

BIOMASS UK NO.2 LTD

Annual Performance Report 2020

Permit EPR/AB3790ZB

Barry Energy Production Facility

Biomass UK No.2 Ltd

Year: 2020

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This report is required under the Industrial Emissions Directive's Article 55(2) requirements on reporting and public information on waste incineration plants and co-incineration plants, which require the operator to produce an annual report on the functioning and monitoring of the plant and make it available to the public.

Plant Description and Design

The Barry Energy Production Facility is a renewable energy generation facility which has been designed to recover energy from pre-prepared mixed waste wood feedstocks using gasification. The gasification facility is an Advanced Thermal Treatment (ATT) process that will produce a combustible synthesis gas, which is then used to raise steam and generate electricity, through steam cycle turbine generation.

The Advanced Thermal Treatment (ATT) plant is designed to process shredded mixed waste wood feedstocks to produce heat to raise steam in a conventional tube boiler for utilisation in a steam turbine for the production of renewable electricity with an export capacity up to 10MWe (notionally 9.95MWe).

The Installation has been designed to process approximately 86,400 tonnes of pre-processed non-hazardous mixed waste wood per annum.

Summary of Operational Processes and Procedures

The principle components of the process comprise the following:

Waste Acceptance and Reception: All waste wood is delivered directly into the fuel storage building via electrically operated roller shutter doors. When required, the waste is discharged onto the feedstock feed system, which delivers the waste into the gasification building. All waste is accepted in accordance to the sites waste acceptance procedures.

Gasification: The feedstock feed system delivers the waste into the fluidised bed gasification system where the waste is combusted to produce a synthetic gas (syngas). The syngas is then combusted to produce a high temperature flue-gas. A steam boiler then recovers the heat from the combustion gases through the conversion into superheated steam.

Electricity Generation: The superheated steam then passes to a Steam Turbine and Generator, which will export 10MWe (net) of renewable electricity onto the Local Distribution Network.

Flue-Gas Cleaning: Flue gas cleaning and pollution control consists of urea injection for De-NOx, lime injection for acid gas neutralisation and activated carbon powder injection for absorption and removal of heavy metals, dioxins, VOCs and other harmful substances. The stream has a baghouse system, which is designed to have the capacity to remove submicron dust particles within anticipated emission limit values (ELV's) stipulated by Chapter IV of the Industrial Emissions Directive (IED).

The plant is operated in accordance with its Environmental Management System which is designed to meet the requirements of ISO14001:2004.

Summary of Plant Operations and Maintenance during the reporting year

The plant completed hot commissioning in Q1 2020 and began the testing phase of the commissioning process in April. Unfortunately, due to lack of clarity around fuel supply during the COVID-19 pandemic and ongoing issues with the Local Authority (around regularisation of the planning consent) the plant has been in shut down since April 2020. It is anticipated that once these issues have been resolved the plant will resume operations so that testing can be completed prior to commencement of commercial operations.

Operational Data

Plant Size	86,400 tonnes pa	MWth	10 MWe
No. of combustion lines	1	No. of Turbines:	1

Total waste received	Unit	Q1	Q2	Q3	Q4	Year Total
Waste wood (biomass)	Tonnes	10,866	14,565	-	-	25,431
Total waste wood co-incinerated		10,866	14,565	-	-	25,431

Energy Usage / Export	Unit	Q1	Q2	Q3	Q4	Year Total	MWh/tonne incinerated
Electrical Energy Generated	MWh	8,088	1,369	-	-	9,457	0
Electrical Energy Exported		7,403	1,309	-	-	8,712	0
Electrical Energy Used on site		1,521	240	-	-	1,761	0
Power Imported		56	195	35	6	292	0
Parasitic Load	%	9.1%	16.3%	-	-	10.6%	
Thermal Energy Produced	MWh	-	-	-	-	-	-
Thermal Energy Used on site		-	-	-	-	-	-

Waste Disposal & Recovery	Unit	Q1	Q2	Q3	Q4	Year Total	tonnes/tonne of waste co-incinerated
APC Residues - produced	tonnes	173	28	-	-	201	0.8%
Bottom Ash - produced		201	45	-	-	246	1.0%

Raw Material Usage	Unit	Q1	Q2	Q3	Q4	Year Total	tonnes/tonne of waste co-incinerated
Water Consumption	m ³	6,500	1,227	210	124	8,061	0.32
Urea Consumption	tonnes	27	-	-	-	27	0.00
Activated Carbon Consumption	tonnes	-	-	-	-	-	-
Lime Consumption	tonnes	48	25	-	-	73	0.00
Fuel oil Consumption	tonnes	1,053	287	-	-	1,340	0.05

2020 Annual Reporting Performance Form 1

Permit EPR/AB37902B
 Facility: Barry Energy Production Facility

Operator: Biomass UK No.2 Ltd
 Form: Performance 1

Reporting of Performance Parameters for the Period from:

01 January 2020

31 December 2020

Parameter	Total Values	Units	Specific Value	Units
Electrical Energy imported from national grid	292	MWh	0.0	MWh/tonne of waste co-incinerated (dry basis)
Electrical Energy exported to national grid	8712	MWh	0.3	MWh/tonne of waste co-incinerated (dry basis)
Electrical Energy used at the installation	1761	MWh	0.1	MWh/tonne of waste co-incinerated (dry basis)
Fuel Oil consumption	1340	tonnes	0.05	tonnes/tonne of waste co-incinerated (dry basis)
Mass of bottom ash (including boiler ash)	246	tonnes	0.009673233	tonnes/tonne of waste co-incinerated (dry basis)
Mass of APC residues produced	201	tonnes	0.0	tonnes/tonne of waste co-incinerated (dry basis)
Urea consumption	27	tonnes	0.0	tonnes/tonne of waste co-incinerated (dry basis)
Activated Carbon consumption	0	tonnes	0.0	tonnes/tonne of waste co-incinerated (dry basis)
Lime Consumption	73	tonnes	0.0	tonnes/tonne of waste co-incinerated (dry basis)
Water consumption	8061	m ³	0.3	m ³ /tonne of waste co-incinerated (dry basis)

Operator's comments :

The plant has been in shutdown since April 2020 due to planning conditions by WAG and the Local Authority. All data therefore relates only to the period January - April 2020.

