Annual Performance Report 2021

Permit No. P0446/14A/V1

Full Circle Generation Ltd

Energy From Waste Plant

Full Circle Generation Ltd

Year:	2021		
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Approved by:		Position:	Director
Version:	1		
Issue Date:	20/01/2022		

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Version Control

Section	Information	Date
1	Preliminary	20/01/2022

Distribution

Copy	Name, Role	No.
1	Harry Lockhart, FCG - Senior General Manager	
2	Steven Castles, NIEA - Pollution Inspector	
3	Alan Cassells, FCG - Plant Manager	

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

Plant is located in the industrial zone of Belfast docks, surrounded by Belfast City airport and Flogas.

It has three lines, ie 3 off RDF gasifiers/boilers, each 20.8MW net thermal.

Design throughput of each line is 5.4 t/h of RDF. Total of 16.2 t/h per plant.
RDF NCV range: 11.5-16.5 MJ/kg.

2 steam turbines: 4.87 and 9.98MWe.

Flue gas scrubbing system consists of SNCR (urea) and dry abatement (lime+PAC) with bag filters.

Summary of Operational Processes and Procedures

Plant has a long list of SOPs covering all areas of the plant including:
- Waste reception, waste handling, waste quarantine, waste sampling
- Residue handling, storage and transport
- All process-related systems including for fuel metering, operation of gasifier, boiler, filtration, RDF and ash systems, water-steam cycle
- Functional safety test procedures
- Start up and shutdown procedures
- Maintenance procedures
- Building management procedures (housekeeping, safety checks, ...)
- Statutorey inspections, tests and checking.
- CEMS monitoring and calibration
- H&S related procedures (dust emissions, safety tests, site access and inductions, training,...)

Plant also has critical EOPs covering:
- fire procedures
- gas release procedure
- grid blackout
- neighbouring site emergency
- boiler leak
- liquid spillage
- steam turbine emergency (fire plan, overspeed, oil leak, TX fire plan)

All SOPs are regularly reviewed and updated.

Signed Director Date 20/01/2022

Annual Performance Report 2021 Full Circle Generation Ltd

Operational Data

Plant Size	144,000	tonnes pa	21	MWth	15	MWe
No. of combustion lines	3	No. of Turbines:		2		

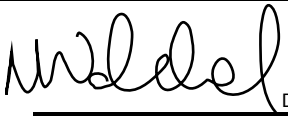
Waste types received	Unit	Q1	Q2	Q3	Q4	**Year Total**	%
Household / Local Authority	tonnes					**-**	-
Commercial & Industrial						**-**	-
Hazardous						**-**	-
Clinical						**-**	-
Waste wood (biomass)						**-**	-
Refuse Derived Fuel * - H'hold/LA		11402	11884	238	25,449	**48,972**	100.0%
Refuse Derived Fuel * - C&I						**-**	-
Other [Please specify]						**-**	-
Other [Please specify]							
Other [Please specify]							
Total waste combusted		**11402**	**11884**	**238**	**25,449**	**48,972**	100.0%
Rejected Waste						**-**	-
Unprocessed waste transferred out						**-**	-

Energy Useage / Export	Unit	Q1	Q2	Q3	Q4	**Year Total**	KWh/te
Power Generated	MWh	4,396	7,269	0	4,170	**15,835**	323
Power Exported		3,550	5,886	0	3,438	**12,874**	263
Power Used on site						**-**	-
Power Imported		1235	601	684	2,450	**4,969**	101
Parasitic Load	%	36.9%	25.2%	-	48.1%	38.1%	
Thermal Energy Produced **	MWh					**-**	-
Thermal Energy Exported **						**-**	-
R1 value					0.74	Design	

Waste Disposal & Recovery	Unit	Q1	Q2	Q3	Q4	**Year Total**	% inputs
APC Residues - produced	tonnes	90	487	0	735	**1,311**	2.7%
IBA - produced		403	1,225	0	2,441	**4,069**	8.3%
Metals recycling						**-**	-
Boiler Ash		16	125	0	145	**287**	0.6%
UGC Ash		242	375	0	219	**836**	1.7%
Other Hazardous Waste (Filter Bags)		0	0	33	0	**33**	0.1%

Raw Material Usage	Unit	Q1	Q2	Q3	Q4	**Year Total**	kg or Ltr /te
Mains Water	ltrs	74,807	76,402	18,844	136,244	**306,297**	6.25
Other Water	ltrs					**-**	-
Ammonia	kgs					**-**	-
Urea (32% solution)	Ltrs	9,368	8,662	-	22,980	**41,010**	0.84
Activated Carbon	kgs	8,500	14,000	500	28,500	**51,500**	1.05
Lime / hydrated lime	kgs	160,060	173,300	3,750	353,110	**690,220**	14.09
Fuel oil	ltrs	963	1,686	598	1,286	**4,533**	0.09
Gas	M3	230,330	113,260	-	304,420	**648,010**	
Other		-	-	-	-	**-**	

Summary	Line/Unit	Q1	Q2	Q3	Q4	**Year Total**	
Availability of waste combustion by line, hrs	1	556	602	53	1,879	**3,090**	35.3%
	2	641	709	3	1,565	**2,919**	33.3%
	3	844	752	0	1,507	**3,103**	35.4%
	4	-	-	-		**-**	x %
	5	-	-	-		**-**	x %
Overall Availability, mean avg. of all lines, hrs		680	688	19	1,650	**1,822**	**x %**
Hours of turbine operations, hrs	1	282	633	-	-	**915**	x %
Hours of turbine operations, hrs	2	267	738	-	1,244	**2,249**	x %
Hours of heat / steam export		-	-	-	-	**-**	n/a
Net Calorific Value of waste	MJ/kg	12.7	13.2	-	11.6	**12.5**	-
Abnormal Events	qty.	38	32	-	29	**99**	yes
Abnormal operation	hours	3,111	3,221	6,528	2,122	**14,983**	57.01%
Permit Breaches	qty.	1	-	-	-	**1**	yes

Signed  Director Date **20/01/2022**

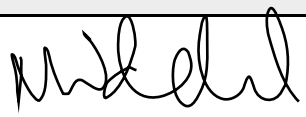
Summary of Plant Operations and Maintenance during the reporting year

The plant is in commercial operation. In July the operator changed from BYES to Full Circle Generation.
There was one planned outage in the period.
This was a statutory outage in July/August along with some equipment improvements which ran into September.
There were two unplanned outages:
1st was from May -June due to different degrees of refractory wear in all three boiler streams.
2nd unplanned outage was in September when 10MW steam turbine was off after a blade excursion in the final stage

Summary of Residue Handling for the reporting year

There are 4 residue sources at the plant:
- IBA (Incineration Bottom Ash) from the end of the grate. Non-Haz.
- UGC (Undergrate and Combustor ash). Haz.
- Boiler ash. Haz.
- APCr filter ash. Haz.

Tonnages are indicated on previous page.
IBA is collected in a common silo (from all three boilers), and discharged on trailers (covered) and taken to Riverridge site at Craigmorewhere it goes through a wash plant and, following compliance with an approved quality the processed product is used as a recycled aggregate material.
UGC is collected in big bags (separately from each stream), collected over the month and transported off site regularly and disposed of to landfill at Augean's site at Port Clarence at Teesside.
Boiler ash is collected in big bags (separately from each stream), collected over the month and transported off site regularly and disposed of to landfill at OCO's Wingmoor Farm site near Avonmouth.
APCr filter ash is collected in two silos (from all three boilers), and discharged in tankers and and transported to OCO's facilty at Leeds and is recovered for use in the manufacture of concrete blocks

Signed  Director Date 20/01/2022

2021 Annual Reporting Performance Form 1

Permit No. P0446/14A/V1 Operator: 0
Facility: Full Circle Generation Ltd Form: Performance 1

