Annual Performance and Monitoring review
EPR Permit JP3632ZH
Cogen Plant - Dow Silicones UK Ltd

This report is to fulfil ERP permit JP3632ZH condition 4.2.2

4.2.2 A report or reports on the performance of the activities over the previous year shall be submitted to Natural Resources Wales by 31 January (or other date agreed in writing by Natural Resources Wales) each year. The report(s) shall include as a minimum:
(a) a review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of that data;

Contents

Summary

The report includes details of our performance during 2023 . SPC charts have been used for all CEMS monitoring we carry out for NOX and CO for the last 7 years. SPC charts have been used for extractive sampling we have carried out since 2008.

Points of interest for 2023 :

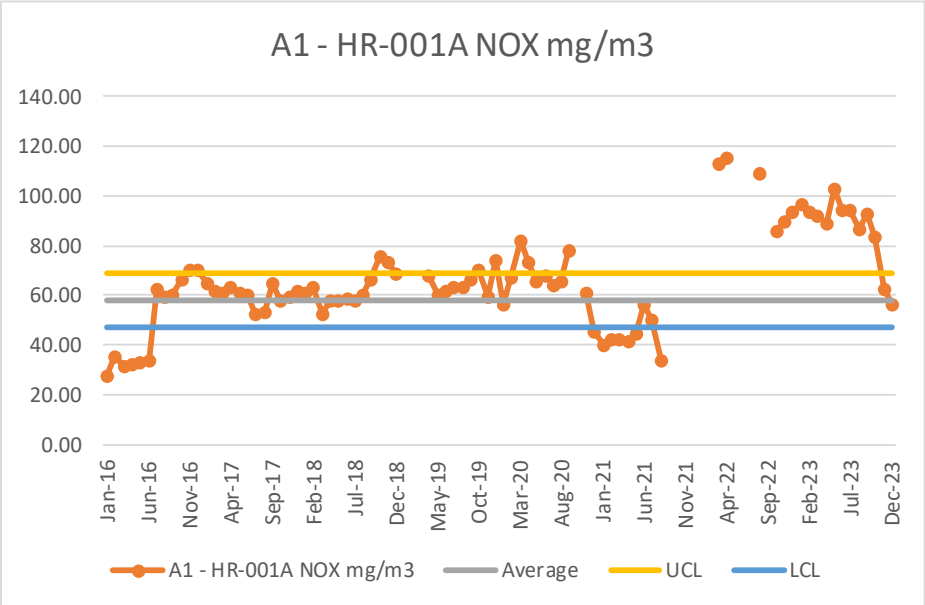
- GT running hours during the year have been low. GTA started up again and ran well for the last month and a half of the year. GTB will restart in 2024 when the boiler stat inspection is complete.
- 3 new CEMS have been ordered following on from the failure of the system on Unit B. These new systems will be installed during 2024.
- Fired boiler still requires some optimisation to run at higher rates without seeing elevated levels of CO.

Incidents

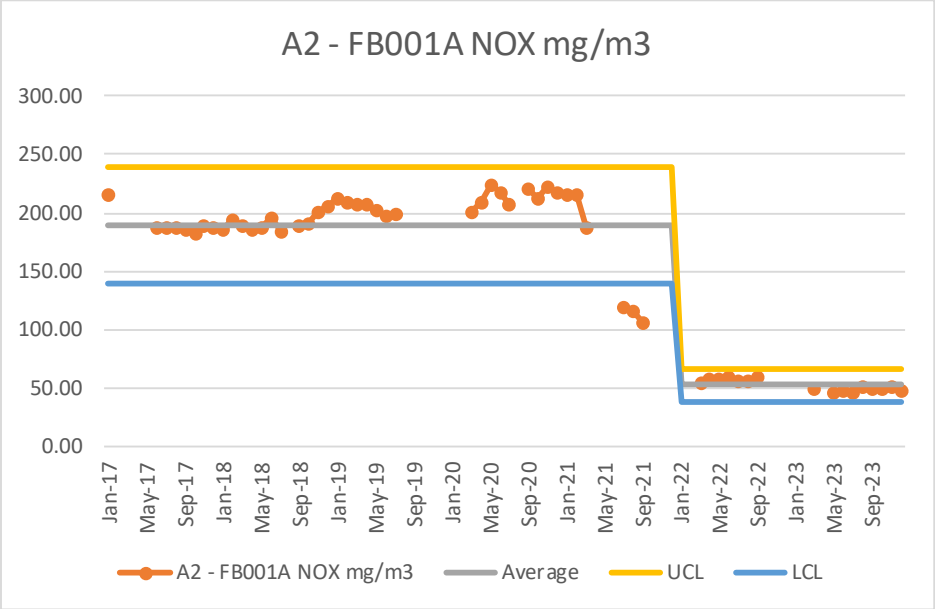
Schedule 5's submitted during 2023:

- Q2 Unit A Nox and Unit FB CO – the NOx on Unit A was caused by being unable to run the GT, the CO on the Fired boiler was caused by running the system at high rates. This identified the need for further optimisation of the Fired boiler.
- June 2023 – Unit B CEMS Analyser failure – this old analyser failed and meant we were unable to gather monitoring data. After a number of unsuccessful attempts by the vendor, the Unit was eventually brought back on line and is operational whilst we wait for delivery and installation of a new CEMS.

Air monitoring
CEMS data
NOX

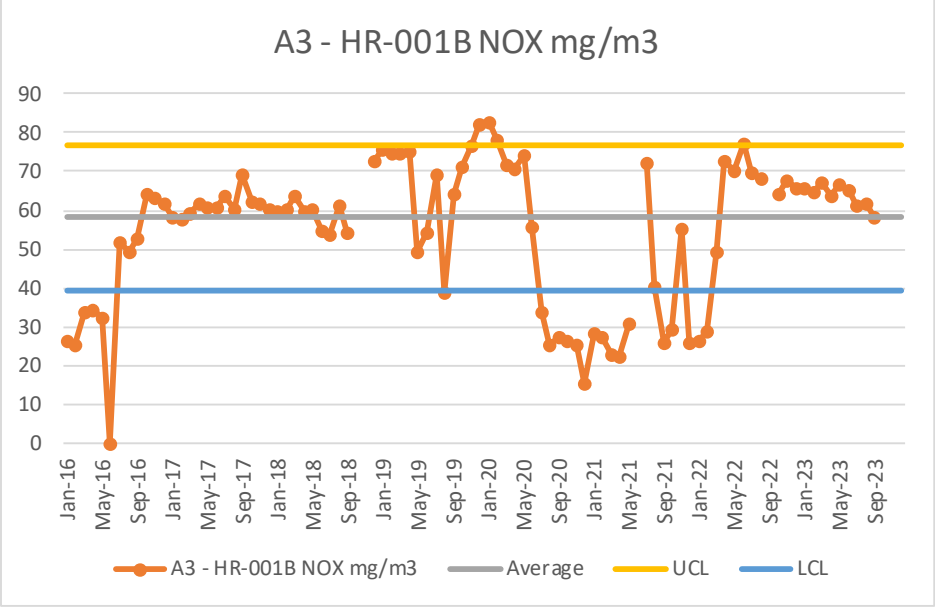


Permit limit:
Monthly ave 75mg/m3
Annual ave 55 mg/m3
(with GT running)
*O2 ref 15%