Reporting of Annual Production / Treatment for the Period from: 01 January 2020

to:

Parameter	Value	Unit
Total Waste Wood Received	25431	Tonnes
Total Waste Wood Co-incinerated	25431	Tonnes
Electrical Energy Generated	9457	MWh
Electrical Energy Exported	8712	MWh
Electrical Energy Used on Installation	1761	MWh
Thermal Energy produced	0	MWh
Thermal Energy used on installation	0	MWh
Total bottom ash (including boiler ash produced)	246	Tonnes
Total APC residue produced	201	Tonnes

Operator's comments :

The plant has been in shutdown since April 2020 due to planning conditions by WAG and the Local Authority. All data therefore relates only to the period January - April 2020.

Signed: _____

Date: _____

Summary of Permit Compliance**Compliance with permit limits for continuously monitored pollutants**

The plant met its emission limits as shown in the table below:

Substance	Percentage time compliant during operation	
	Half-hourly limit	Daily limit
Particulates	100%	100%
Oxides of nitrogen	100%	99%
Sulphur dioxide	100%	100%
Carbon monoxide	100%	100%
Total organic carbon	100%	100%
Hydrogen chloride	100%	99%
Hydrogen fluoride	100%	99%
Ammonia	N/A	100%

Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance [including Line/Reference]	Reason	Measures taken to prevent reoccurrence
04/08/2020	Cat 4 Non-compliance for late submission of Q1 Quarterly Reporting	Operational difficulties due to Covid-19	Site manager fully informed of reporting deadlines

Summary of any complaints received and actions taken to resolve them.

Date	Summary of complaint [including Line/Reference]	Reason *	Measures taken to prevent reoccurrence
22/04/2020	Odour complaint to EA	Visible steam emission from burn down of wood chip prior to shutdown	Unsubstantiated
17/07/2020	Noise complaint to EA	Unsubstantiated - plant in shut down	N/A

* including whether substantiated by the operator or the EA

Summary of Plant Improvements

Summary of any efficiency improvements that have been completed within the year.
The plant was operational only in Q1 of 2020 in which commissioning was finalised. There have therefore been no efficiency improvements this year.

Summary of any permit improvement conditions that have been completed within the year and the resulting environmental benefits.
All Pre-operational conditions of the permit have now been completed with the final PO5 and PO6 having been signed off in January 2020.

Plant undergoing commissioning and only operational in Q1 2020, therefore no improvement conditions have yet been completed and submitted.

Summary of any changes to the plant or operating techniques which required a variation to the permit and a summary of the resulting environmental impact.
A variation to the permit was undertaken in March 2019 to allow periodic rather than continuous monitoring of hydrogen fluoride at the plant. QAL-2 and AST testing has yet to be completed as the plant has only been sporadically operational in Q1 2020 with not enough consecutive days operation on which to perform such testing.

Summary of any other improvements made to the plant or planned to be made and a summary of the resulting environmental benefits.
To ensure accurate measurement of the waste wood undergoing incineration, improvements are planned for the weigh belt measuring instrument on the feed system.

2020 Annual Reporting Residues Form 1

Permit EPR/AB3790ZB

Operator: Biomass UK No.2 Ltd

Facility: Barry Energy Production Facility

Form: Performance 1

Reporting of Residue Quality Period from: 01 January 2020 to: 31 December 2020

Residue Composition (TOC, Metals, Dioxins, etc.)																						
	TOC	Sb	Cd	Tl	Hg	Pb	Cr	Cu	Mn	Ni	As	Co	V	Zn	Dioxin/furan	Dioxin / Furan			Dioxin-like PCBs			
	<3 %	mg/kg	l-TEQ ng/kg	WHO-TEQ	Furan	ng/kg	WHO-TEQ	ng/kg	Fish													
Bottom Ash (including boiler ash)																						
APC Residues	N/A																					

Reporting of Ash solubility Period from: N/A to:

Ash Solubility (Metals)													
	Sb	Cd	Tl	Hg	Pb	Cr	Cu	Mn	Ni	As	Co	V	Zn
	mg/kg												
Bottom Ash (including boiler ash)													
APC Residues													

Operator's comments :
Residue testing has not been carried out in 2020. The plant was sporadically operational only in Q1 2020 and did not reach sufficient stability to be able to carry out residue testing.

Signed: _____ Date: _____

Emissions to Water

Summary of monitoring undertaken and compliance
N/A

Commentary on any specific events	
Date & Event	Description

Emissions to Water / Sewer					
Parameter	Monitoring Frequency	Limit	Target	Max.	Average

Emissions to Air (periodically monitored)

Summary of monitoring undertaken, standards used and compliance
Not applicable at this stage. QAL-2 Periodic monitoring and AST testing was not undertaken in Q1 2020 due to the sporadic nature of operations meaning there were not enough consecutive days on which to undertake the testing. The plant has been in shutdown since April 2020, upon re-commencement of operations QAL-2 periodic monitoring will be undertaken at the earliest opportunity.