Reporting Period from: 01 January 2021 to: 31 December 2021

2021 Annual Reporting of Waste Disposal and Recovery

Waste Description	Disposal Route(s)	Disposal Tonnes	Recovery Tonnes	% / tonne of waste incinerated
1) Hazardous Wastes				
APC Residues	OCO		3,142.6	6.4%
IBA				-
UGC	RRR/Augean	836.2		1.7%
Boiler	OCO	286.8		0.6%
APCR Bag Filter	OCO	32.9		0.1%
Total Hazardous Waste		1,155.9	3,142.6	8.8%
2) Non-Hazardous Wastes				
IBA	RRR		8,641.8	17.6%
Ferrous Metal				-
Process Water	Effluent - Sewage	204,198.0		417.0%
				-
				-
Total Non-Hazardous Waste		204,198.0	8,641.8	434.6%
TOTAL WASTE		**205,353.9**	**11,784.4**	443.4%

Operator's comments :

2021 Annual Reporting of Water and Other Raw Material Usage

Raw Material	Usage	Unit	Specific Useage	Unit
Mains Water	306,297	m^3	6.25	m^3/te
Total Water	306,297	m^3	6.25	m^3/te
Urea	41,010	kg	0.84	kg/te
Activated Carbon	51,500	kg	1.05	kg/te
Lime	690,220	kg	14.09	kg/te

Operator's comments :

2021 Annual Reporting of other performance indicators

Parameter	Results by Line A1	A2	A3	A4	A5		Turbine 1	Turbine 2
Operating hours for the year, hours	3089.7	2918.6	3102.5					
Number of periods of abnormal operation, qty.	1	1	1					
Cumulative hours of abnormal operation for this year, hours	6	6	6					

Operator's comments :

CEMS in manual during March Periodic Test

Signed: Director Date: 20/01/2022

2021 Annual Reporting of Energy Usage/Export

Permit No. P0446/14A/V1 Operator: Full Circle Generation Ltd

Facility: Full Circle Generation Ltd Form: Energy 1

Reporting Period from: 01 January 2021 to: 31 December 2021

Energy Source	Energy Usage	Unit	Specific Useage (KWh/tonne incinerated
Electricity Produced	15,835	MWh	323
Electricity Imported	4,969	MWh	101
Electricity Exported	12,874	MWh	263
Natural gas	648,010	Nm3	7,470
Steam/hot water exported	0	GWh	-

Operator's comments :

Signed: Director Date: 20/01/22

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	
	*97% or 100% Half-hourly limit	Daily limit
Particulates	100.00%	100.00%
Oxides of nitrogen	100.00%	100.00%
Sulphur dioxide	100.00%	100.00%
Total organic carbon	100.00%	100.00%
Hydrogen chloride	100.00%	100.00%
Hydrogen fluoride	100.00%	100.00%
Carbon monoxide	99.91%	100.00%

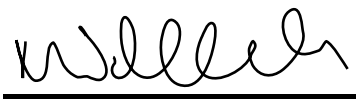
Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance [including Line/Reference]	Reason	Measures taken to prevent reoccurrence
	Refer to all Sch 1 in the Appendix.		

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

Date	Summary of complaint [including Line/Reference]	Reason *	Measures taken to prevent reoccurrence
28/05/2021	Fly Infestation in Fuel Hall	Static fuel - Apr/May FO	Fly Monitor/Abatement
16/06/2021	Excessive Odour from Fuel Hall	During removal of static fuel	Odour Control in service

*** including whether substantiated by the operator or the NIEA**

Signed  Director 20/01/2022

Summary of Plant Improvements

Summary of any efficiency improvements that have been completed within the year.
1. 100% replacement with new grate shoe design with spring loaded side seal on all three lines - improved airflow and reduced quantities of undergrate ash. 2. Replacement of all Slag Screen and Superheater sootblowers with Shock Pulse Generators, SPG to improve heat exchanger bank cleaning on all three lines - improved heat transfer and ash removal and thus reduce gas path blockages leading to improved ID fan efficiency. 3. Replacement of all slagging screen and superheater ash removal hoppers to increase removal surface area and reduce landing area were ash can collect causing blockages - improved gas path flow and increase ID fan efficiency. 4. DCS Combustion control optimisation - improved temperature control in the combustor and back end of the gas path. Provides reduced refractory damage in combustor and increase of efficiency of bag house filiter to absorb controlled substances.

Summary of any permit improvement conditions that have been completed within the year and the resulting environmental benefits.
Mechanical upgrades: 1. . **Software upgrades – improvements for environmental benefits** 1. .

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.
None

Summary of any other improvements made to the plant or planned to be made and a summary of the resulting environmental benefits.
1 Extra SPG between slagging screen and Superheater 2 Independent grate zone speed control 3 Enhanced grate air flow monitoring

Signed Director Date 20/01/2022

Details of Public & Stakeholder Liasion

Summary of events held during the reporting year.	
Date	**Description**

List of events planned for next year	
Date	**Description**

If you wish to be involved in the public liasion programme, please contact __hlockhart@equitix.co.uk_____

Residue Quality Monitoring Requirements

Summary of monitoring undertaken and compliance
IBA ash underwent 12-week assessment - determined to be non-Haz, compliant with the Permit. Quality monitored monthly with lab samples. Reports all submitted promptly.
UGC and Boiler ash - determined to be Haz.
APCr ash - determined to be Haz. Two samples sent to the lab to assess composition and propose plant/process improvements. These were implemented.

Commentary on any specific events

Date & Event	Description
	None.

Residue Quality Monitoring Results			
Parameter (unit)	Limit	Normal Operation	
		Bottom ash	APC Residues
Loss on Ignition (average %)	<5%	2.31	
Total Organic Carbon (average %)	<3%	0.73	
No. of Assessments Undertaken	---	7 (one per operating month)	All batches tested as received
No. of Hazardous Results	---	0	

Comments :

All samples were shown to be non-Haz. 1 IBA sample was sent to additional in-vitro tests to establih new limit values on pH.

Signed Director Date 20/01/2022

Emissions to Water

Summary of monitoring undertaken and compliance
Emissions to Ground water: Sampling and analysing performed by external lab. 2 samples showed increased COD and BOD. Repeated sampling shown no excedances. All later samples compliant.
Emissions to Sewage: Online monitoring for pH, temp and flow as per permit. All on DCS. Everything compliant. Some problems with flow meter - potential upgrade looked at. Additional blowdown cooling added to help keep temperatures sufficiently low at all times.

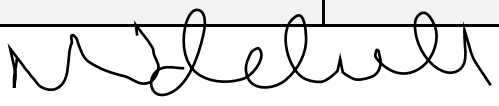
Commentary on any specific events	
Date & Event	**Description**
	None

Emissions to Sewer

Parameter	Monitoring Frequency	Limit	Min	Max	Avg
BOD (ATU)	Quaterly		2.20	16.00	5.37
COD (Total)	Quaterly	500	25.00	64.00	31.50
pH	Quaterly	5-10	7.33	9.05	7.69
Suspended Solids	Quaterly	300	3.00	126.00	7.00
Temperature (Deg C)	Quaterly	<43	16.30	20.20	19.20
Visible Oil & Grease	Quaterly	None Visible	<1	<1	<1

Emissions to Water

Parameter	Monitoring Frequency	Limit	Min	Max	Avg
BOD (ATU)	Quaterly	10.00	1.95	9.70	5.19
COD (Total)	Quaterly		<25	70.00	<25
pH	Quaterly	6-9	7.10	8.80	7.17
Suspended Solids	Quaterly	50.00	7.00	23.00	7.00
Temperature	Quaterly	25.00	15.10	22.30	19.60
Visible Oil & Grease	Quaterly	None Visible	0.00	0.00	0.00



Signed Director Date 20/01/2022

Emissions to Air (periodically monitored)

Summary of monitoring undertaken, standards used and compliance
A1 Testing Duration : 22nd March to 7th April 2021
A2 Testing Duration : 15th March to 17th March 2021
A3 Testing Duration : 17th March to 18th March 2021

