N/A	9.67
Thallium (mg/kg)	---	N/A	N/A	N/A	<0.1
Mercury (mg/kg)	---	N/A	N/A	N/A	<0.5
Lead (mg/kg)	---	N/A	N/A	N/A	750.2
Chromium (mg/kg)	---	N/A	N/A	N/A	108
Copper (mg/kg)	---	N/A	N/A	N/A	1649
Manganese (mg/kg)	---	N/A	N/A	N/A	1032
Nickel (mg/kg)	---	N/A	N/A	N/A	38.1
Arsenic (mg/kg)	---	N/A	N/A	N/A	9.5
Cobalt (mg/kg)	---	N/A	N/A	N/A	21.4
Vanadium (mg/kg)	---	N/A	N/A	N/A	26.3
Zinc (mg/kg)	---	N/A	N/A	N/A	2164.1
Dioxins WHO-TEQ (ng/kg)	---	N/A	N/A	N/A	17.437
Furans (WHO-TEQ) (ng/kg)	---	N/A	N/A	N/A	13.3203
PCB (WHO-TEQ) (ng/kg)	---	N/A	N/A	N/A	0.42296

**Table 6: APCr Quality**

<b>APCr Quality</b>				
<b>Parameter</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
	<b>Composite</b>	<b>Composite</b>	<b>Composite</b>	<b>Composite</b>
Antimony (mg/kg)	N/A	N/A	N/A	1129
Cadmium (mg/kg)	N/A	N/A	N/A	297
Thallium (mg/kg)	N/A	N/A	N/A	0.7
Mercury (mg/kg)	N/A	N/A	N/A	9.43
Lead (mg/kg)	N/A	N/A	N/A	26.1
Chromium (mg/kg)	N/A	N/A	N/A	76.2
Copper (mg/kg)	N/A	N/A	N/A	854
Manganese (mg/kg)	N/A	N/A	N/A	415
Nickel (mg/kg)	N/A	N/A	N/A	18.6
Arsenic (mg/kg)	N/A	N/A	N/A	47
Cobalt (mg/kg)	N/A	N/A	N/A	8.2
Vanadium (mg/kg)	N/A	N/A	N/A	<10
Zinc (mg/kg)	N/A	N/A	N/A	15560
Dioxins WHO-TEQ (ng/kg)	N/A	N/A	N/A	131.743
Furans (WHO-TEQ) (ng/kg)	N/A	N/A	N/A	127.295
PCB (WHO-TEQ) (ng/kg)	N/A	N/A	N/A	16.5579

## 4. Performance Parameters

### 4.1 Introduction

Condition 4.2.2(b), (c), Table S4.2 and S4.3 of the Permit set out the reporting criteria for performance parameters.

### 4.2 Commentary on Data

The recorded performance data is set out in Tables 7 & 8

**Table 7: Energy 1**

Parameter	Total (MWh)	Specific usage (MWh / tonne incinerated)
Electricity generated	33,450	0.42
Electricity exported to the National Grid	29,276	0.36
Energy exported as heat (if any)	0	0
Energy usage	4,174	0.05

**Table 8: Performance 1**

Parameter	Units	
Total municipal waste processed	Tonnes	59,801
Total commercial and industrial waste incinerated	Tonnes	20,515
Total waste incinerated	Tonnes	80,316
Water Usage	m <sup>3</sup> /tonne waste incinerated	3.54
Gas oil consumption	kg/tonne waste incinerated	13.2
Total Urea used	kg/tonne waste incinerated	2.03
Total acid abatement reagent used	kg/tonne waste incinerated	7.19
Total Powdered Activated Carbon used	kg/tonne waste incinerated	0.5
Total Air Pollution Control residues disposed of	kg/tonne waste incinerated	17.1
Total bottom ash generated	kg/tonne waste incinerated	192
Total bottom ash recycled	kg/tonne waste incinerated	192
Total bottom ash disposed of	kg/tonne waste incinerated	0