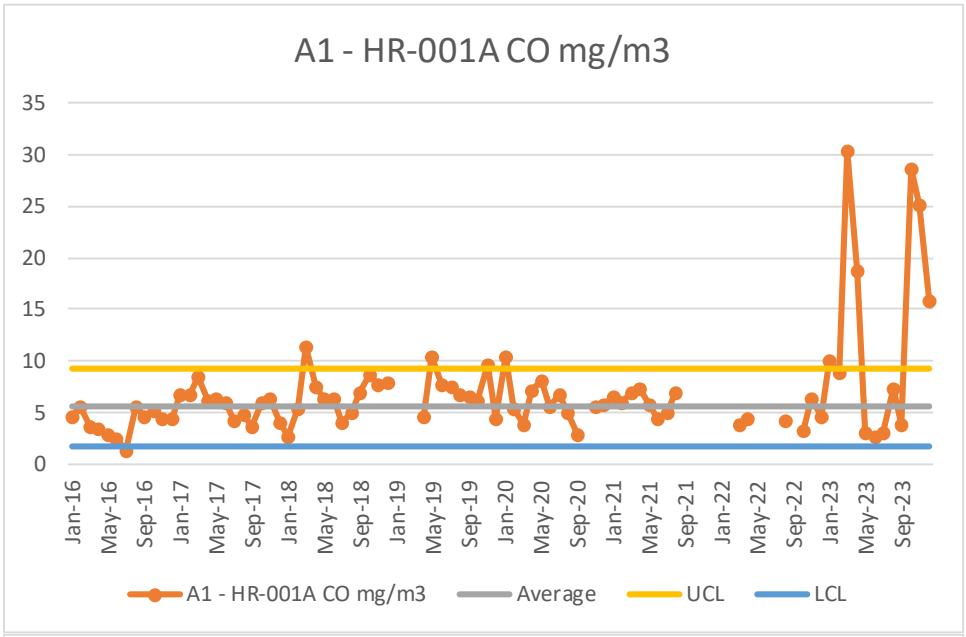
Permit limit:
Monthly ave 100 mg/m3
Annual ave 100 mg/m3
*O2 ref 3%

Burner was upgraded to reduce NOx during 2022. Optimisation was carried out in March 2022 and proved very successful as can be seen from the SPC chart (and updated limits).

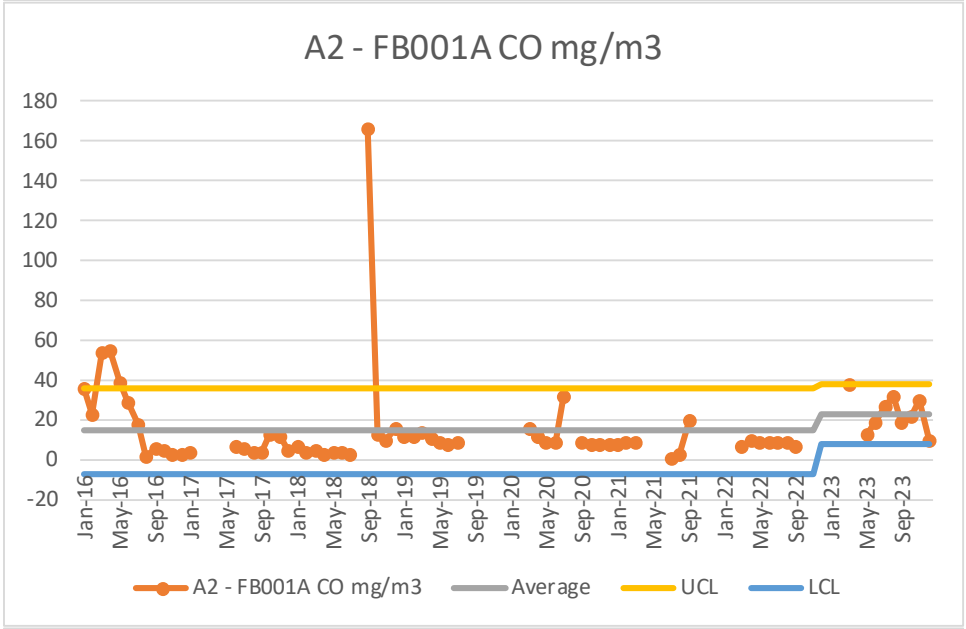


Permit limit:
Monthly ave 75mg/m3
Annual ave 55 mg/m3
(with GT running)
*O2 ref 15%