Results of emissions to air that are periodically monitored

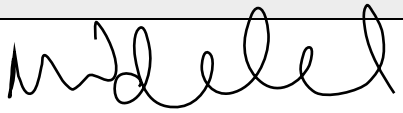
Substance	Ref. Period	Emission Limit Value	Average				
			A1	A2	A3	A4	A5
Hydrogen fluoride	1 hr	2 mg/m^3	0.012	0.01	0.01	-	-
Cd and Tl and their compounds	6-8hrs	0.05 mg/m^3	0.0023	0.001	0.0009	-	-
Hg and its compounds	6-8hrs	0.05 mg/m^3	0.0007	0.0006	0.0006	-	-
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m^3	0.029	0.007	0.007	-	-
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 ng/m^3	0.0056	0.2921	0.0511	-	-
PCBs (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m^3	0.0007	0.0268	0.0054	-	-
PCBs (WHO-TEQ Fish)	6-8hrs	None set ng/m^3	0.00003	0.0011	0.0003	-	-
PCBs (WHO-TEQ Birds)	6-8hrs	None set ng/m^3	0.0011	0.0354	0.009	-	-
Dioxins & Furans (WHO-TEQ Humans / Mammals)	6-8hrs	None set ng/m^3	0.0052	0.2769	0.046	-	-
Dioxins & Furans (WHO-TEQ Fish)	6-8hrs	None set ng/m^3	0.0049	0.264	0.0476	-	-
Dioxins & Furans (WHO-TEQ Birds)	6-8hrs	None set ng/m^3	0.006	0.3136	0.0667	-	-
Particulates	6-8hrs	30 mg/Nm^3	0.12	1.57	0.73	-	-
Ammonia	6-8hrs	None set $\mu g/m^3$	0.11	0.09	0.12	-	-
TOC	6-8hrs	20 mg/Nm^3	0.71	0.73	0.78	-	-
Oxides of Nitrogen	6-8hrs	400 mg/Nm^3	38.16	77.93	87.49	-	-
Sulphur Dioxide	6-8hrs	200 mg/Nm^3	12.52	0.66	0.53	-	-
Carbon Monoxide	6-8hrs	100 mg/Nm^3	0.09	0.22	0.23	-	-
Hydrogen Chloride	6-8hrs	60 mg/Nm^3	6.69	7.54	10.76		
Anthanthrene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Benzo(a)anthracene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Benzo(a)pyrene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Benzo(b)fluoranthene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Benzo(b)naptho(2,1-d) thiophene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Benzo(c)phenanthrene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Benzo(ghi)perylene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Benzo(k)fluoranthene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Cholanthrene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Chrysene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Cyclopenta(cd)pyrene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Dibenzo(ai)pyrene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Dibenzo(ah)anthracene	6-8hrs	None set $\mu g/m^3$	<0.0068	<0.0057	<0.0052		
Fluoranthene	6-8hrs	None set $\mu g/m^3$	0.02	0.01	0.01		
Indeno(123-cd) pyrene	6-8hrs	None set $\mu g/m^4$	<0.0068	<0.0057	<0.0052		
Naphthalene	6-8hrs	None set $\mu g/m^5$	0.17	0.14	0.13	-	-
Comments :							

Signed _____ Director Date 20/01/2022

Emissions to Air (periodically monitored)

Summary of monitoring undertaken, standards used and compliance
A1 Testing Duration : November 2021 A2 Testing Duration : A3 Testing Duration :

Results of emissions to air that are periodically monitored							
Substance	**Ref. Period**	**Emission Limit Value**	**Average**				
			A1	**A2**	**A3**	**A4**	**A5**
Hydrogen fluoride	1 hr	2 mg/m^3				-	-
Cd and Tl and their compounds	6-8hrs	0.05 mg/m^3				-	-
Hg and its compounds	6-8hrs	0.05 mg/m^3				-	-
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds	6-8hrs	0.5 mg/m^3				-	-
Dioxins & Furans (I-TEQ)	6-8hrs	0.1 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				-	-
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				-	-
Particulates	6-8hrs	30 mg/Nm^3				-	-
Ammonia	6-8hrs	None set µg/m^3				-	-
TOC	6-8hrs	20 mg/Nm^3				-	-
Oxides of Nitrogen	6-8hrs	400 mg/Nm^3				-	-
Sulphur Dioxide	6-8hrs	200 mg/Nm^3				-	-
Carbon Monoxide	6-8hrs	100 mg/Nm^3				-	-
Hydrogen Chloride	6-8hrs	60 mg/Nm^3					
Anthanthrene	6-8hrs	None set µg/m^3					
Benzo(a)anthracene	6-8hrs	None set µg/m^3					
Benzo(a)pyrene	6-8hrs	None set µg/m^3					
Benzo(b)fluoranthene	6-8hrs	None set µg/m^3					
Benzo(b)naptho(2,1-d) thiophene	6-8hrs	None set µg/m^3					
Benzo(c)phenanthrene	6-8hrs	None set µg/m^3					
Benzo(ghi)perylene	6-8hrs	None set µg/m^3					
Benzo(k)fluoranthene	6-8hrs	None set µg/m^3					
Cholanthrene	6-8hrs	None set µg/m^3					
Chrysene	6-8hrs	None set µg/m^3					
Cyclopenta(cd)pyrene	6-8hrs	None set µg/m^3					
Dibenzo(ai)pyrene	6-8hrs	None set µg/m^3					
Dibenzo(ah)anthracene	6-8hrs	None set µg/m^3					
Fluoranthene	6-8hrs	None set µg/m^3					
Indeno(123-cd) pyrene	6-8hrs	None set µg/m^4					
Naphthalene	6-8hrs	None set µg/m^5				-	-
Comments :							
Results of November 2021 emissions to air test not yet available							

Signed  Director Date 20/01/2022

Emissions to Air (continously monitored)

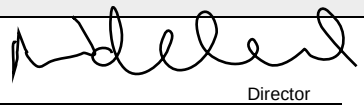
Summary of monitoring undertaken, standards used and compliance

Results of emissions to air that are continuously monitored (maximum and average values for each line)

Substance	**Reference Period**	**Emission Limit Value**	**A1**		**A2**		**A3**		**A4**		**A5**	
			Max.	**Avg.**	**Max.**	**Avg.**	**Max.**	**Avg.**	**Max.**	**Avg.**	**Max.**	**Avg.**
Oxides of nitrogen	Daily mean	170 mg/m^3	102.20	41.10	132.80	48.60	120.40	38.60				
	*(100%) ½ hourly mean	400 mg/m^3	281.00	41.60	151.30	48.50	177.80	39.00				
	*(97%) ½ hourly mean	200 mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A				
Particulates	Daily mean	10 mg/m^3	0.40	-0.10	0.20	0.00	0.30	0.00				
	*(100%) ½ hourly mean	30 mg/m^3	1.90	0.10	0.50	0.00	7.10	0.00				
	*(97%) ½ hourly mean	10mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A				
Total Organic Carbon	Daily mean	10 mg/m^3	5.40	0.10	0.60	0.00	1.10	0.00				
	*(100%)½ hourly mean	20 mg/m^3	16.80	0.20	6.40	0.00	11.90	0.10				
	*(97%) ½ hourly mean	10 mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A				
Hydrogen chloride	Daily mean	10 mg/m^3	9.80	4.80	8.80	4.30	8.60	4.40				
	(100%)½ hourly mean	60 mg/m^3	41.60	4.90	21.10	4.40	40.00	4.40				
	*(97%) ½ hourly mean	10 mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A				
Sulphur dioxide	Daily mean	50 mg/m^3	6.70	2.40	5.40	2.47	10.20	2.43				
	(100%)½ hourly mean	200 mg/m^3	86.60	2.56	58.20	2.52	148.40	2.45				
	(97%)½ hourly mean	50 mg/m^3	N/A	N/A	N/A	N/A	N/A	N/A				
Carbon monoxide	Daily mean	50 mg/m^3	4.50	0.56	0.95	0.90	6.40	0.63				
	½ hourly mean *	100 mg/m^3 *	N/A	N/A	N/A	N/A	N/A	N/A				
	95%ile 10-min avg *	150 mg/m^3 *	4.83	0.71	3.75	0.32	43.70	0.64				
Ammonia	Daily mean	No limit set	0.40	-0.06	0.20	-0.03	0.70	0.09				