Results of emissions to air that are periodically monitored							
Substance	Ref. Period	Emission Limit Value	Average				
			Q1	Q2	Q3	Q4	Total
Hydrogen fluoride	min 1 hr	3 mg/m ³					
Cd and Th and their compounds	30 min, max 8hrs	0.05 mg/m ³					
Hg and its compounds	30 min, max 8hrs	0.05 mg/m ³					
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	30 min, max 8hrs	0.5 mg/m ³					
Dioxins & Furans (I-TEQ)	6-8hrs	0.01 ng/m ³					
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m ³					
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m ³					
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m ³					
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m ³					
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m ³					
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m ³					
Total PAHs	6-8hrs	0.001 mg/m ³					
Comments :							

Annual Performance Report 2020

Emissions to Air (continuously monitored)

Summary of monitoring undertaken, standards used and compliance
 CEMS equipment has been in calibration and operational since December 2019. Plant has been in shutdown since April 2020. All data therefore relates only to the period January - April 2020.

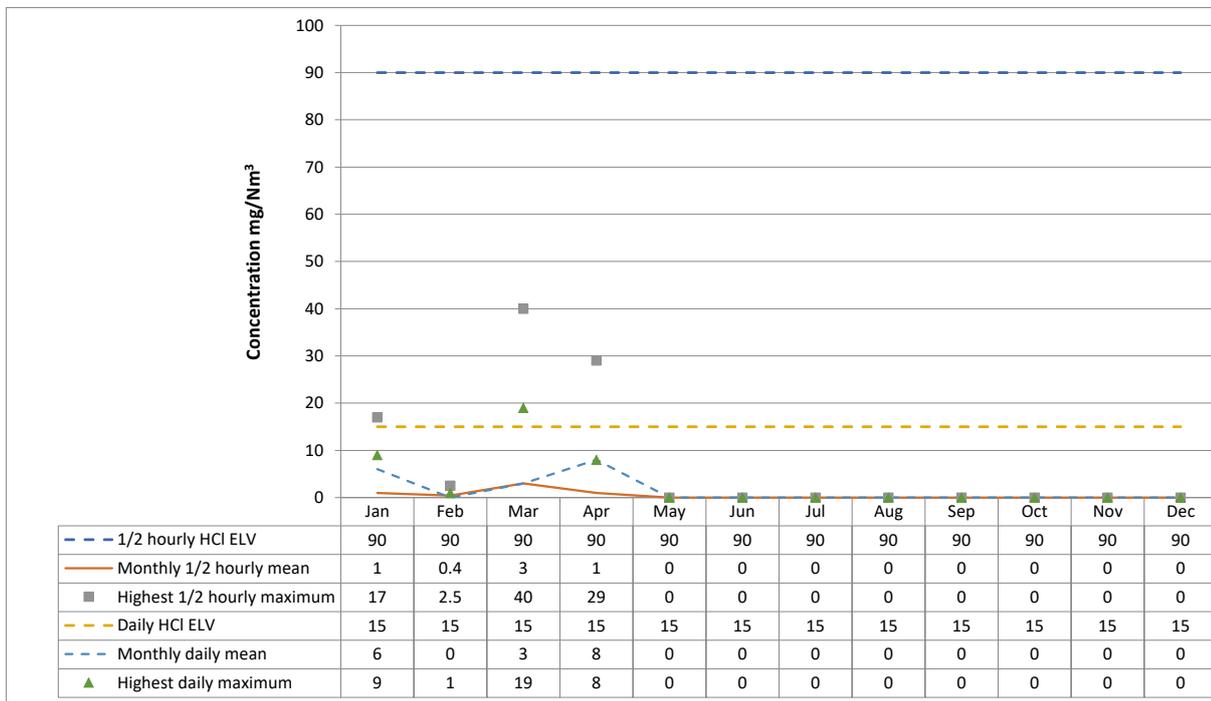
Results of emissions to air that are continuously monitored				
Substance	Reference Period	Emission Limit Value	A1	
			Max.	Avg.
Oxides of nitrogen	Daily mean	300 mg/m ³	334	221.3
	½ hourly mean	600 mg/m ³	529	221.3
Particulates	Daily mean	15 mg/m ³	0.3	<1
	½ hourly mean	45 mg/m ³	0.3	0.2
Total Organic Carbon	Daily mean	15 mg/m ³	0.1	0.0
	½ hourly mean	30 mg/m ³	3	0.0
Hydrogen chloride	Daily mean	15 mg/m ³	19	5.7
	½ hourly mean	90 mg/m ³	40	1.4
Hydrogen fluoride	Daily mean	6 mg/m ³	2.2	0.5
	½ hourly mean	1.5 mg/m ³	2.4	0.5
Sulphur dioxide	Daily mean	75 mg/m ³	34	7.0
	½ hourly mean	300 mg/m ³	57	7.3
Carbon monoxide	Daily mean	75 mg/m ³	46	17.0
	½ hourly mean	150 mg/m ³	64	16.8
Ammonia	Daily mean	5 mg/m ³	30	5.3
Nitrous oxide	Daily mean	No Limit Set	7	1.1

* = delete or amend as appropriate

Comments :