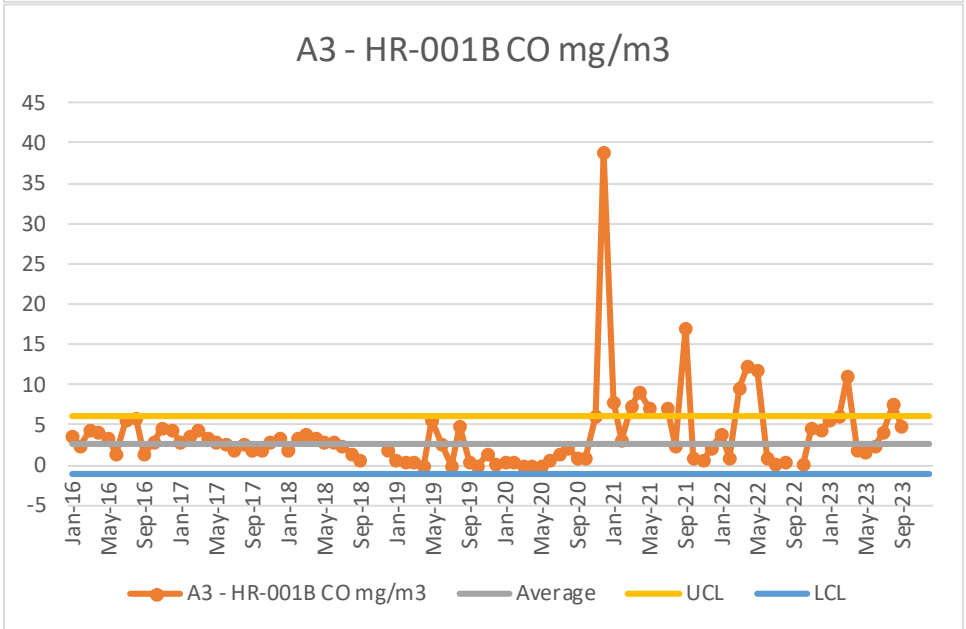
CO



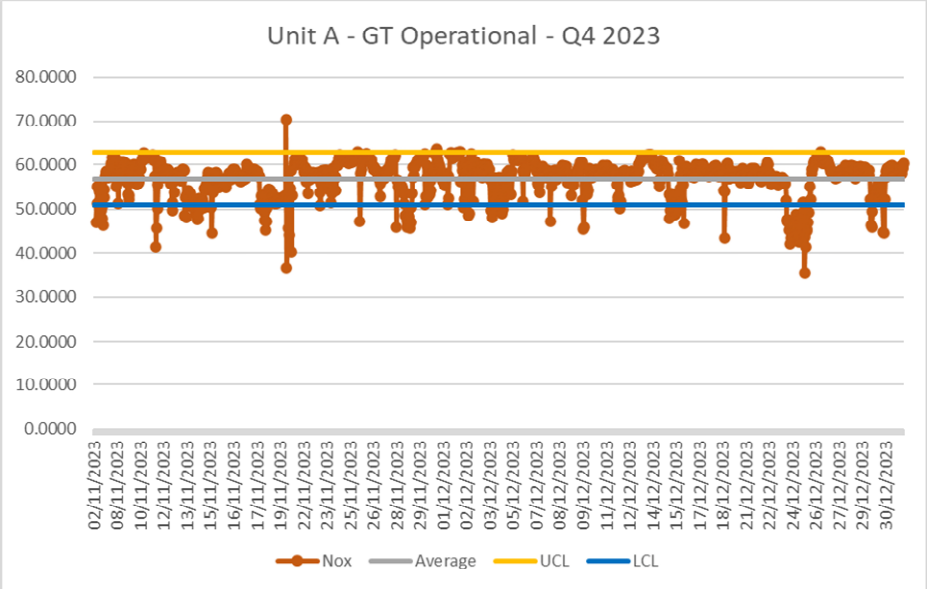
Permit limit:
Monthly ave 80mg/m3
Annual ave 30 mg/m3
*O2 ref 15%



