

Annual performance report for: E.ON UK Infrastructure Services Limited,
Blackburn Meadows Renewable Energy Plant

Permit Number: EPR/LP3131TA

Year: 2022

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.

1. Introduction

Name and address of plant	E.ON UK Infrastructure Services Limited Blackburn Meadows Renewable Energy Plant Alsing Road Sheffield S9 1HF
Description of waste input	100% Waste Wood
Operator contact details if members of the public have any questions	info@eon.com

2. Plant description

Blackburn Meadows is a biomass fired renewable energy plant. The Installation is designed to process up to 250,000 tonnes of biomass per year and export up to 30 MWe of electricity and up to 25 MWth of heat. It is owned by E.ON UK and is located 5km North East of Sheffield to the East of the M1 Tinsley Viaduct in Blackburn Meadows on land off Alsing Road. It is about 400 meters North East of the Meadowhall shopping centre.

Biomass is delivered by road and unloaded into the fuel store by conveyor from the tipping area. The entire unloading process is conducted in an enclosed space. Any ferrous material is removed by magnetic separators during conveyance to the fuel store.

The biomass is removed from the fuel store by screw conveyors and loaded into the feed chute for delivery to the combustion unit. This is a bubbling fluidised bed design which ensures homogeneous mixing of the biomass with bed material and leads to good combustion. Residues from the combustion chamber are drawn down from the bottom of the bed and passed through a classifier. This separates out and cools the coarse particles and allows the fine particles to be returned as bed material. Surpluses are diverted via a blow pot to a boiler ash silo. Ash is transferred off site for recovery or disposal at a suitably licenced facility.

Emissions of nitrogen oxides are controlled by the injection of urea into the combustion chamber. Hot gases from combustion are passed through a boiler to raise steam. The steam is then passed to a steam turbine to generate electricity for export to National Grid, before being condensed in an air-cooled condenser and returned to the boiler. The combustion gases are cleaned in a flue gas treatment plant. This includes the injection of carbon, primarily to control dioxin emissions, the injection of lime, to control acid gas

emissions, and the use of a fabric filter to remove dust. The cleaned exhaust gases are released to atmosphere via a 90 metre stack.

There are emissions to sewer for process water arising from boiler blow-down and cleaning. There are no process emissions to water.

3. Summary of Plant Operation

Waste wood (biomass) received	199,548 tonnes
Total waste received	199,548 tonnes
Total plant operational hours	7,422 hours
Total hours of “abnormal operation” (see permit for definition)	0.22 hours (13 Minutes)
Total quantity of incinerator bottom ash (IBA) produced	4,669 tonnes
Disposal or recovery route for IBA	R13 - Storage of wastes pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced)
Did any batches of IBA test as hazardous? If yes, state quantity	Currently all IBA is consigned as hazardous. Re-classification to non-hazardous report submitted to the EA in Dec 2021 – awaiting comment from the EA.
Total quantity of air pollution control (APC) residues produced	5,207 tonnes
Disposal or recovery route for APC residues	January – September 2022 APCR disposed of as D09 - Physico-chemical treatment which results in final compounds or mixtures which are discarded by means of any of the operations numbered D1 to D12 (e.g. evaporation, drying, calcination, etc.) October – December 2022 APCR recovered under R05 - Recycling/reclamation of other inorganic materials
Total electricity generated for export to the National Grid	214,199.95 MWh - total exported 238,709.72 MWh - total generated
Total heat produced for export (e.g. to hospital or district heating scheme)	14,259.1 MWh