Monitoring of Hydrogen Chloride emissions Whole Installation

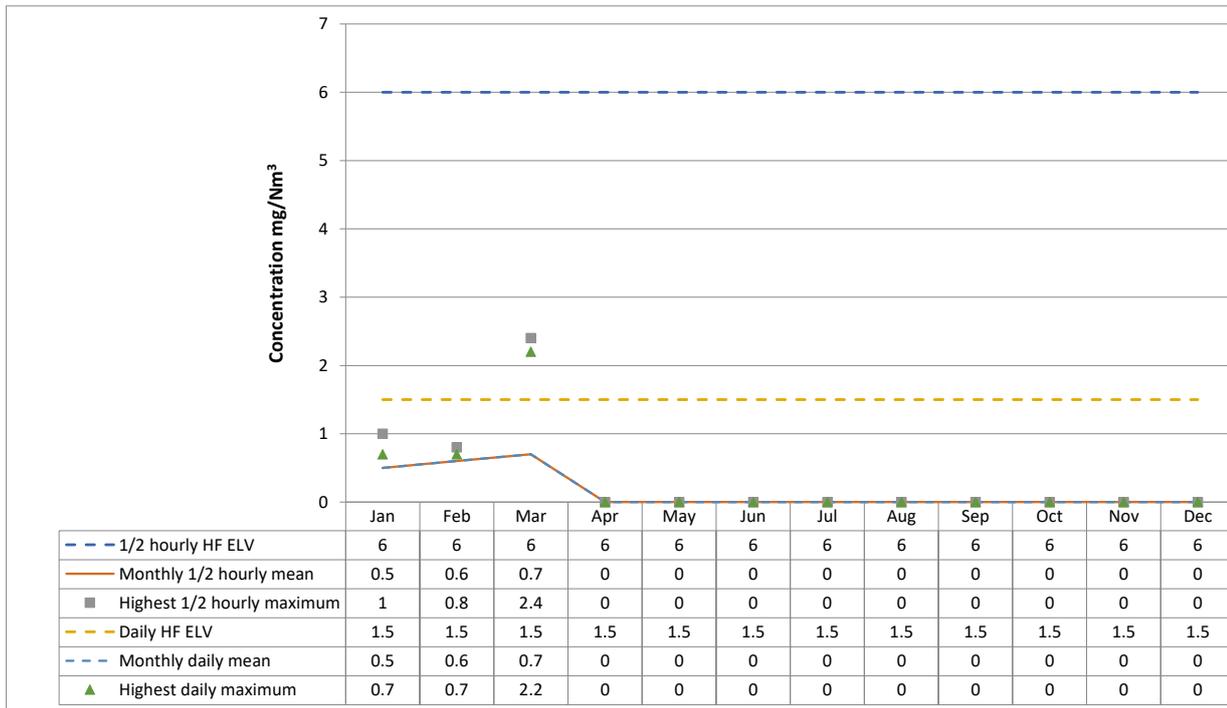
mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly HCl ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily HCl ELV	Monthly daily mean	Highest daily maximum
2020						
Jan	90	1	17	15	6	9
Feb	90	0.4	2.5	15	<1	1
Mar	90	3	40	15	3	19
Apr	90	1	29	15	8	8
May	90	-	-	15	-	-
Jun	90	-	-	15	-	-
Jul	90	-	-	15	-	-
Aug	90	-	-	15	-	-
Sep	90	-	-	15	-	-
Oct	90	-	-	15	-	-
Nov	90	-	-	15	-	-
Dec	90	-	-	15	-	-



Comments :
 Plant operational sporadically in January - April 2020. Shut down since April 2020.

Monitoring of Hydrogen Fluoride emissions Whole Installation

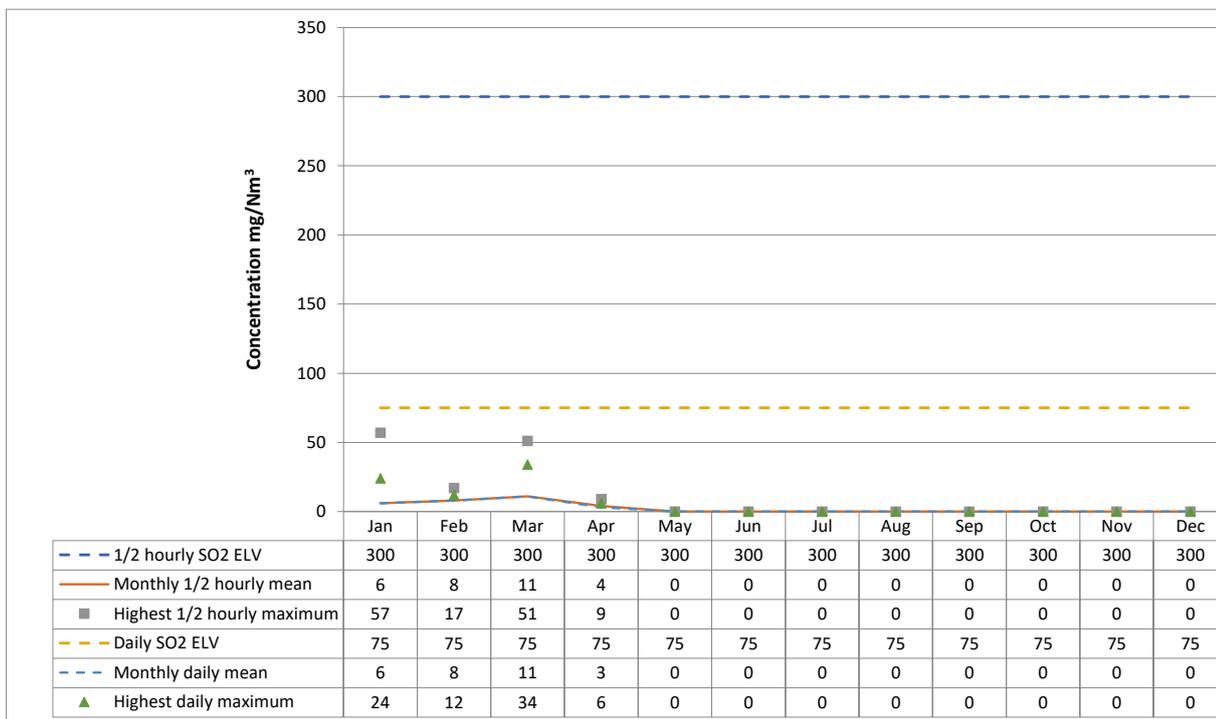
mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly HF ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily HF ELV	Monthly daily mean	Highest daily maximum
2020						
Jan	6	0.5	1	1.5	0.5	0.7
Feb	6	0.6	0.8	1.5	0.6	0.7
Mar	6	0.7	2.4	1.5	0.7	2.2
Apr	6	0	0	1.5	0	0
May	6	-	-	1.5	-	-
Jun	6	-	-	1.5	-	-
Jul	6	-	-	1.5	-	-
Aug	6	-	-	1.5	-	-
Sep	6	-	-	1.5	-	-
Oct	6	-	-	1.5	-	-
Nov	6	-	-	1.5	-	-
Dec	6	-	-	1.5	-	-