Permit limit:
Monthly ave 100mg/m3
Annual ave 40 mg/m3
*O2 ref 3%

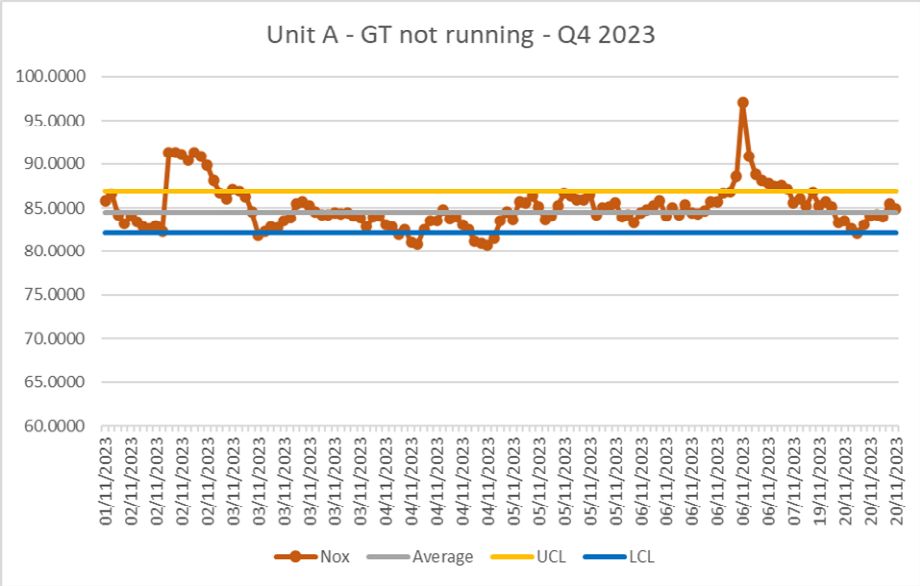


Permit limit:
Monthly ave 80mg/m3
Annual ave 30 mg/m3
*O2 ref 15%



SPC Run chart of hourly data for Q4 2023 – GT running

(This data is taken from the Pi Process data, not the DAHS reporting system, this yields slightly higher values due to calibration factors))

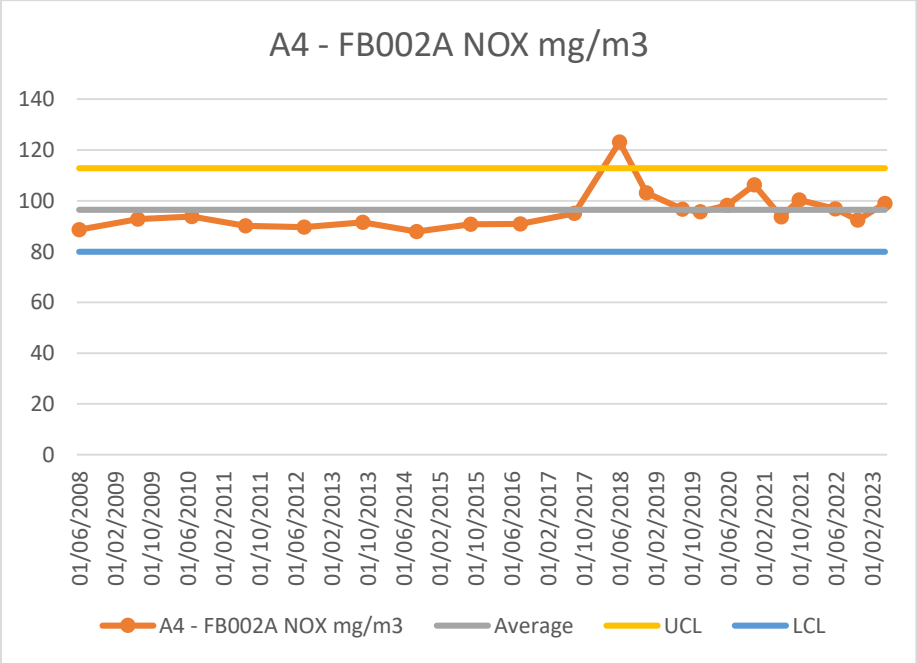


SPC Run chart of hourly data for Q4 2023 – GT not running

(This data is taken from the Pi Process data, not the DAHS reporting system, this yields slightly higher values due to calibration factors)