4. Summary of Plant Emissions

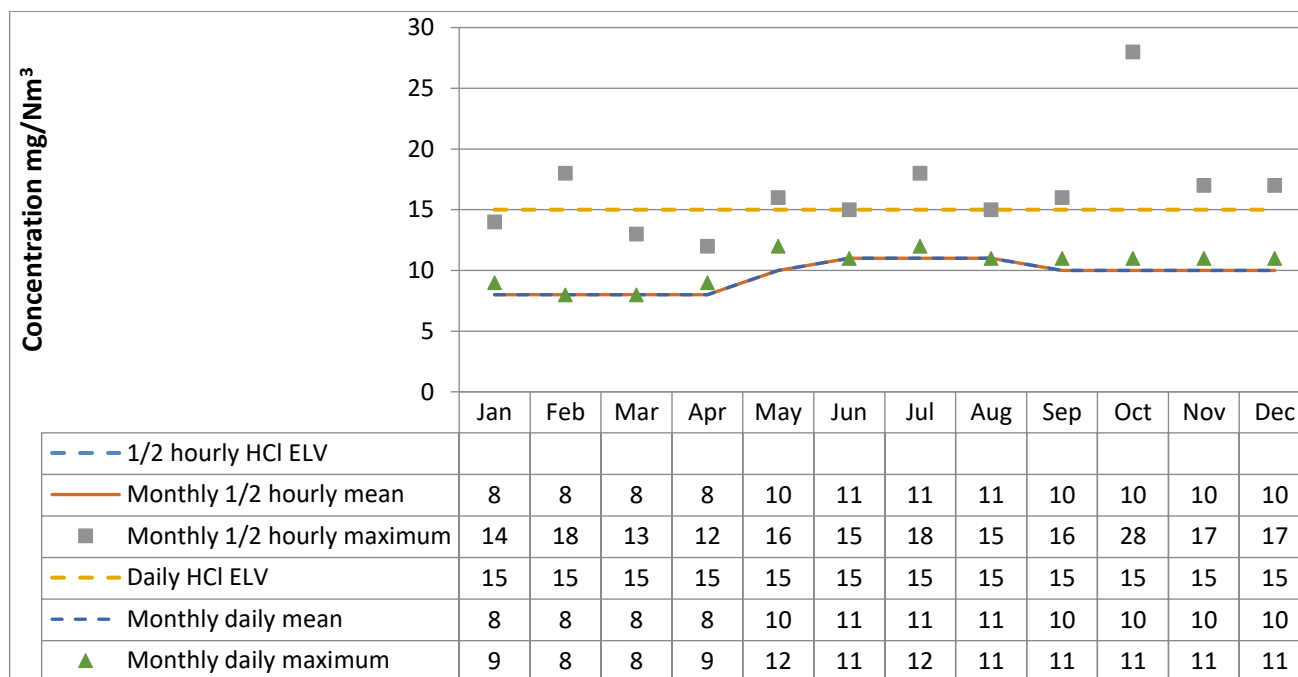
4.1 Summary of continuous emissions monitoring results for emissions to air

The following charts show the performance of the plant against its emission limit values (ELVs) for substances that are continuously monitored.