Comments :
 Plant operational sporadically in January - April 2020. Shut down since April 2020.

Monitoring of Sulphur dioxide emissions Whole Installation

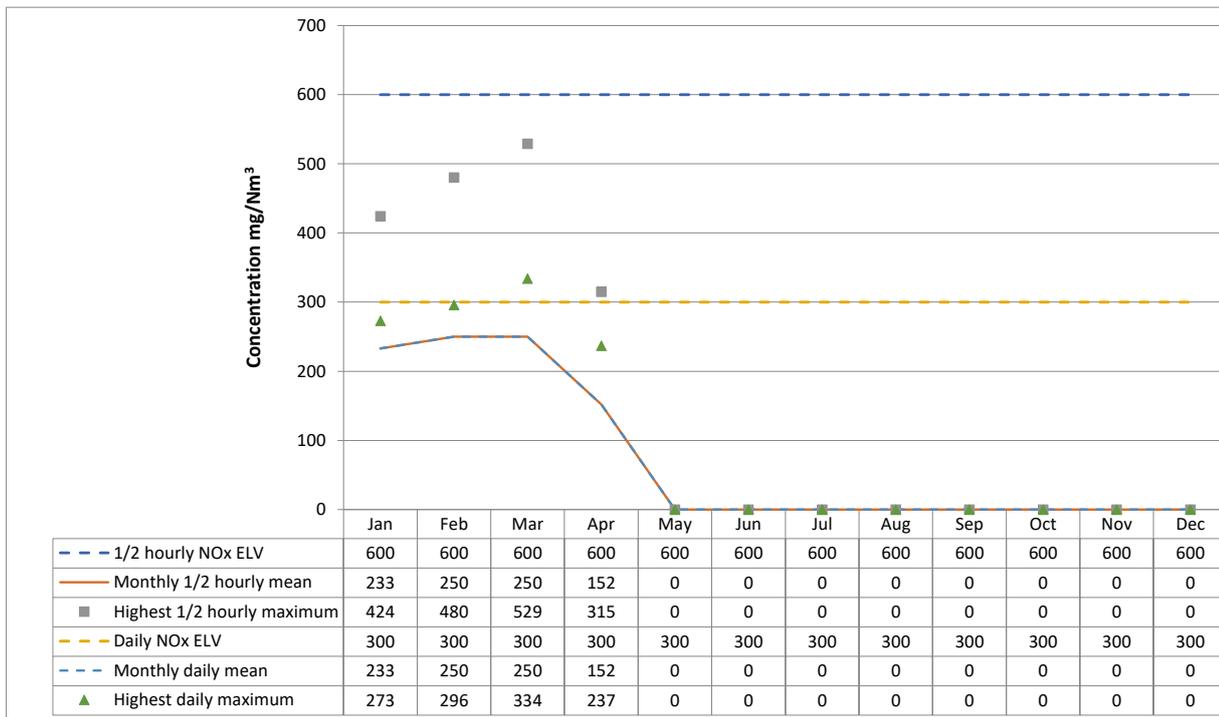
mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly SO2 ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily SO2 ELV	Monthly daily mean	Highest daily maximum
2020						
Jan	300	6	57	75	6	24
Feb	300	8	17	75	8	12
Mar	300	11	51	75	11	34
Apr	300	4	9	75	3	6
May	300	-	-	75	-	-
Jun	300	-	-	75	-	-
Jul	300	-	-	75	-	-
Aug	300	-	-	75	-	-
Sep	300	-	-	75	-	-
Oct	300	-	-	75	-	-
Nov	300	-	-	75	-	-
Dec	300	-	-	75	-	-



Comments :
 Plant operational sporadically in January - April 2020. Shut down since April 2020.

Monitoring of Oxides of Nitrogen emissions Whole Installation (A1)