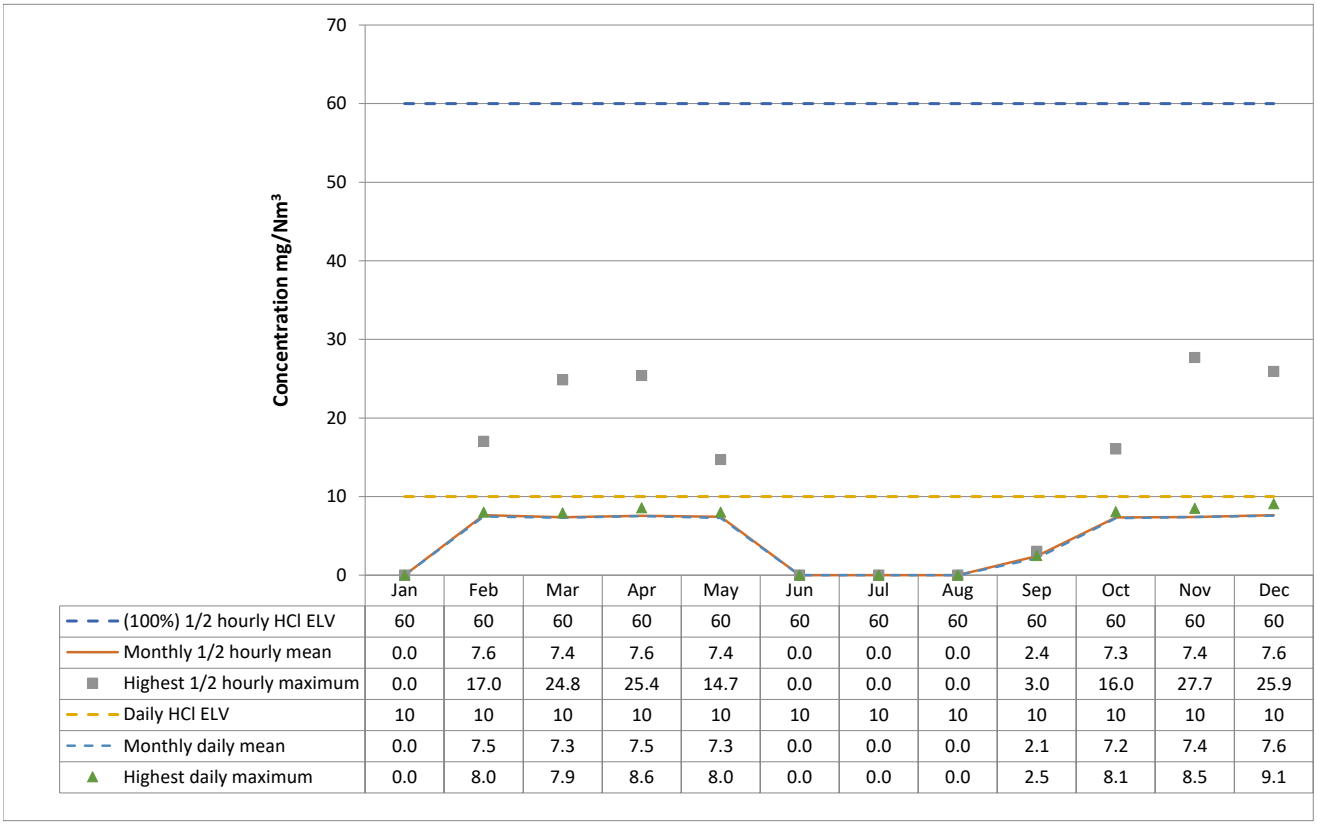
* = delete or amend as appropriate

Comments :

Signed  Director Date 20/01/2022

Monitoring of Hydrogen Chloride emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**(100%) 1/2 hourly HCl ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily HCl ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	60	0.0	0.0	10	0.0	0.0
Feb	60	7.6	17.0	10	7.5	8.0
Mar	60	7.4	24.8	10	7.3	7.9
Apr	60	7.6	25.4	10	7.5	8.6
May	60	7.4	14.7	10	7.3	8.0
Jun	60	0.0	0.0	10	0.0	0.0
Jul	60	0.0	0.0	10	0.0	0.0
Aug	60	0.0	0.0	10	0.0	0.0
Sep	60	2.4	3.0	10	2.1	2.5
Oct	60	7.3	16.0	10	7.2	8.1
Nov	60	7.4	27.7	10	7.4	8.5
Dec	60	7.6	25.9	10	7.6	9.1



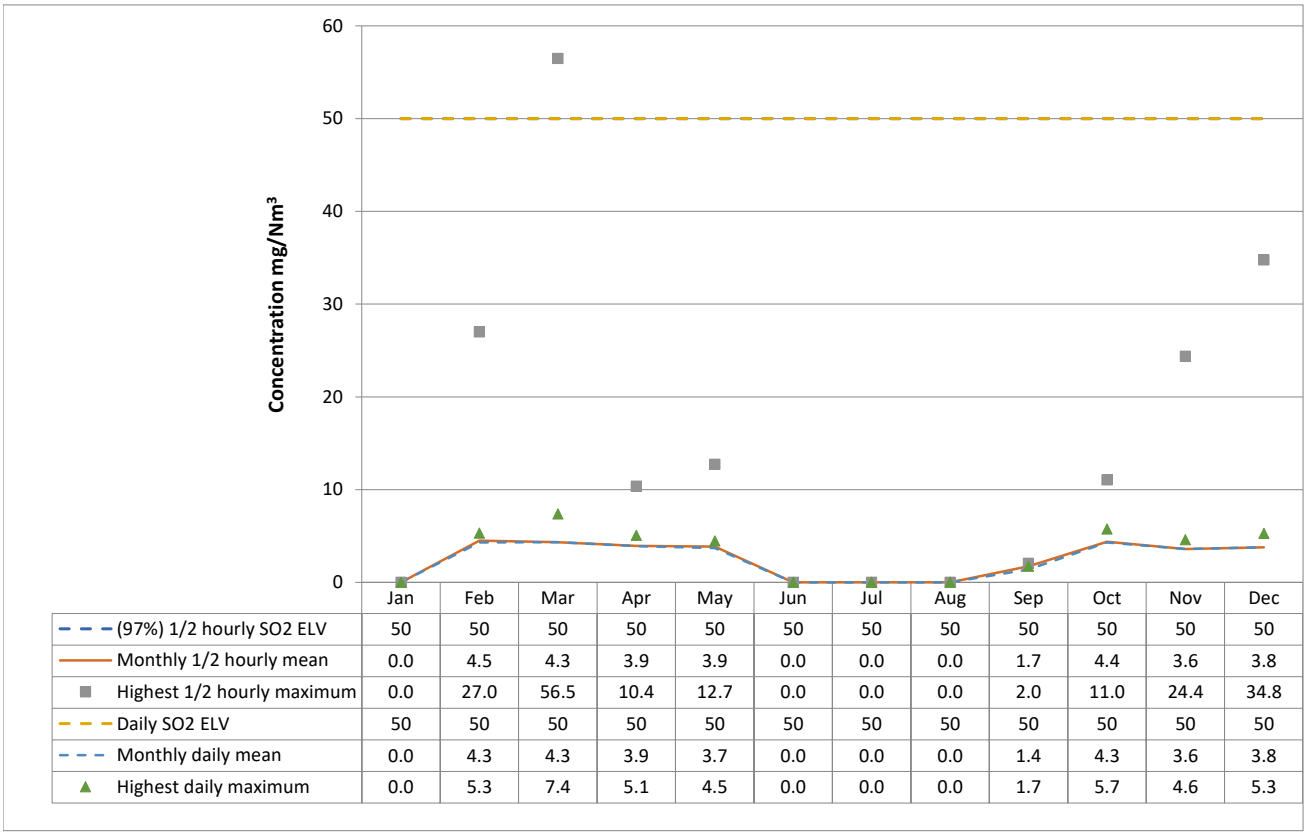
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(100%) 1/2 hourly HCl ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hourly mean	0.0	7.6	7.4	7.6	7.4	0.0	0.0	0.0	2.4	7.3	7.4	7.6
Highest 1/2 hourly maximum	0.0	17.0	24.8	25.4	14.7	0.0	0.0	0.0	3.0	16.0	27.7	25.9
Daily HCl ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.0	7.5	7.3	7.5	7.3	0.0	0.0	0.0	2.1	7.2	7.4	7.6
Highest daily maximum	0.0	8.0	7.9	8.6	8.0	0.0	0.0	0.0	2.5	8.1	8.5	9.1