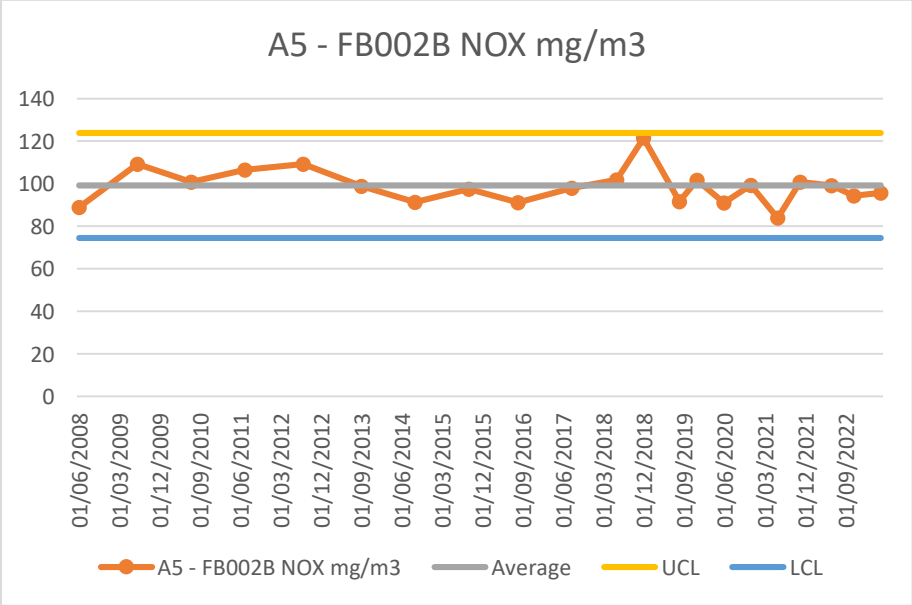
Periodic extractive sampling

NOX



Results within permit limit.

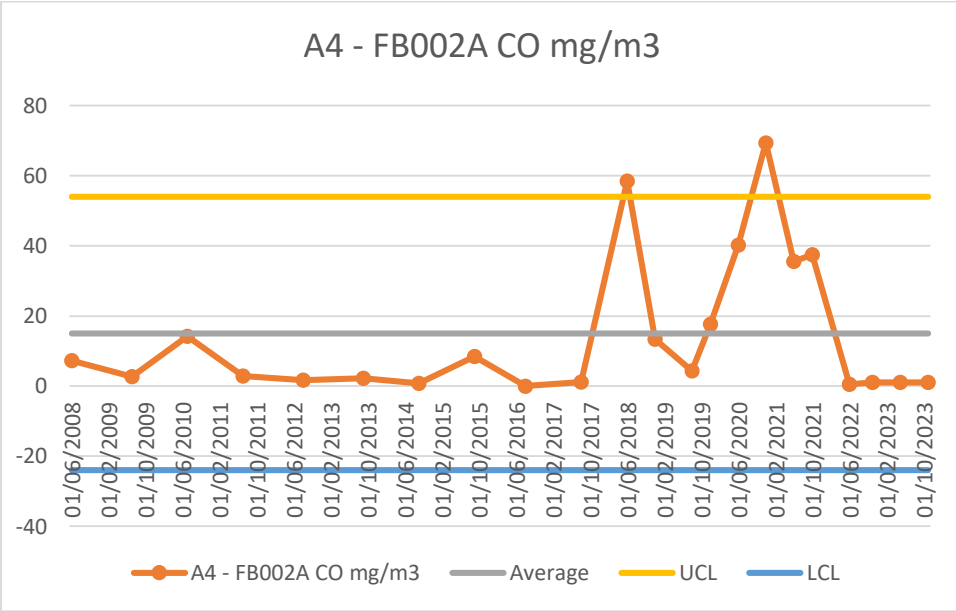
Permit limit:
6 monthly extractive sample 110 mg/m3
*O2 ref 3%



Results within permit limit.

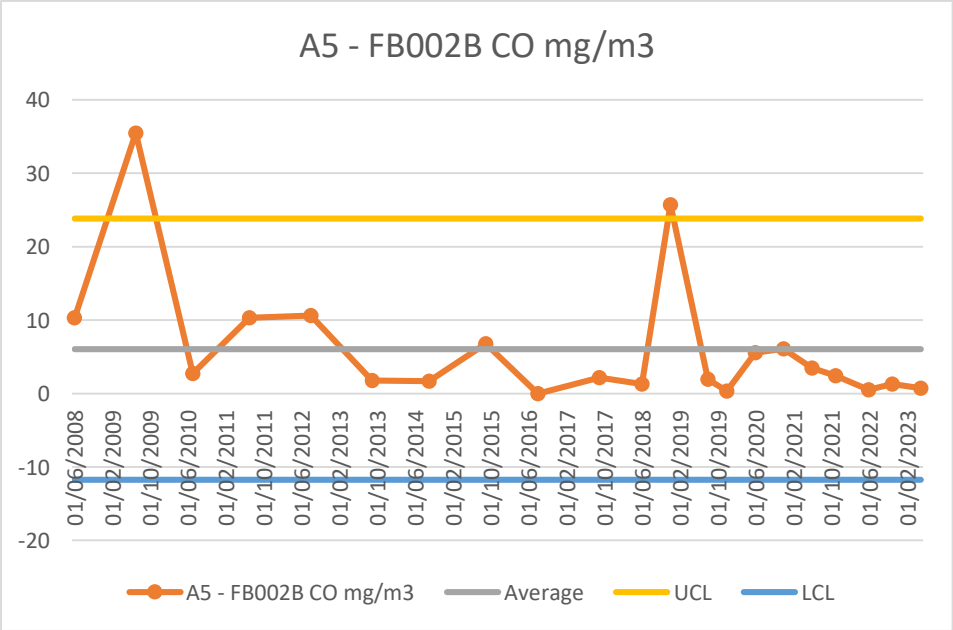
Permit limit:
6 monthly extractive sample 110 mg/m3
*O2 ref 3%

CO



Results within permit limit.

Permit limit:
6 monthly extractive sample 100 mg/m3
*O2 ref 3%



Results within permit limit.

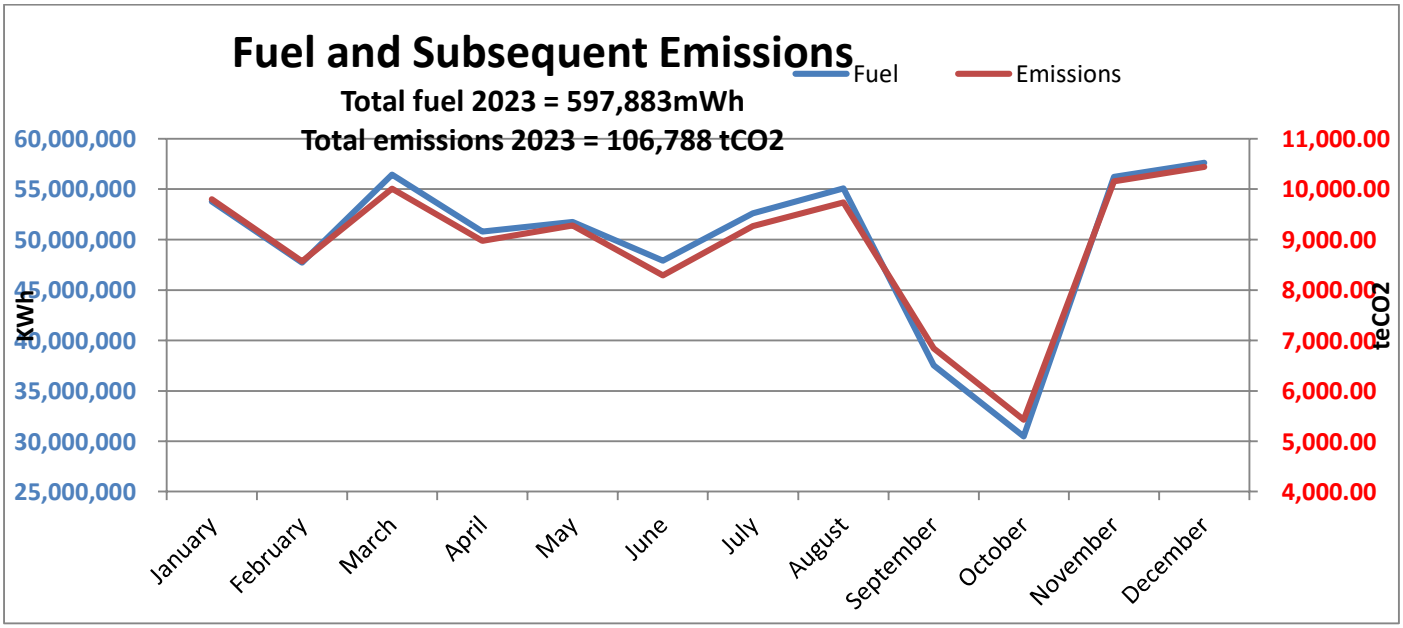
Permit limit:
6 monthly extractive sample 100 mg/m3
*O2 ref 3%

Fuel and Subsequent Emissions

Fuel and emissions were slightly higher than 2022. There was no electricity exported during 2023.