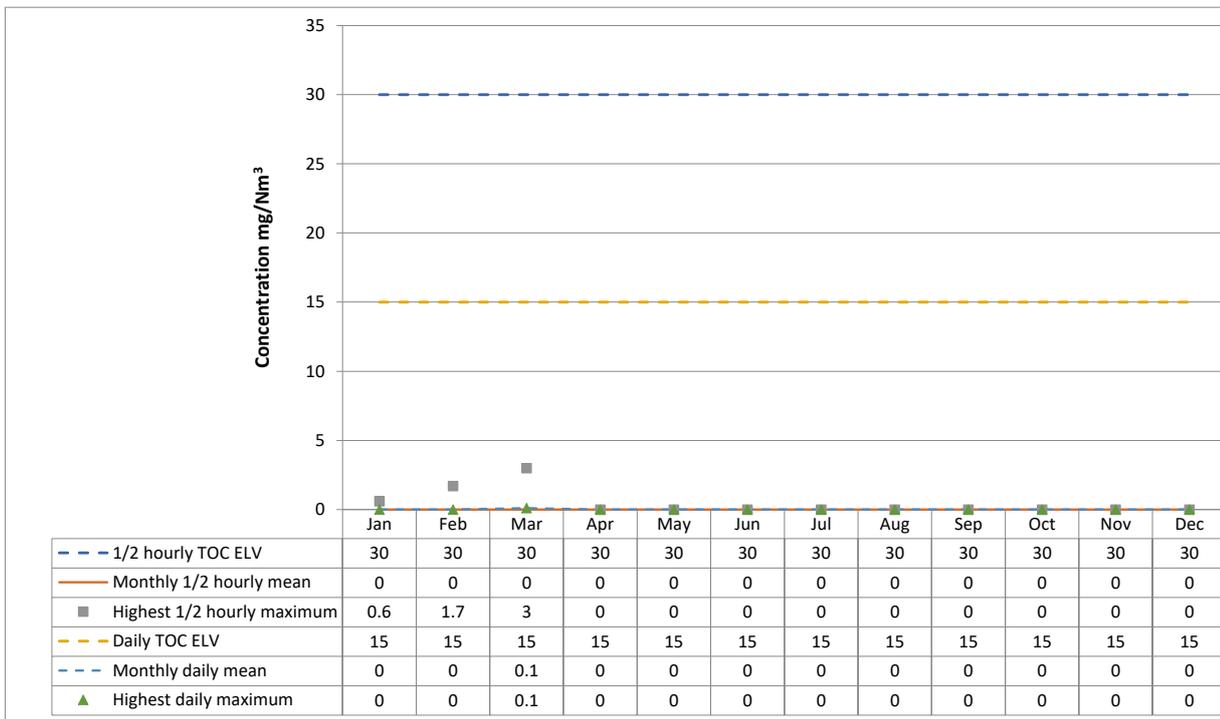
mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly NOx ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily NOx ELV	Monthly daily mean	Highest daily maximum
2020						
Jan	600	233	424	300	233	273
Feb	600	250	480	300	250	296
Mar	600	250	529	300	250	334
Apr	600	152	315	300	152	237
May	600	-	-	300	-	-
Jun	600	-	-	300	-	-
Jul	600	-	-	300	-	-
Aug	600	-	-	300	-	-
Sep	600	-	-	300	-	-
Oct	600	-	-	300	-	-
Nov	600	-	-	300	-	-
Dec	600	-	-	300	-	-



Comments :
 Plant operational sporadically in January - April 2020. Shut down since April 2020.

Monitoring of Total organic carbon emissions Whole Installation

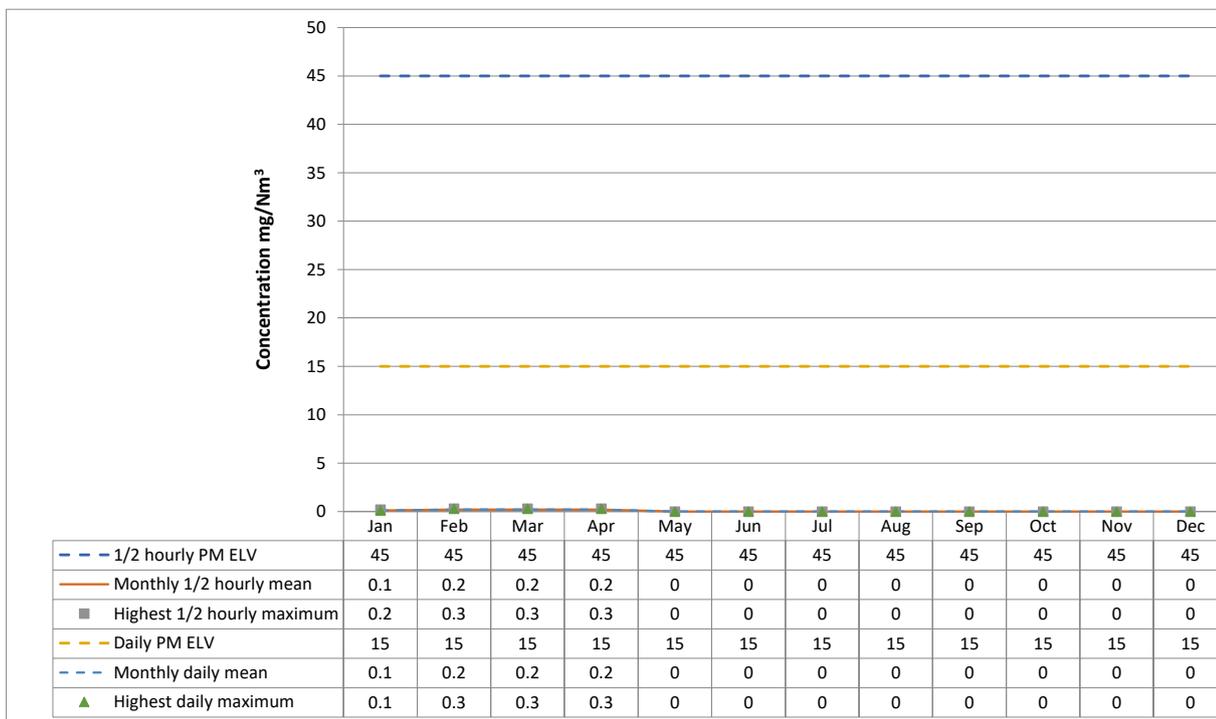
mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly TOC ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily TOC ELV	Monthly daily mean	Highest daily maximum
2020						
Jan	30	-	0.6	15	0	0
Feb	30	0	1.7	15	0	0
Mar	30	0	3	15	0.1	0.1
Apr	30	0	0	15	0	0
May	30	-	-	15	-	-
Jun	30	-	-	15	-	-
Jul	30	-	-	15	-	-
Aug	30	-	-	15	-	-
Sep	30	-	-	15	-	-
Oct	30	-	-	15	-	-
Nov	30	-	-	15	-	-
Dec	30	-	-	15	-	-



Comments :
 Plant operational sporadically in January - April 2020. Shut down since April 2020.