Comments :

Signed _____ Director Date 20/01/2022

Monitoring of Sulphur dioxide emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**(97%) 1/2 hourly SO2 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily SO2 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	50	0.0	0.0	50	0.0	0.0
Feb	50	4.5	27.0	50	4.3	5.3
Mar	50	4.3	56.5	50	4.3	7.4
Apr	50	3.9	10.4	50	3.9	5.1
May	50	3.9	12.7	50	3.7	4.5
Jun	50	0.0	0.0	50	0.0	0.0
Jul	50	0.0	0.0	50	0.0	0.0
Aug	50	0.0	0.0	50	0.0	0.0
Sep	50	1.7	2.0	50	1.4	1.7
Oct	50	4.4	11.0	50	4.3	5.7
Nov	50	3.6	24.4	50	3.6	4.6
Dec	50	3.8	34.8	50	3.8	5.3



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(97%) 1/2 hourly SO2 ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly 1/2 hourly mean	0.0	4.5	4.3	3.9	3.9	0.0	0.0	0.0	1.7	4.4	3.6	3.8
Highest 1/2 hourly maximum	0.0	27.0	56.5	10.4	12.7	0.0	0.0	0.0	2.0	11.0	24.4	34.8
Daily SO2 ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	0.0	4.3	4.3	3.9	3.7	0.0	0.0	0.0	1.4	4.3	3.6	3.8
Highest daily maximum	0.0	5.3	7.4	5.1	4.5	0.0	0.0	0.0	1.7	5.7	4.6	5.3

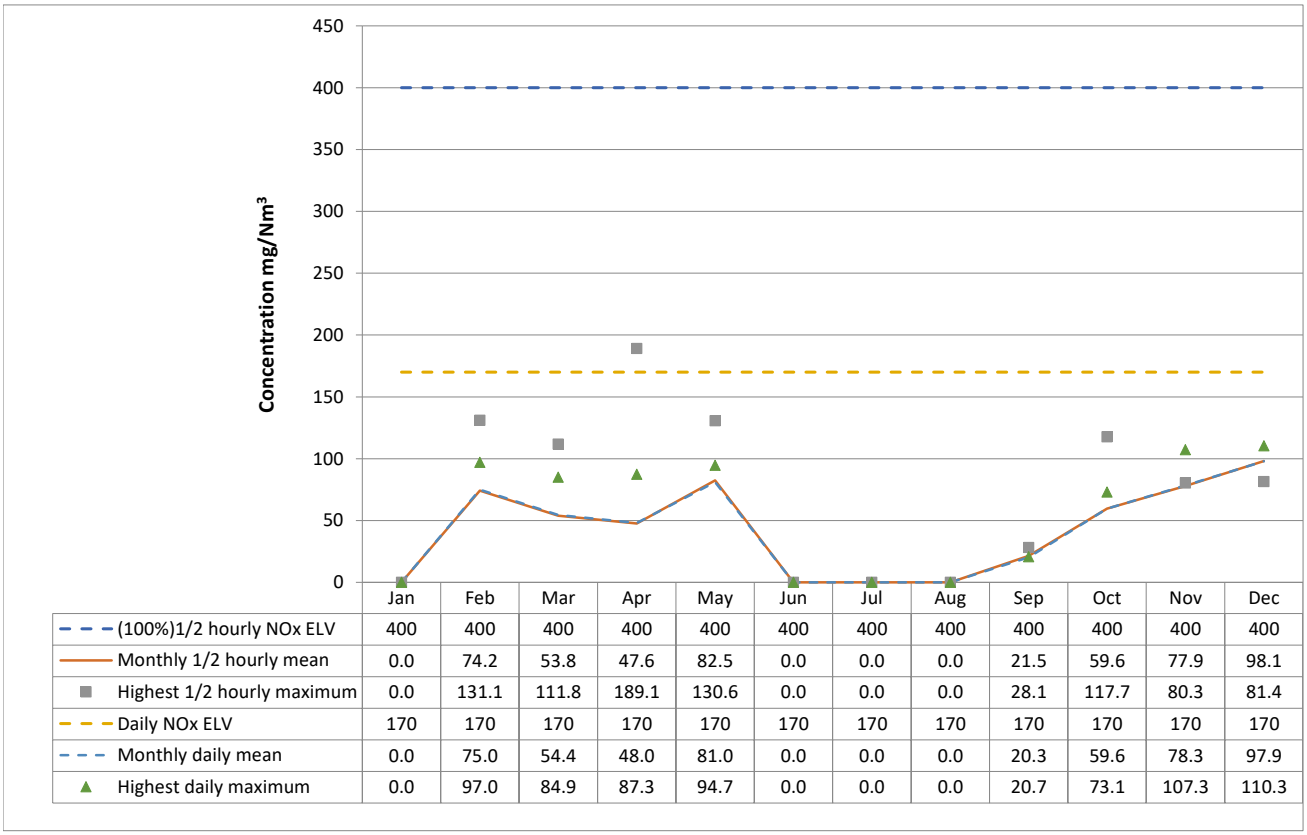
Comments :

Signed Director Date 20/01/2022

Annual Performance Report 2021 Full Circle Generation Ltd

Monitoring of Oxides of Nitrogen emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**(100%)1/2 hourly NOx ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily NOx ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	400	0.0	0.0	170	0.0	0.0
Feb	400	74.2	131.1	170	75.0	97.0
Mar	400	53.8	111.8	170	54.4	84.9
Apr	400	47.6	189.1	170	48.0	87.3
May	400	82.5	130.6	170	81.0	94.7
Jun	400	0.0	0.0	170	0.0	0.0
Jul	400	0.0	0.0	170	0.0	0.0
Aug	400	0.0	0.0	170	0.0	0.0
Sep	400	21.5	28.1	170	20.3	20.7
Oct	400	59.6	117.7	170	59.6	73.1
Nov	400	77.9	80.3	170	78.3	107.3
Dec	400	98.1	81.4	170	97.9	110.3