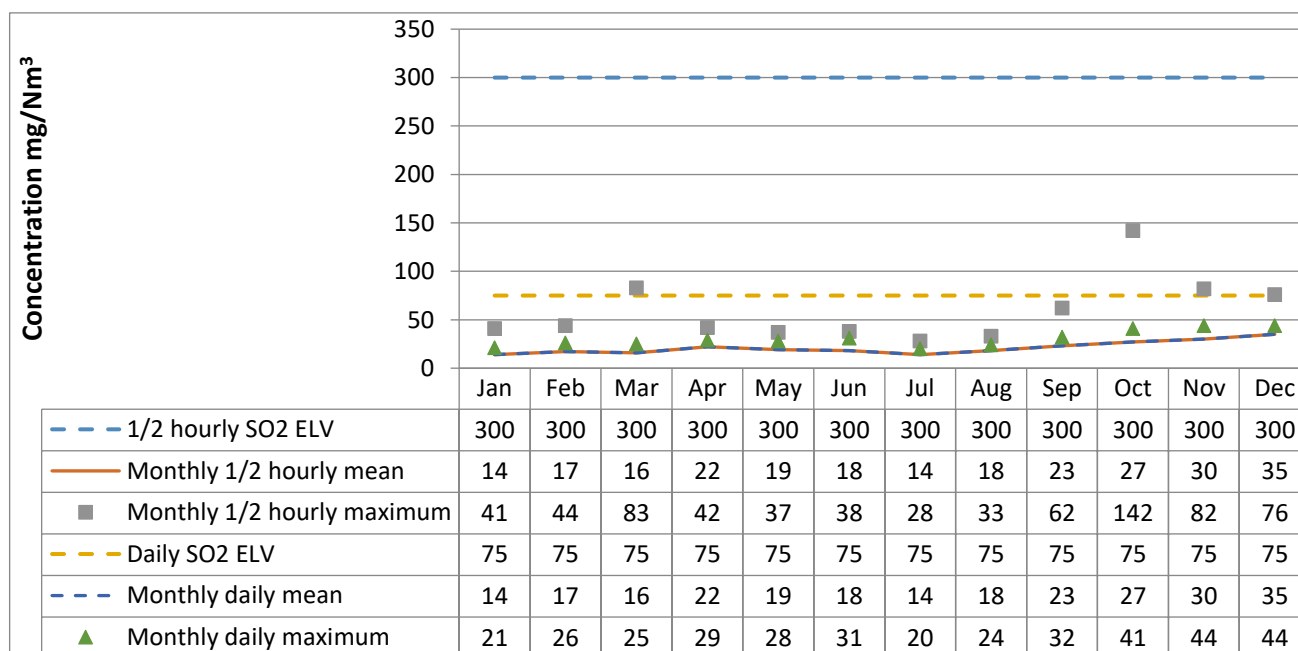


Monthly emissions summary incl half hr

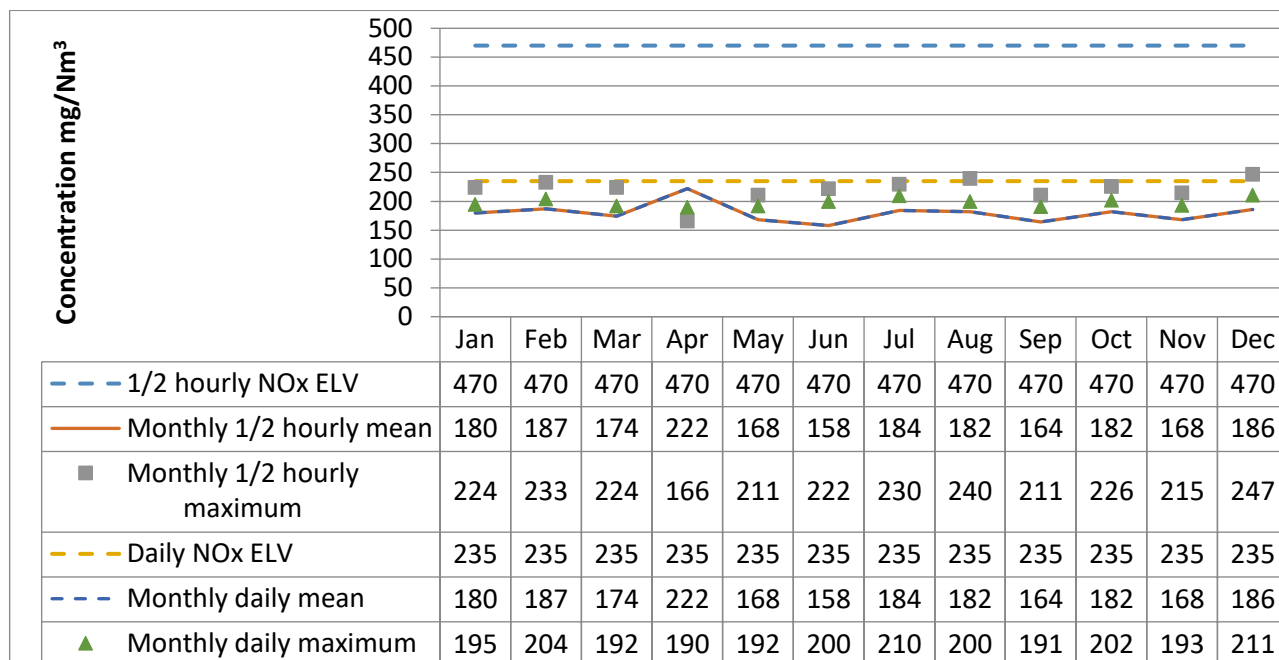
Line 1 - Hydrogen chloride