Average fuel consumption for the year was 49,823 MWh per month compared to 46,281 MWh per month for 2022.

Average CO2 emissions for the year were 8,899 tCO2 per month compared to 8,315 tCO2 per month for 2022



Running Hours

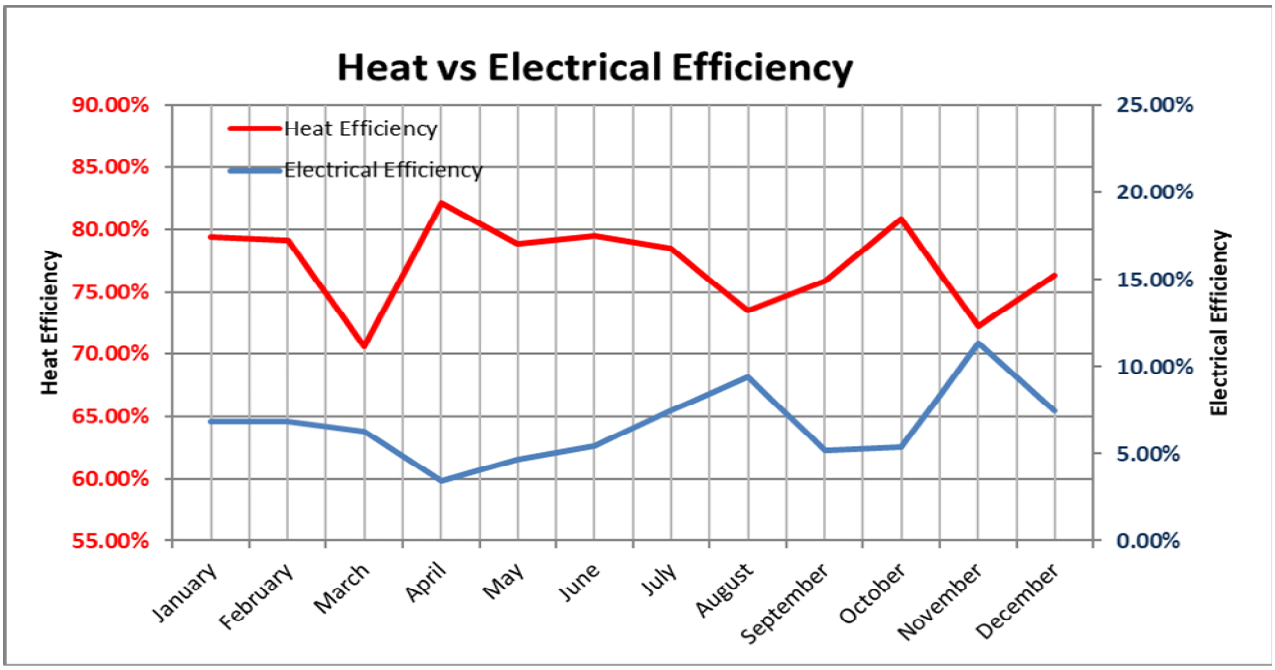
	Year:	A1 (hours)	A2 (hours)	A3 (hours)	A4 (hours)	A5 (hours)
Annual Operating Hours	2023	5179.108	2439	4427.426	568	1319.4
GT operation (% of Operating hours)		36%		6%		

The annualised hours reflect a general running philosophy that the gas turbines and heat recovery units are used as base generating units for both electricity and steam, with the fired boiler/MP boilers taking up the rest of the plant demand. However during 2023 A3 (HRSG / GT B) was out of operation from September onwards for statutory inspection.

The MP boilers are kept ready to go, should they be needed, so the hours have been calculated based on hours that each MP boiler is running above 20%.

Heat vs Electrical Efficiency

The heat efficiency was higher during periods of the year where the GT's were not running. The electrical efficiency was higher during periods of the year where the GT's were running.



CHP efficiency

CHP efficiency was variable during the year. This efficiency is calculated as a sum of the electrical and heat output divided by the fuel input. The efficiency measured in this way shows as higher at periods when there is higher heat efficiency.
The steam turbine ran from January-November and GTA ran for some of November and December.
We look forward to being able to increase our energy efficiency with greater online time for the GT's in 2024