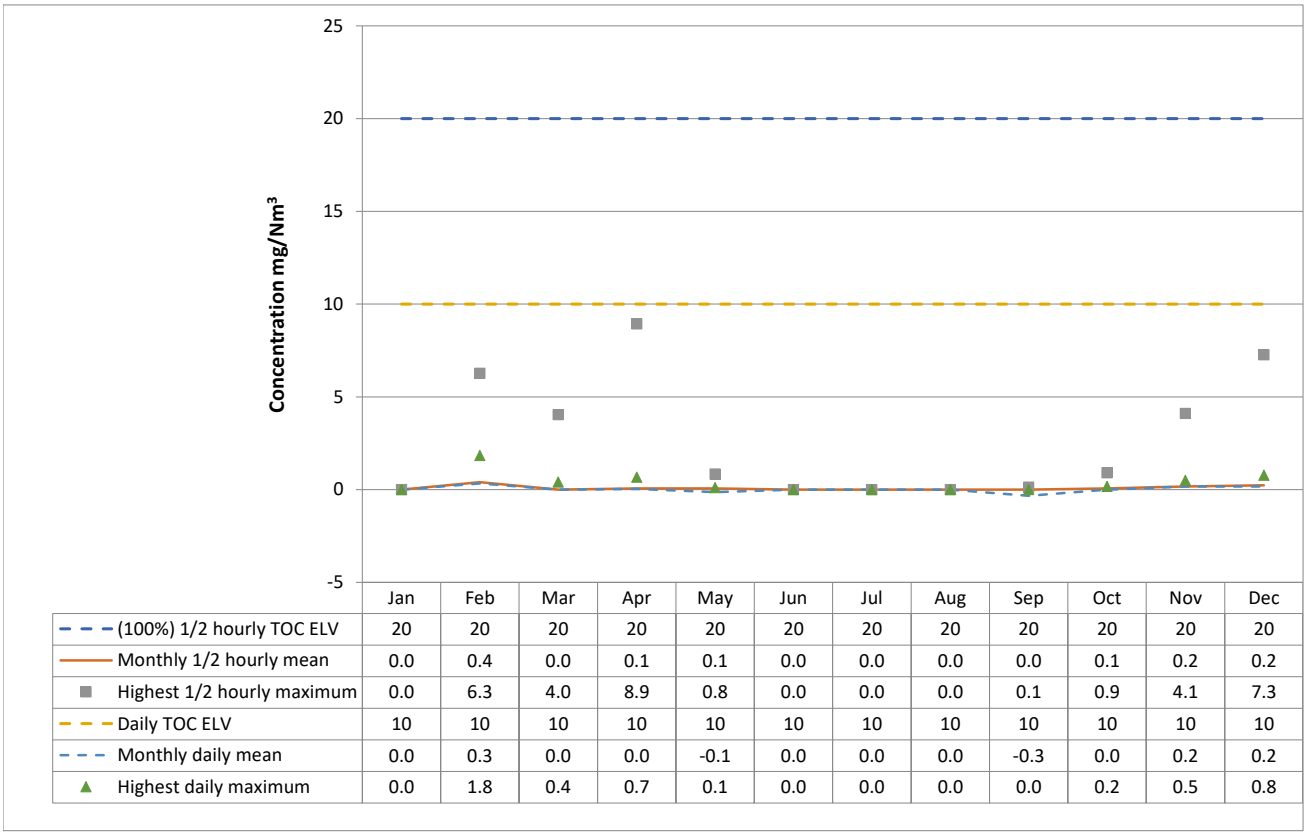
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(100%)1/2 hourly NOx ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hourly mean	0.0	74.2	53.8	47.6	82.5	0.0	0.0	0.0	21.5	59.6	77.9	98.1
Highest 1/2 hourly maximum	0.0	131.1	111.8	189.1	130.6	0.0	0.0	0.0	28.1	117.7	80.3	81.4
Daily NOx ELV	170	170	170	170	170	170	170	170	170	170	170	170
Monthly daily mean	0.0	75.0	54.4	48.0	81.0	0.0	0.0	0.0	20.3	59.6	78.3	97.9
Highest daily maximum	0.0	97.0	84.9	87.3	94.7	0.0	0.0	0.0	20.7	73.1	107.3	110.3

Comments :

Signed _____ Director Date 20/01/2022

Monitoring of Total organic carbon emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**(100%) 1/2 hourly TOC ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily TOC ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	20	0.0	0.0	10	0.0	0.0
Feb	20	0.4	6.3	10	0.3	1.8
Mar	20	0.0	4.0	10	0.0	0.4
Apr	20	0.1	8.9	10	0.0	0.7
May	20	0.1	0.8	10	-0.1	0.1
Jun	20	0.0	0.0	10	0.0	0.0
Jul	20	0.0	0.0	10	0.0	0.0
Aug	20	0.0	0.0	10	0.0	0.0
Sep	20	0.0	0.1	10	-0.3	0.0
Oct	20	0.1	0.9	10	0.0	0.2
Nov	20	0.2	4.1	10	0.2	0.5
Dec	20	0.2	7.3	10	0.2	0.8



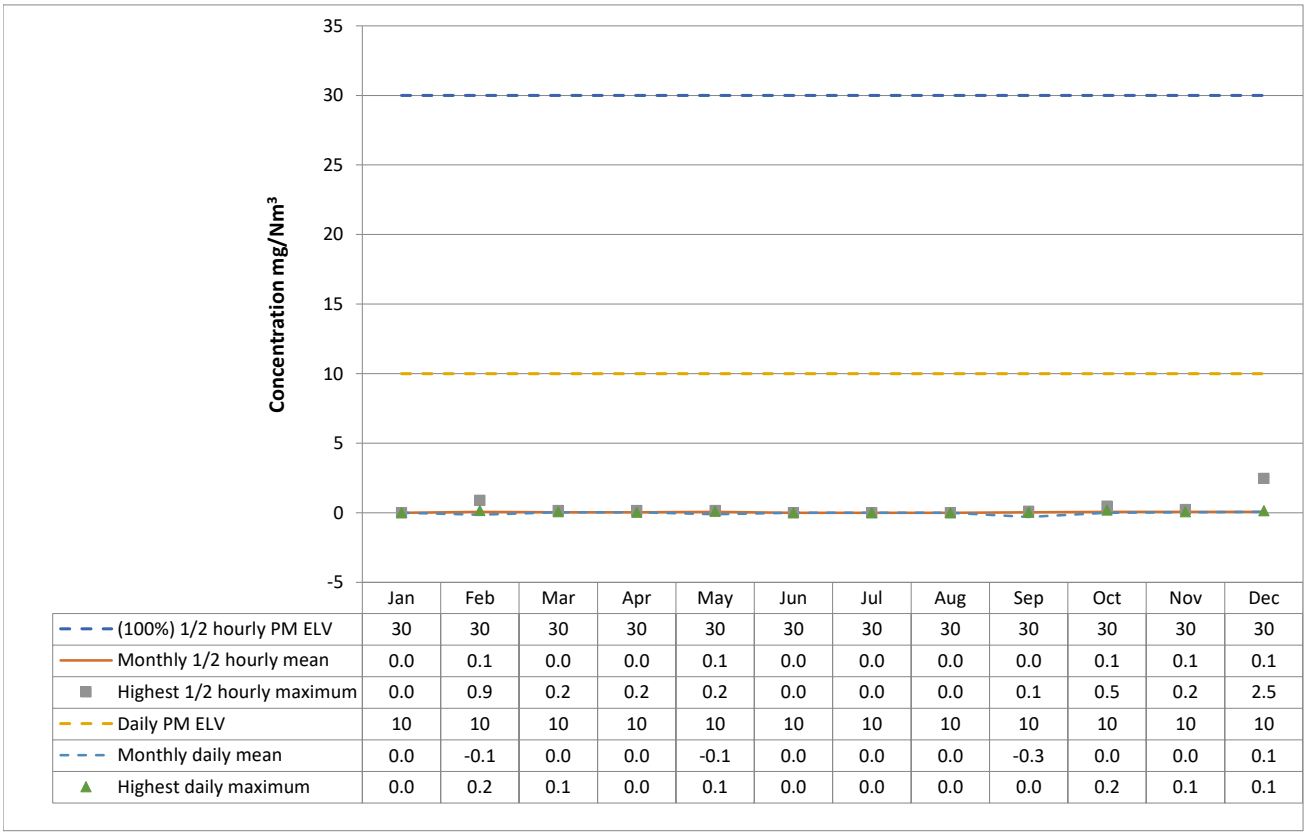
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(100%) 1/2 hourly TOC ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hourly mean	0.0	0.4	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.2
Highest 1/2 hourly maximum	0.0	6.3	4.0	8.9	0.8	0.0	0.0	0.0	0.1	0.9	4.1	7.3
Daily TOC ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.0	0.3	0.0	0.0	-0.1	0.0	0.0	0.0	-0.3	0.0	0.2	0.2
Highest daily maximum	0.0	1.8	0.4	0.7	0.1	0.0	0.0	0.0	0.0	0.2	0.5	0.8

Comments :

Signed Director Date 20/01/2022

Monitoring of Particulate matter emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**(100%) 1/2 hourly PM ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily PM ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	30	0.0	0.0	10	0.0	0.0
Feb	30	0.1	0.9	10	-0.1	0.2
Mar	30	0.0	0.2	10	0.0	0.1
Apr	30	0.0	0.2	10	0.0	0.0
May	30	0.1	0.2	10	-0.1	0.1
Jun	30	0.0	0.0	10	0.0	0.0
Jul	30	0.0	0.0	10	0.0	0.0
Aug	30	0.0	0.0	10	0.0	0.0
Sep	30	0.0	0.1	10	-0.3	0.0
Oct	30	0.1	0.5	10	0.0	0.2
Nov	30	0.1	0.2	10	0.0	0.1
Dec	30	0.1	2.5	10	0.1	0.1