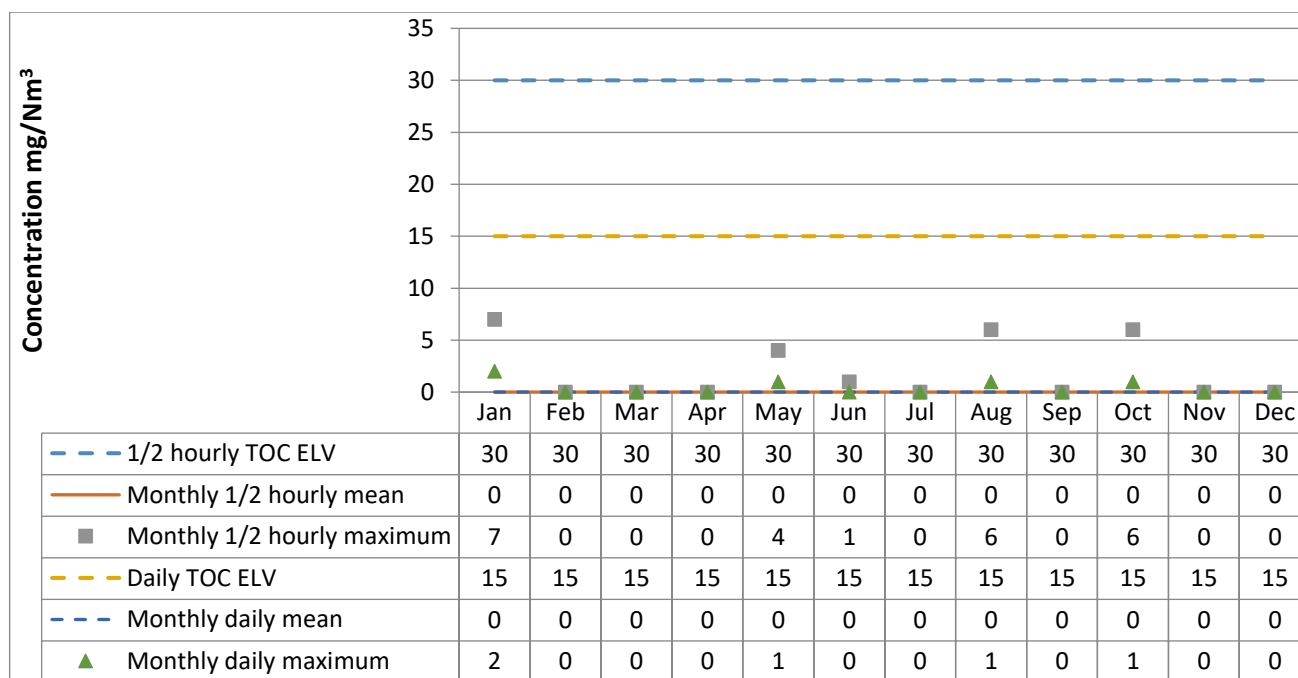
Line 1 – Sulphur dioxide



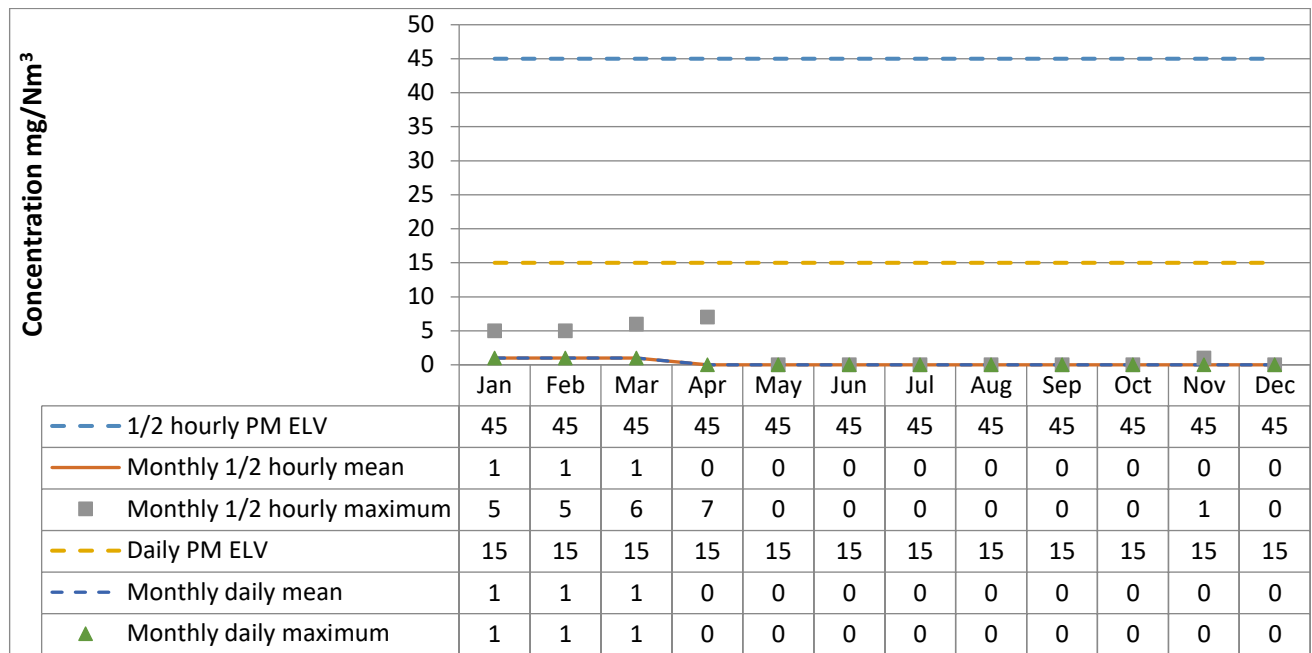
Line 1 – Oxides of nitrogen



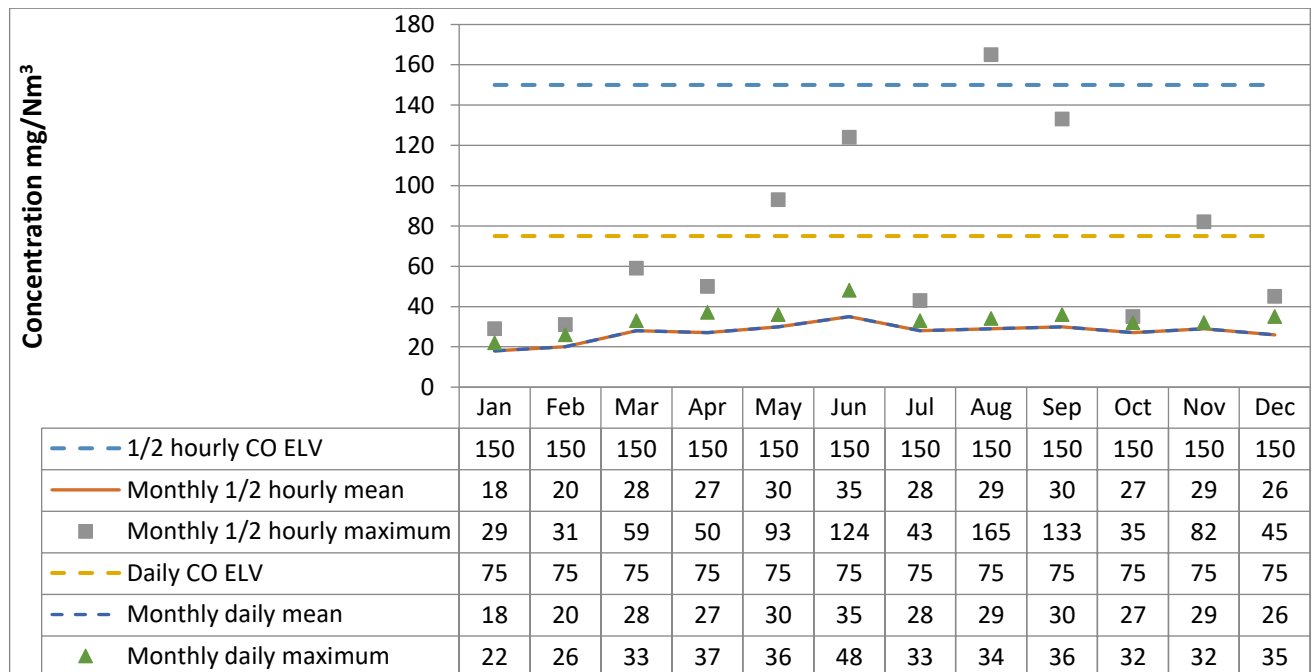
Line 1 – Total organic carbon



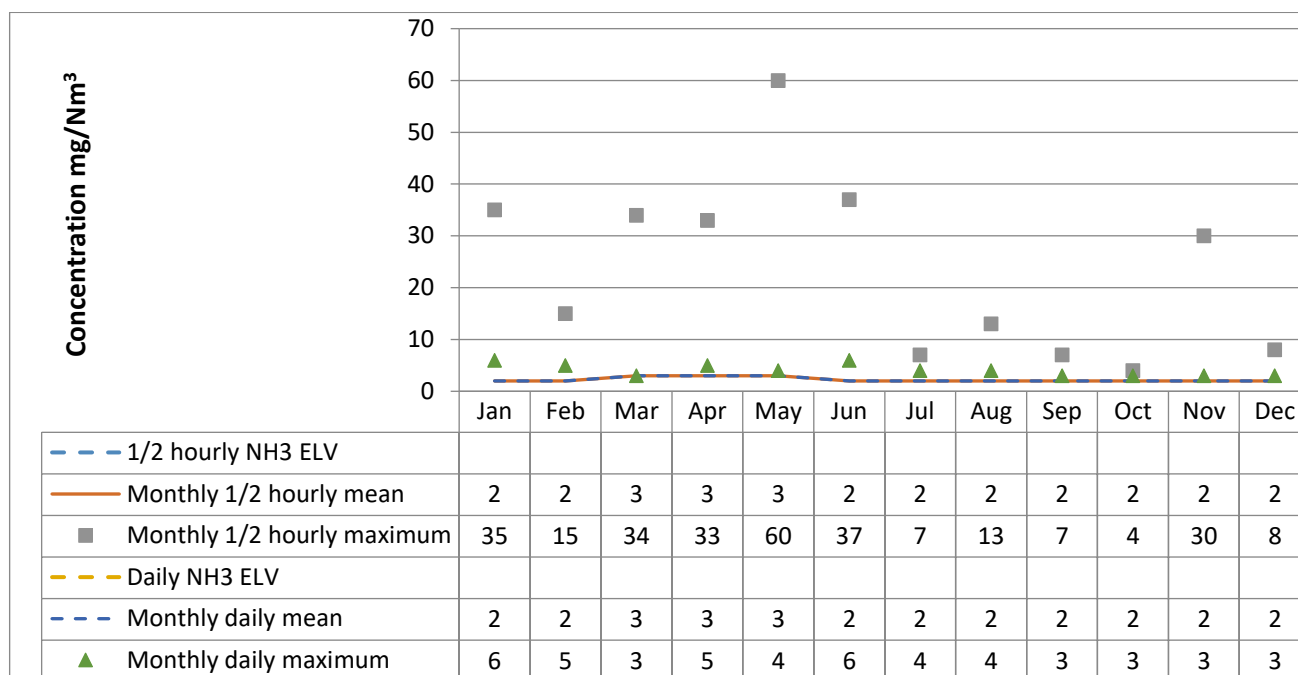
Line 1 – Particulates



Line 1 – Carbon monoxide



Line 1 – Ammonia



4.2 Summary of periodic monitoring results for emissions to air

The table below shows the results of periodically monitored substances.