Monitoring of Particulate matter emissions Whole Installation

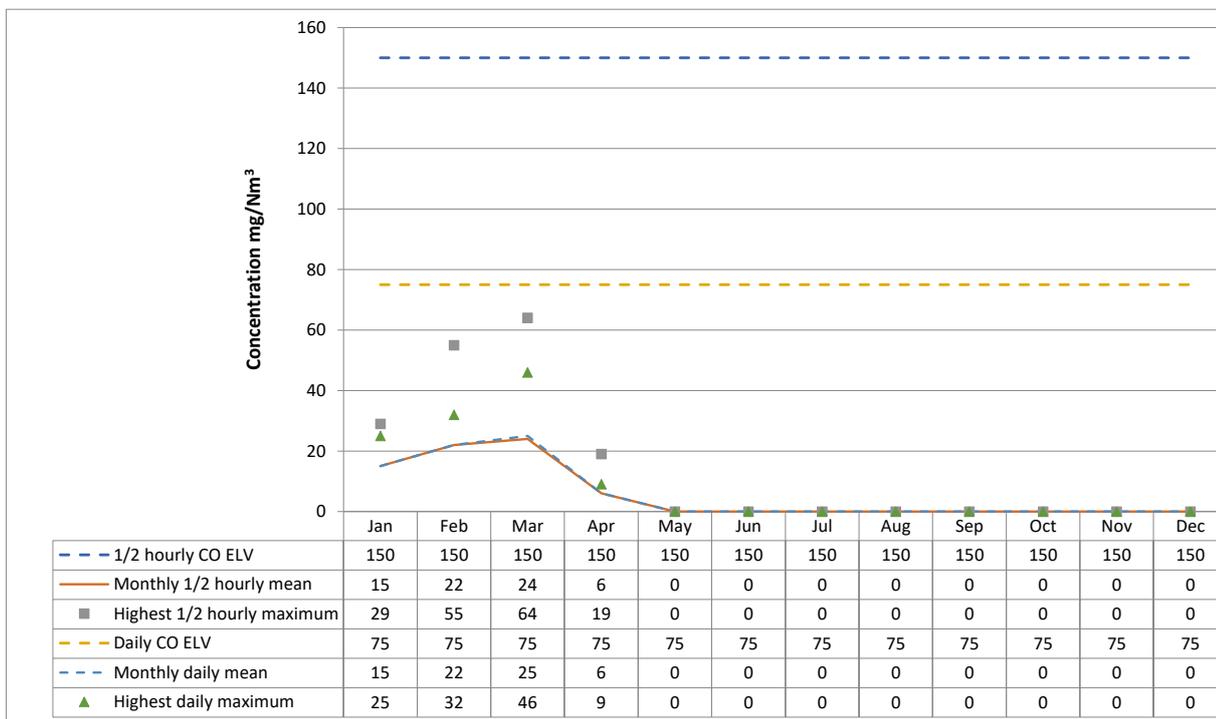
mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly PM ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily PM ELV	Monthly daily mean	Highest daily maximum
2020						
Jan	45	0.1	0.2	15	0.1	0.1
Feb	45	0.2	0.3	15	0.2	0.3
Mar	45	0.2	0.3	15	0.2	0.3
Apr	45	0.2	0.3	15	0.2	0.3
May	45	-	-	15	-	-
Jun	45	-	-	15	-	-
Jul	45	-	-	15	-	-
Aug	45	-	-	15	-	-
Sep	45	-	-	15	-	-
Oct	45	-	-	15	-	-
Nov	45	-	-	15	-	-
Dec	45	-	-	15	-	-



Comments :
 Plant operational sporadically in January - April 2020. Shut down since April 2020.

Monitoring of Carbon Monoxide (half hourly) Whole Installation

mg/Nm ³	1/2 Hourly Reference Periods			Daily Reference Periods		
	1/2 hourly CO ELV	Monthly 1/2 hourly mean	Highest 1/2 hourly maximum	Daily CO ELV	Monthly daily mean	Highest daily maximum
2020						
Jan	150	15	29	75	15	25
Feb	150	22	55	75	22	32
Mar	150	24	64	75	25	46
Apr	150	6	19	75	6	9
May	150	-	-	75	-	-
Jun	150	-	-	75	-	-
Jul	150	-	-	75	-	-
Aug	150	-	-	75	-	-
Sep	150	-	-	75	-	-
Oct	150	-	-	75	-	-
Nov	150	-	-	75	-	-
Dec	150	-	-	75	-	-



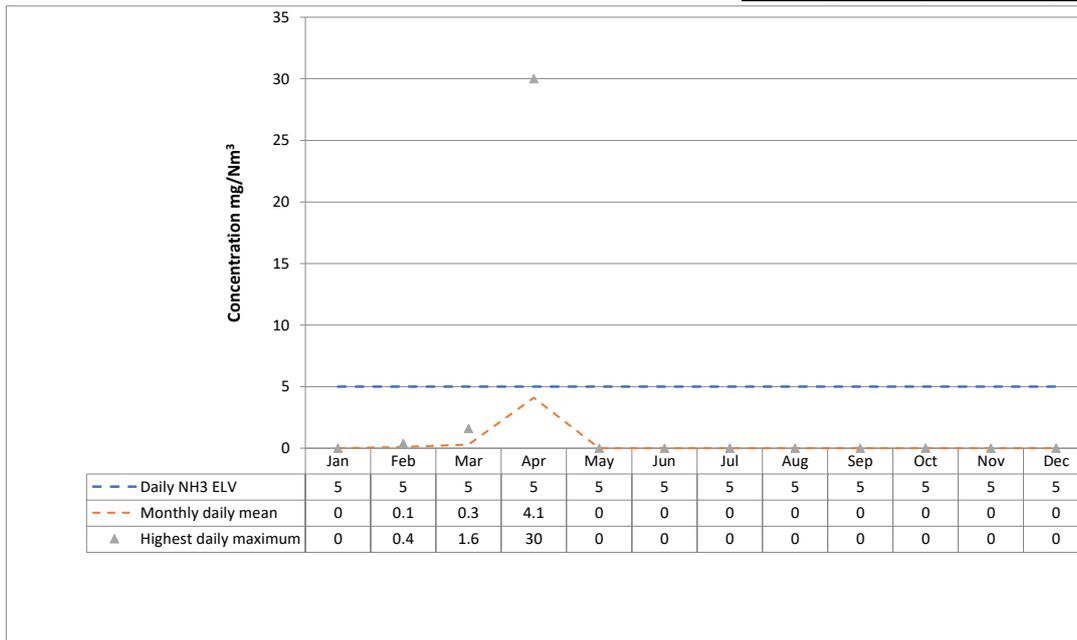
Comments :
 Plant operational sporadically in January - April 2020. Shut down since April 2020.

Monitoring of Ammonia emissions

mg/Nm ³	Daily Reference Periods		
	Daily NH3 ELV	Monthly daily mean	Highest daily maximum
2020			
Jan	5	0	0
Feb	5	0.1	0.4
Mar	5	0.3	1.6
Apr	5	4.1	30
May	5	-	-
Jun	5	-	-
Jul	5	-	-
Aug	5	-	-
Sep	5	-	-
Oct	5	-	-
Nov	5	-	-
Dec	5	-	-

Monitoring of Ammonia Per Combustion Line

2020	mg/Nm ³	Monthly daily mean	Monthly daily maximum
A1	Jan	<1	<1
	Feb	<1	<1
	Mar	2	2
	Apr	8.5	30
	May	-	-
	Jun	-	-
	Jul	-	-
	Aug	-	-
	Sep	-	-
	Oct	-	-
	Nov	-	-
	Dec	-	-
Annual		5.25	30



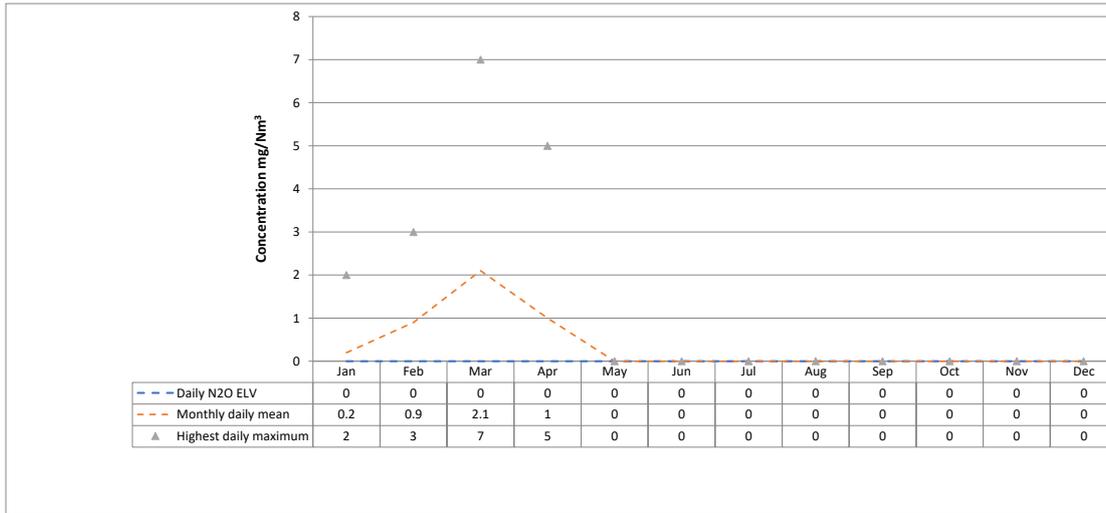
Comments :
 Plant operational sporadically in January - April 2020. Shut down since April 2020.

Monitoring of Nitrous Oxide emissions

mg/Nm ³	Daily Reference Periods		
	Daily N2O ELV	Monthly daily mean	Highest daily maximum
2020			
Jan	0	0.2	2
Feb	0	0.9	3
Mar	0	2.1	7
Apr	0	1	5
May	0	-	-
Jun	0	-	-
Jul	0	-	-
Aug	0	-	-
Sep	0	-	-
Oct	0	-	-
Nov	0	-	-
Dec	0	-	-

Monitoring of Nitrous Oxide € Per Combustion Line

2020	mg/Nm ³	Monthly daily mean	Monthly daily maximum
A1	Jan	0.2	2
	Feb	0.9	3
	Mar	2.1	7
	Apr	1	5
	May	-	-
	Jun	-	-
	Jul	-	-
	Aug	-	-
	Sep	-	-
	Oct	-	-
	Nov	-	-
	Dec	-	-
Annual	1.05	7	



Comments :
 An indicated ELV value of zero in the table above means that no nitrous oxide limit is set in the permit.