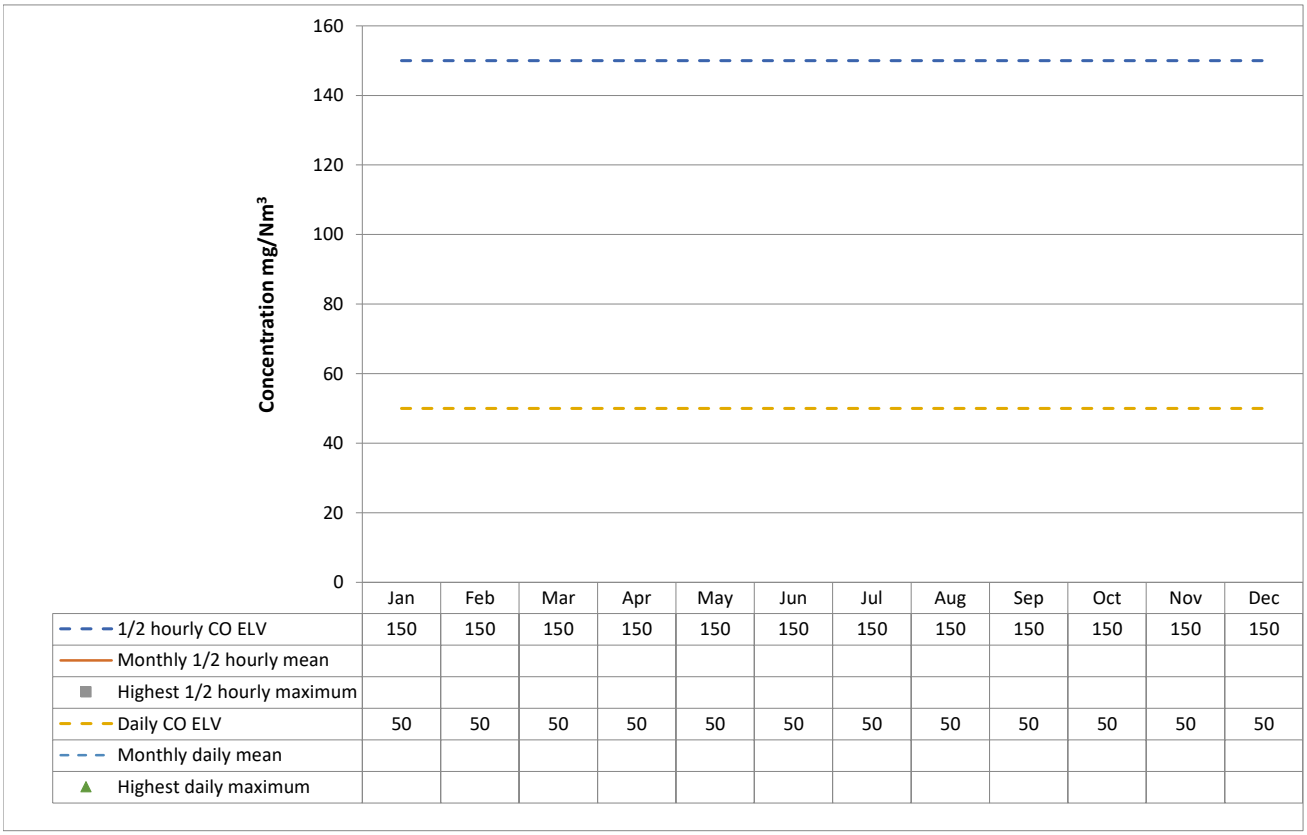
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(100%) 1/2 hourly PM ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 1/2 hourly mean	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Highest 1/2 hourly maximum	0.0	0.9	0.2	0.2	0.2	0.0	0.0	0.0	0.1	0.5	0.2	2.5
Daily PM ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.0	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	-0.3	0.0	0.0	0.1
Highest daily maximum	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.1

Comments :

Signed Director Date 20/01/2022

Monitoring of Carbon Monoxide (half hourly) **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**1/2 hourly CO ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily CO ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	150			50		
Feb	150			50		
Mar	150			50		
Apr	150			50		
May	150			50		
Jun	150			50		
Jul	150			50		
Aug	150			50		
Sep	150			50		
Oct	150			50		
Nov	150			50		
Dec	150			50		

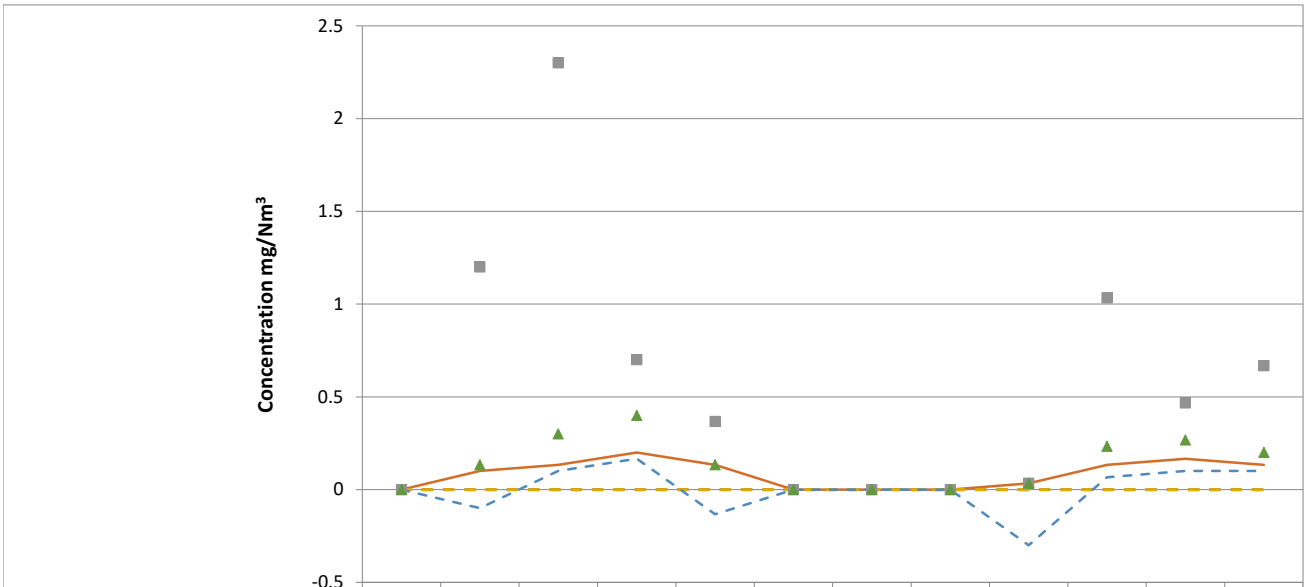


Comments :

Signed Director Date 20/01/2022

Monitoring of Ammonia emissions **Whole Installation** *See Notes in Cell Q3*

mg/Nm^3	1/2 Hourly Reference Periods			Daily Reference Periods		
2021	**1/2 hourly NH3 ELV**	**Monthly 1/2 hourly mean**	**Highest 1/2 hourly maximum**	**Daily NH3 ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	/	0.0	0.0	/	0.0	0.0
Feb	/	0.1	1.2	/	-0.1	0.1
Mar	/	0.1	2.3	/	0.1	0.3
Apr	/	0.2	0.7	/	0.2	0.4
May	/	0.1	0.4	/	-0.1	0.1
Jun	/	0.0	0.0	/	0.0	0.0
Jul	/	0.0	0.0	/	0.0	0.0
Aug	/	0.0	0.0	/	0.0	0.0
Sep	/	0.0	0.0	/	-0.3	0.0
Oct	/	0.1	1.0	/	0.1	0.2
Nov	/	0.2	0.5	/	0.1	0.3
Dec	/	0.1	0.7	/	0.1	0.2