Substance	Emission limit value	Results	
		05/05/2022 - 10/05/2022	24/08/2022 - 01/09/2022
Mercury and its compounds	0.05 mg/m ³	0.0001 mg/m ³	0.0006 mg/m ³
Cadmium & thallium and their compounds (total)	0.05 mg/m ³	0.0011 mg/m ³	0.00173 mg/m ³
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m ³	0.1190 mg/m ³	0.1190 mg/m ³
Dioxins and furans (I-TEQ)	0.1 ng/m ³	0.0032 ng/m ³	0.0044 ng/m ³
Hydrogen Fluoride	3 mg/m ³	0.57 mg/m ³	0.20 mg/m ³

4.3 Summary of monitoring results for emissions to water

There are no emissions to water from the process [other than clean surface water and emissions to sewer].

5. Summary of Permit Compliance

5.1 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 %	100 %
Sulphur dioxide	100 %	100 %
Carbon monoxide	99.993%	100 %
Total organic carbon	100 %	100 %
Hydrogen chloride	100 %	100 %

5.2 Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
10/08/2022	Carbon Monoxide half hour ELV of 150 mg/m3 breached, with a measured value of 164.9 mg/Nm3 between 01:30 and 01:59 on the 10/08/2022.	Half hourly CO ELV breach occurred following a large slag fall in the furnace, resulting in poor fluidisation of the bed and incomplete combustion of solid fuel.	System being installed to add a fuel additive to the wood fuel as it enters the boiler to reduce formation of slag within the furnace.

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

Date of complaint	Summary of complaint	Reason for complaint including whether substantiated by the operator or the EA	If substantiated, measures to prevent reoccurrence
N/A	N/A	N/A	N/A

6. Summary of plant improvements

Summary of any permit improvement conditions that have been completed within the year and the resulting environmental benefits.
None
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.
<p>Bed Ash</p> <p>Further speciation analysis on the IBA was undertaken in 2021 to support the data from 2015 & 2018 speciation work. The conclusion of this work demonstrated that a significant proportion of the zinc and copper species present in the ash are present as non-hazardous zinc and copper compounds and hence the ash does not trigger the hazardous thresholds prescribed in WM3. This study was carried out with support from WRC Group Laboratory and presented to the EA in December 2021. The EA are yet to provide comment on the report. for A non-hazardous classification is expected to provide additional re-use/recycling routes for the ash stream, providing environment and cost benefits.</p> <p>APCR</p> <p>APCR from Blackburn Meadows Power Station no longer goes to landfill, with a new contract going live from October 2022 with Enva to take our APCR to OCO Technology in Leeds for recovery. The ash is put through a carbon negative process to produce an aggregate material suitable for use in a range of applications including masonry, concrete and asphalt. This is an EA end of waste approved process.</p> <p>Fuel Additive</p> <p>Blackburn Meadows has historically had issues with slag formation in the furnace of the boiler, an issue which has resulted in several unplanned shutdowns in 2022 to carry out a furnace de-slag. This results in down time for the installation as well as having a negative impact on the environment due to the additional bed ash production, increased consumption of gas oil used as a start-up and shutdown fuel and an increase in raw material usage as extra sand is required to re-fill the boiler bed.</p> <p>A fuel additive dosing system will be trialled in 2023, dosing a clay like material 'Kaolin' into the boiler along with the fuel, which is proven to reduce slag formation in similar installations. It is hoped that the addition of this additive will significantly reduce slag formation and result in fewer shutdowns of the plant – thus having a positive impact on the environment.</p>

Bed Ash

APCR

Fuel Additive

Consumable Optimisation

In 2022, with the support from Fichtner Environmental Services, the use of consumables used for flue gas treatment was reviewed.

The study revealed that in using Sorbacal SP branded hydrated lime, we are using the most efficient product available due to its large surface area making it the most efficient product on the market at reducing acid gas emissions whilst keeping raw material consumption and APCR production at a minimum.

An alternative supplier of 40% Urea (used in the SNCR system) was sourced as a result of this study. However, as this was a 'like for like' product there was no environmental benefit. Further SNCR optimisation work is on hold until further boiler optimisations can be made once the fuel additive system has been commissioned in 2023.

Solar Panels

In January 2022 81kW of solar panels were installed on the roof of the administration building, reducing the carbon footprint of this building by 16.8 tonnes of CO₂ annually.