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly NH3 ELV	0	0	0	0	0	0	0	0	0	0	0	0
Monthly 1/2 hourly mean	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.1
Highest 1/2 hourly maximum	0.0	1.2	2.3	0.7	0.4	0.0	0.0	0.0	0.0	1.0	0.5	0.7
Daily NH3 ELV	0	0	0	0	0	0	0	0	0	0	0	0
Monthly daily mean	0.0	-0.1	0.1	0.2	-0.1	0.0	0.0	0.0	-0.3	0.1	0.1	0.1
Highest daily maximum	0.0	0.1	0.3	0.4	0.1	0.0	0.0	0.0	0.0	0.2	0.3	0.2

Comments :

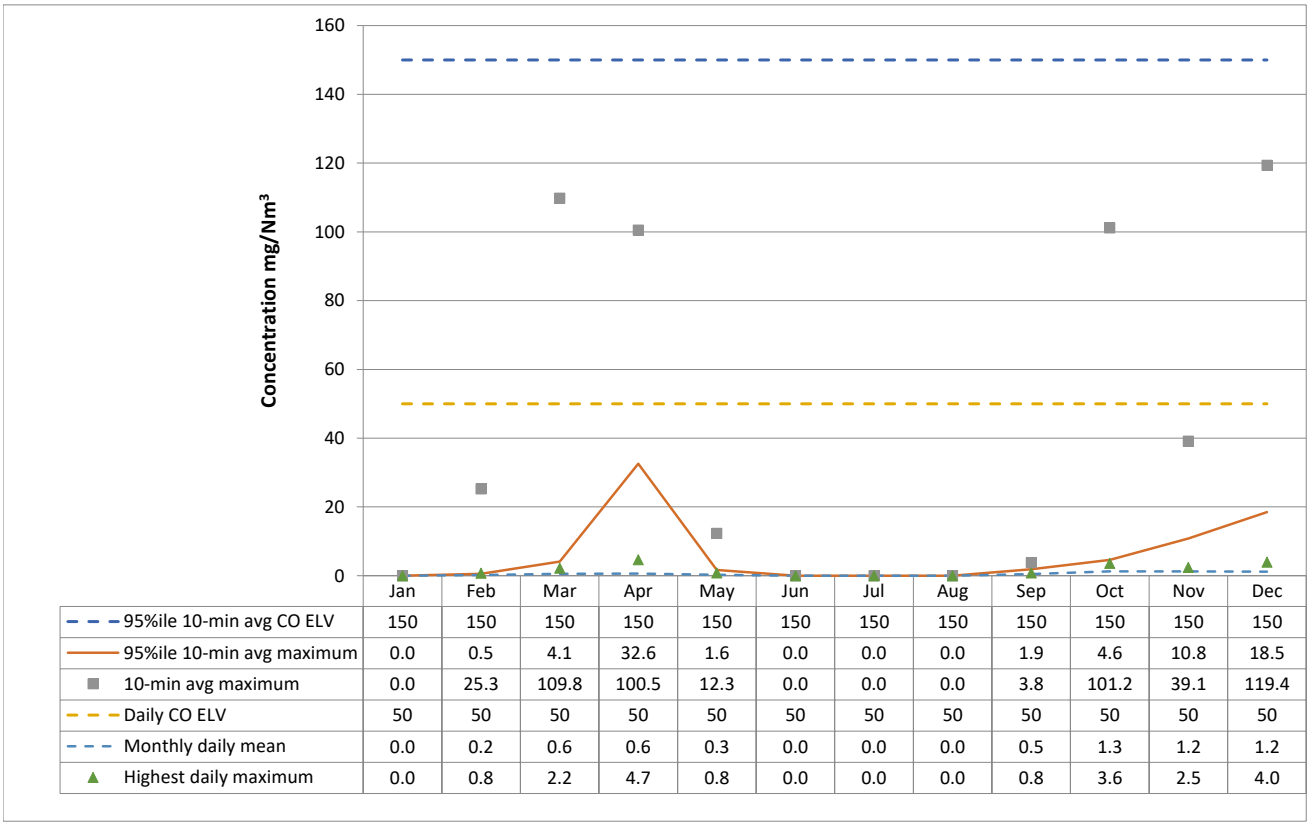
An indicated ELV value of zero in the table above means that no ammonia limit is set in the permit.

Signed Director Date 20/01/2022

Annual Performance Report 2021 Full Circle Generation Ltd

Monitoring of Carbon Monoxide (10-minute avg) **Whole Installation** *See Notes in Cell S3*

mg/Nm^3	10-minute Reference Periods				Daily Reference Periods		
2021	**95%ile 10-min avg CO ELV**	**95%ile 10-min avg maximum**	**Monthly CO 10-min avg mean**	**10-min avg maximum**	**Daily CO ELV**	**Monthly daily mean**	**Highest daily maximum**
Jan	150	0.0	0.0	0.0	50	0.0	0.0
Feb	150	0.5	0.3	25.3	50	0.2	0.8
Mar	150	4.1	0.6	109.8	50	0.6	2.2
Apr	150	32.6	0.6	100.5	50	0.6	4.7
May	150	1.6	0.5	12.3	50	0.3	0.8
Jun	150	0.0	0.0	0.0	50	0.0	0.0
Jul	150	0.0	0.0	0.0	50	0.0	0.0
Aug	150	0.0	0.0	0.0	50	0.0	0.0
Sep	150	1.9	0.9	3.8	50	0.5	0.8
Oct	150	4.6	1.3	101.2	50	1.3	3.6
Nov	150	10.8	1.3	39.1	50	1.2	2.5
Dec	150	18.5	1.2	119.4	50	1.2	4.0



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
95%ile 10-min avg CO ELV	150	150	150	150	150	150	150	150	150	150	150	150
95%ile 10-min avg maximum	0.0	0.5	4.1	32.6	1.6	0.0	0.0	0.0	1.9	4.6	10.8	18.5
10-min avg maximum	0.0	25.3	109.8	100.5	12.3	0.0	0.0	0.0	3.8	101.2	39.1	119.4
Daily CO ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	0.0	0.2	0.6	0.6	0.3	0.0	0.0	0.0	0.5	1.3	1.2	1.2
Highest daily maximum	0.0	0.8	2.2	4.7	0.8	0.0	0.0	0.0	0.8	3.6	2.5	4.0

Comments :

Environment Agency explanatory note: The 10-minute average ELV is based on the “95th percentile”. In this case this means that 95% of the 10 minute averages in the relevant 24-hour period (i.e. 137) must be below 150 mg/Nm3, and 5% (i.e. 7) are allowed to be any value above 150 mg/Nm3. Whilst we expect operators to minimise CO emissions at all times, it is perfectly acceptable for the value of the maximum 10-minute average to be above 150 mg/Nm3, provided the 95th percentile ELV has been met for that period.

Signed _____ Director Date 20/01/2022

Schedule 1 Notifications

Schedule 1 Notifications						Year:								2021				
						Sch 1		60-hrs Counter		Auto - Calculations								
No.	Boiler / Parameter		Period			Duration				NIEA Reporting				Concentrations - max value shown (mg/Nm3)				
Sch 1 No.	Line	Parameter	Date	Start Time	Reference Period	Daily [1]	97% 30-min [1]	100% 30-min [4]	95% 10-min [1]	Str 1 60-hrs Counter [4]	Str 2 60-hrs Counter [4]	Str 3 60-hrs Counter [4]	Breaches Counter [1]	Daily	97% 30-min	100% 30-min	95% 10-min	Comment
11	1	PCDD/PCDF	16/03/2021	10:18	Extractive	1				0	0	0	1	0.292 ng/m3				Limit 0.1 ng/m3
Sch 1 Counter						Total of Dailies:	Total of 97% 30-mins	Total of 100% 30-mins	Total of 95% 10-mins	Total Str 1 (60-hrs Counter):	Total Str 2 (60-hrs Counter):	Total Str 3 (60-hrs Counter):	Total No of Breaches					
						No	Hours	Hours	Hours	Hours	Hours	Hours	No					
1						**1**	**0**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**1**					
										Annual limit is 60hrs.								

Signed Director Date 20/01/2022

NOTE:

Explanations: