# MVV Environment Baldovie Ltd

## Energy from Waste

# Pollution Prevention and Control (Scotland) Regulations 2012

## PPC/A/1003157/CP01

## Annual Report

## 2020

# Contents

## Introduction

The MVV Environment Baldovie Ltd (MEB) Energy from Waste (EfW) facility is located on the north easterly outskirts of Dundee, Scotland. The facility features two bubbling fluidised bed boilers, each with a thermal output of 17 MWth, firing 7.5 tph of waste per unit. The boilers are operated on refuse derived fuel which is prepared on site through the treatment of household and industrial waste which is received at the site from the locality, primarily from Dundee and Angus Councils.

The steam generated by the boilers is supplied to a condensing steam turbine for the generation of up to 10.5 MWe of electrical power. The power is generated at 11 kV and after supplying power to run the plant, the balance is exported directly to the local Distribution Network Operator. The plant was constructed during 1998 to 2000 and has been in operation since March 2000 with various plant improvements and modifications made since operations commenced.

Since the facility was acquired by MVV Umwelt in November 2018, significant investment in replacement and upgraded equipment has been made, resulting in improved reliability and efficiency, together with consistent and sustainable improvement in environmental performance.

MVV are constructing a completely new Combined Heat and Power (CHP) facility alongside and to the south of the existing fluidised bed plant. This plant is due to be commissioned in summer 2020 and has the capability to supply up to 20 tonnes of steam for process use from the steam turbine extraction pass-out. This is in addition to the capability to export 9.9 MWe should the steam pass-out not be utilised.

The operation of both plants is regulated under a common PPC Permit (PPC/1003157-CP01)

Whilst the Permit currently reflects MVV's original intention to cease operating and de-commission the fluidised bed facility when commissioning of the moving grate plant was complete, a detailed review of the current and planned capacity for dealing with residual waste in Scotland showed a capacity gap exists, and that a lifetime extension of the existing fluidised bed facility would be a viable and beneficial option. Parallel operation of both plants would provide a total capacity for approximately 220,000 tonnes of residual waste, with the lifetime extension of the fluidised bed facility providing otherwise unplanned incremental capacity for treating 110,000 tonnes per year and which would be available by summer 2021.

The application for this variation of the Permit has therefore been accepted and provided to the site on the 23rd of December. The site will be required to conduct a thorough review for future reporting and compliance purposes for the continuing of the operation of the fluidised bed plant alongside the moving grate plant for a period of up to ten years.

This thorough review will take into account Best Available Techniques (BAT) in review of operation of both plants and will be required in order to demonstrate that the requirements of the recent BAT Ref for Incineration of Waste are achievable for both plants.

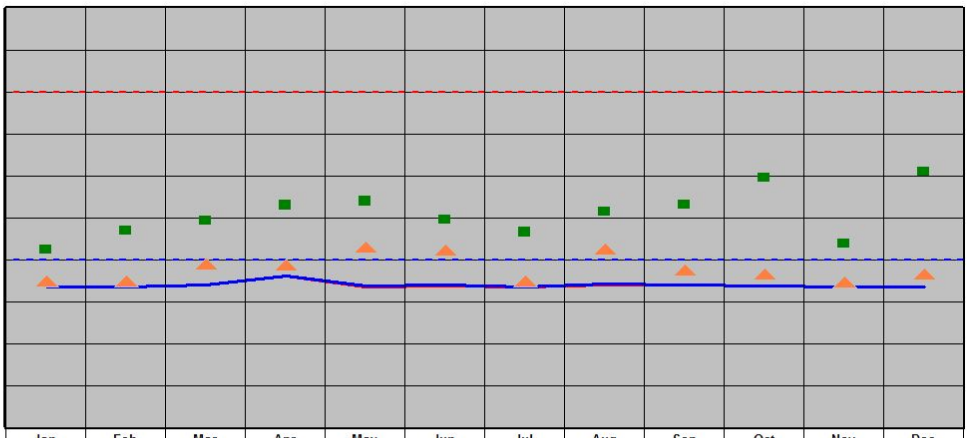
## Emissions to Air

### Continuous Monitoring of Emissions to Air

As required by Condition 6.3.9 and 6.1.1 Quarterly reports for Q1-Q4 2020 required by condition 6.3.9 were submitted to SEPA at the appropriate times. Graphical tables, illustrating the percentage of the allowance used for compliance with Condition 6.1.8 (a) and (b) were also submitted.

*Figure 1 Boiler 1 NOx Annual Emission*

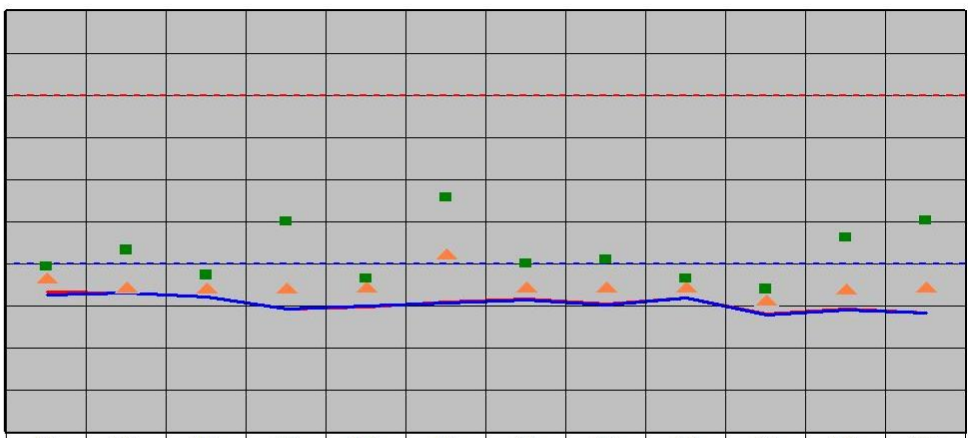
**Annual Reporting of Continuously Monitored Emissions to Air for $NO_x$, Emission Point Line 1 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Monthly 1/2 hr Mean. | 168.3 | 167.9 | 170.0 | 181.2 | 168.4 | 168.5 | 168.0 | 169.7 | 170.2 | 169.0 | 168.0 | 168.3 |
| Monthly 1/2 hr Max | 212.8 | 235.3 | 247.3 | 265.7 | 270.2 | 248.5 | 233.2 | 257.4 | 265.8 | 298.6 | 220.0 | 305.0 |
| Daily ELV | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| Daily Mean | 168.3 | 167.9 | 170.2 | 180.5 | 169.5 | 170.0 | 168.0 | 170.9 | 169.7 | 169.6 | 168.0 | 168.2 |
| Daily Max | 170.5 | 171.0 | 191.3 | 190.0 | 211.3 | 208.2 | 170.5 | 208.6 | 184.3 | 179.1 | 169.4 | 179.3 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 2 B2 NOx Annual Emission*

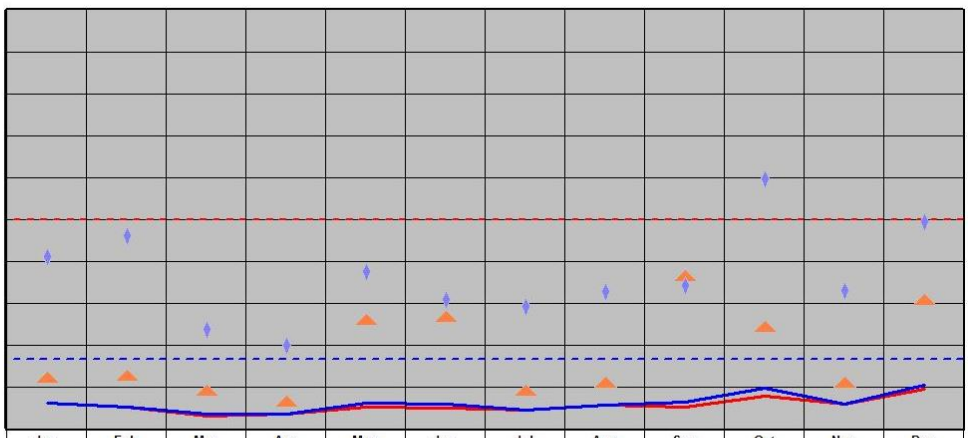
**Annual Reporting of Continuously Monitored Emissions to Air for $NO_x$, Emission Point Line 2 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Monthly 1/2 hr Mean. | 166.1 | 165.1 | 160.9 | 146.5 | 149.3 | 154.3 | 158.4 | 151.8 | 159.9 | 140.0 | 146.9 | 141.7 |
| Monthly 1/2 hr Max | 197.4 | 216.8 | 186.9 | 250.4 | 183.1 | 279.1 | 200.3 | 205.3 | 182.4 | 170.1 | 231.3 | 251.7 |
| Daily ELV | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| Daily Mean | 163.2 | 164.9 | 160.3 | 146.3 | 150.4 | 154.0 | 157.7 | 151.5 | 159.6 | 139.6 | 145.3 | 141.7 |
| Daily Max | 179.6 | 168.5 | 168.0 | 167.3 | 168.3 | 207.7 | 168.2 | 168.2 | 168.1 | 153.0 | 166.2 | 168.0 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 3 Boiler 1 CO Annual Emission*

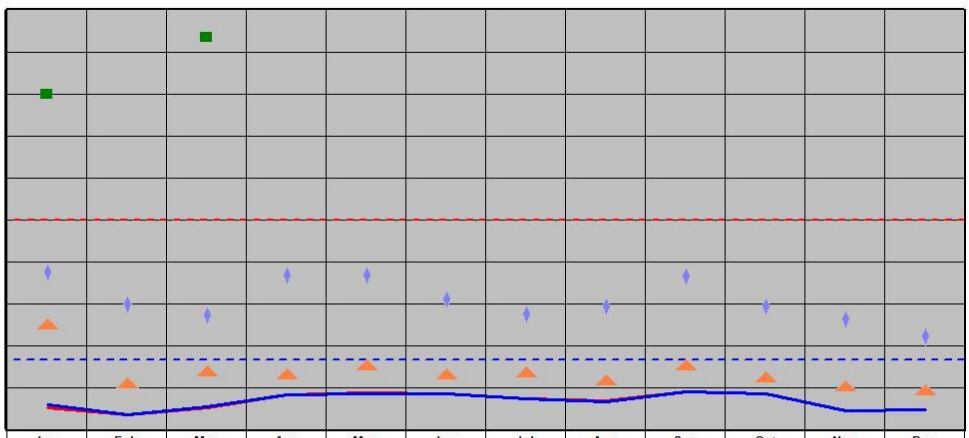
**Annual Reporting of Continuously Monitored Emissions to Air for CO, Emission Point Line 1 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95%ile 10 min ELV | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| Monthly 95% Max. | 123.2 | 138.5 | 71.0 | 59.6 | 112.3 | 92.8 | 87.3 | 98.4 | 102.7 | 178.7 | 98.8 | 148.6 |
| Monthly 10m Mean. | 18.8 | 15.4 | 9.5 | 10.5 | 15.8 | 15.2 | 13.9 | 17.3 | 15.8 | 23.4 | 17.9 | 28.3 |
| Max. 10 min average | 378.0 | 323.9 | 305.5 | 377.2 | 481.1 | 1013.5 | 591.9 | 483.4 | 346.7 | 486.4 | 488.6 | 642.9 |
| Daily ELV | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Daily Mean | 18.8 | 15.8 | 10.6 | 10.5 | 18.3 | 17.9 | 13.9 | 17.0 | 18.9 | 29.5 | 17.8 | 31.7 |
| Daily Max | 34.5 | 36.0 | 25.7 | 17.5 | 76.0 | 78.2 | 25.2 | 30.8 | 107.7 | 70.9 | 31.5 | 90.4 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 4 Boiler 2 CO Annual Emission*

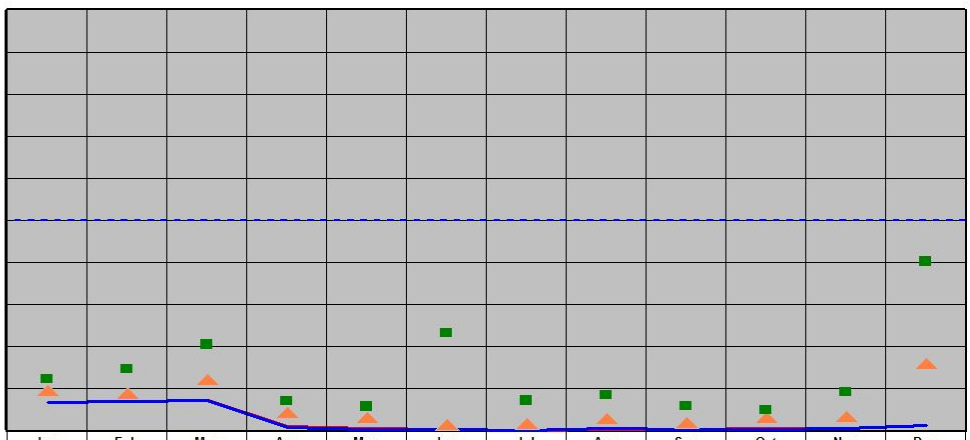
**Annual Reporting of Continuously Monitored Emissions to Air for CO, Emission Point Line 2 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95%ile 10 min ELV | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| Monthly 95% Max. | 112.4 | 89.8 | 82.0 | 110.4 | 110.6 | 93.3 | 82.4 | 88.2 | 109.9 | 88.3 | 79.2 | 66.9 |
| Monthly 10m Mean. | 16.0 | 10.9 | 15.5 | 24.9 | 26.2 | 25.7 | 22.1 | 20.4 | 26.9 | 25.9 | 13.9 | 14.2 |
| Max. 10 min average | 239.9 | 316.8 | 280.8 | 937.4 | 356.1 | 1021.9 | 580.4 | 656.0 | 578.0 | 322.4 | 745.3 | 619.0 |
| Daily ELV | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Daily Mean | 18.1 | 10.8 | 16.3 | 25.2 | 25.7 | 25.6 | 22.0 | 20.2 | 27.2 | 25.6 | 13.9 | 14.3 |
| Daily Max | 73.5 | 31.3 | 39.9 | 37.4 | 44.3 | 37.5 | 39.0 | 33.1 | 44.2 | 35.7 | 29.3 | 26.4 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 5 Boiler 1 Annual Emission $SO_2$*

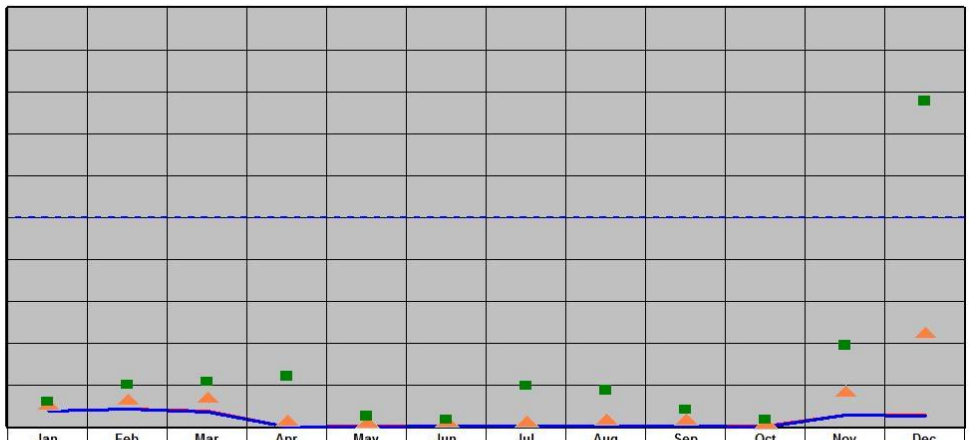
**Annual Reporting of Continuously Monitored Emissions to Air for $SO_2$, Emission Point Line 1 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| Monthly 1/2 hr Mean. | 6.8 | 6.9 | 7.2 | 0.9 | 0.4 | 0.2 | 0.1 | 0.3 | 0.3 | 0.4 | 0.5 | 1.2 |
| Monthly 1/2 hr Max | 12.3 | 14.7 | 20.4 | 7.1 | 5.7 | 23.2 | 7.1 | 8.4 | 5.9 | 4.9 | 9.2 | 40.3 |
| Daily ELV | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Daily Mean | 6.7 | 6.9 | 7.2 | 0.8 | 0.3 | 0.2 | 0.1 | 0.4 | 0.2 | 0.3 | 0.5 | 1.2 |
| Daily Max | 8.7 | 8.1 | 11.3 | 3.4 | 2.3 | 0.7 | 0.8 | 2.1 | 1.1 | 2.2 | 2.7 | 15.2 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 6 Boiler 2 Annual Emission $SO_2$*

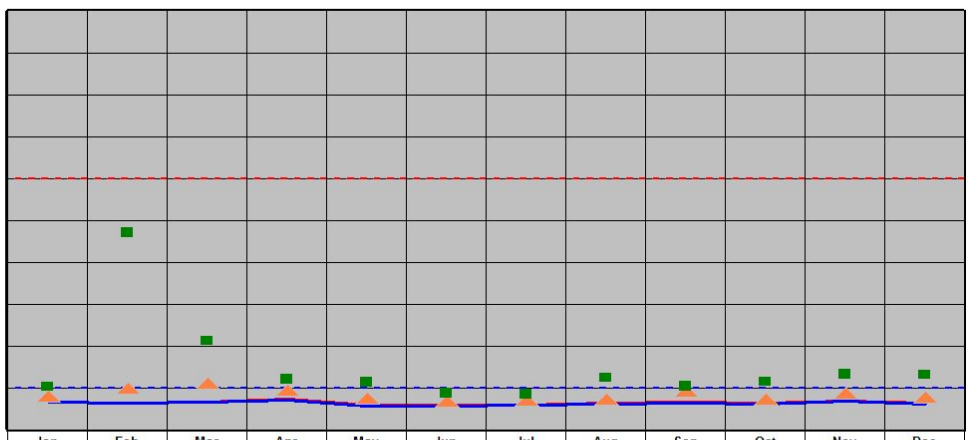
**Annual Reporting of Continuously Monitored Emissions to Air for $SO_2$, Emission Point Line 2 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| Monthly 1/2 hr Mean. | 3.8 | 4.3 | 3.7 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.3 | 0.1 | 2.9 | 2.8 |
| Monthly 1/2 hr Max | 6.0 | 10.2 | 10.9 | 12.2 | 2.6 | 1.7 | 9.9 | 8.8 | 4.2 | 1.8 | 19.5 | 77.8 |
| Daily ELV | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Daily Mean | 3.9 | 4.3 | 3.7 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.0 | 2.8 | 2.7 |
| Daily Max | 4.7 | 5.8 | 6.3 | 1.0 | 0.4 | 0.5 | 0.7 | 1.1 | 1.0 | 0.3 | 7.7 | 21.9 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 7 Boiler 1 Annual Emission HCl*

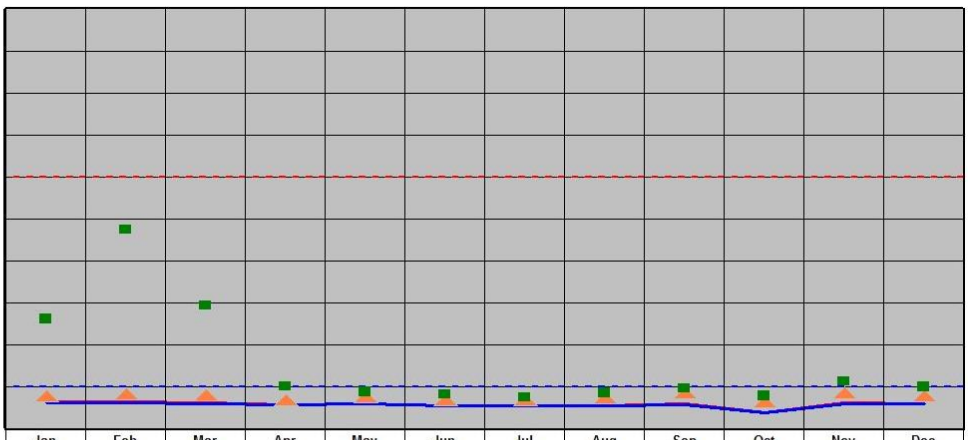
**Annual Reporting of Continuously Monitored Emissions to Air for HCl, Emission Point Line 1 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Monthly 1/2 hr Mean. | 6.6 | 6.4 | 6.7 | 7.3 | 6.0 | 5.9 | 5.9 | 6.4 | 6.7 | 6.5 | 6.9 | 6.4 |
| Monthly 1/2 hr Max | 10.3 | 47.2 | 21.3 | 12.2 | 11.4 | 8.8 | 8.6 | 12.5 | 10.5 | 11.6 | 13.4 | 13.3 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Daily Mean | 6.6 | 6.4 | 6.6 | 7.2 | 5.7 | 5.8 | 5.8 | 6.3 | 6.5 | 6.3 | 6.9 | 6.3 |
| Daily Max | 7.2 | 9.1 | 10.5 | 8.6 | 6.8 | 6.1 | 6.3 | 6.6 | 8.4 | 6.6 | 8.0 | 7.2 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 8 Boiler 2 Annual Emission HCl*

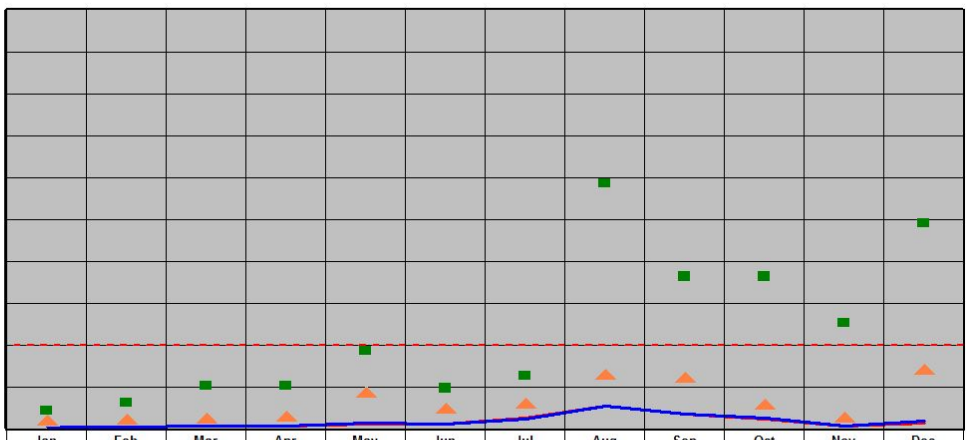
**Annual Reporting of Continuously Monitored Emissions to Air for HCl, Emission Point Line 2 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Monthly 1/2 hr Mean. | 6.5 | 6.4 | 6.2 | 5.8 | 5.9 | 5.5 | 5.5 | 5.6 | 5.9 | 3.9 | 6.3 | 6.0 |
| Monthly 1/2 hr Max | 26.2 | 47.5 | 29.5 | 10.2 | 8.8 | 8.2 | 7.4 | 8.5 | 9.6 | 7.8 | 11.2 | 10.0 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Daily Mean | 6.2 | 6.3 | 6.0 | 5.7 | 5.9 | 5.4 | 5.4 | 5.4 | 5.8 | 3.7 | 6.0 | 5.9 |
| Daily Max | 7.1 | 7.5 | 7.2 | 6.1 | 6.9 | 6.0 | 6.0 | 6.6 | 7.8 | 5.5 | 7.7 | 7.2 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 9 Boiler 1 Annual Emission $NH_3$*

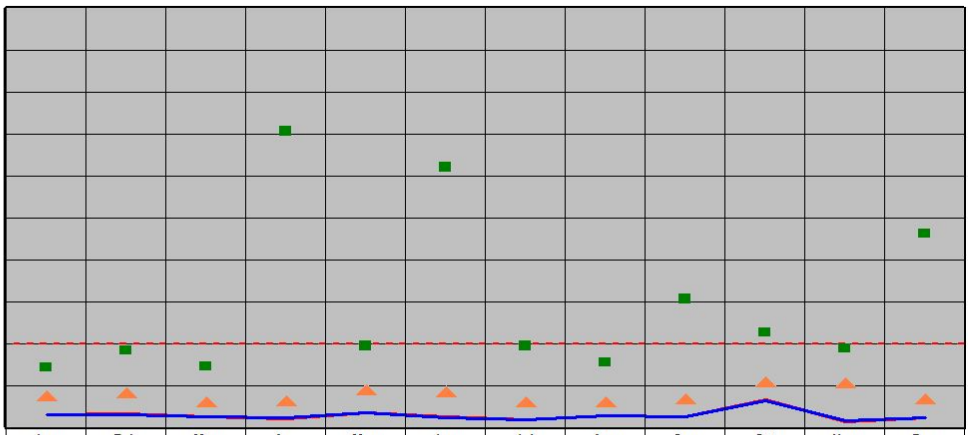
**Annual Reporting of Continuously Monitored Emissions to Air for $NH_3$, Emission Point Line 1 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Monthly 1/2 hr Mean. | 0.2 | 0.2 | 0.3 | 0.3 | 0.6 | 0.6 | 1.3 | 2.7 | 1.7 | 1.1 | 0.4 | 0.7 |
| Monthly 1/2 hr Max | 2.2 | 3.2 | 5.2 | 5.2 | 9.3 | 4.9 | 6.3 | 29.3 | 18.2 | 18.2 | 12.7 | 24.6 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Daily Mean | 0.2 | 0.2 | 0.3 | 0.3 | 0.7 | 0.7 | 1.2 | 2.7 | 1.8 | 1.3 | 0.4 | 0.9 |
| Daily Max | 0.6 | 0.8 | 0.9 | 1.1 | 4.0 | 2.1 | 2.7 | 6.1 | 5.7 | 2.6 | 1.0 | 6.8 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 10 Boiler 2 Annual Emission $NH_3$*

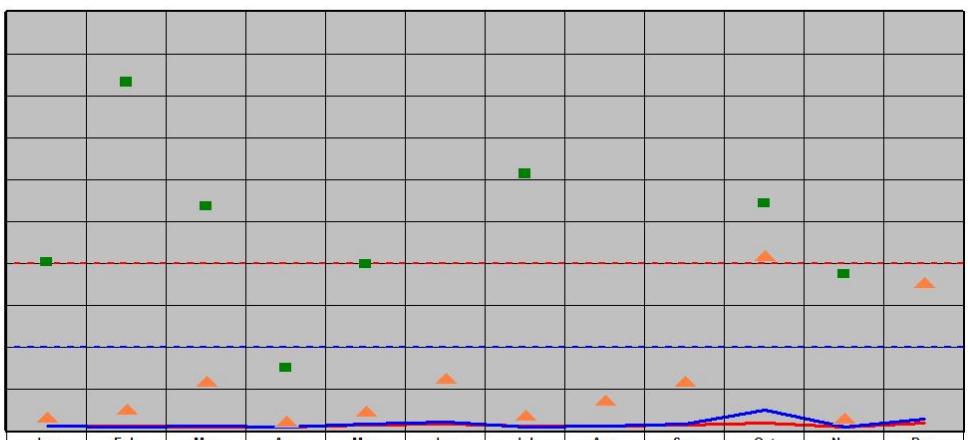
**Annual Reporting of Continuously Monitored Emissions to Air for $NH_3$, Emission Point Line 2 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Monthly 1/2 hr Mean. | 1.5 | 1.6 | 1.3 | 1.1 | 1.8 | 1.3 | 0.9 | 1.4 | 1.3 | 3.3 | 0.7 | 1.2 |
| Monthly 1/2 hr Max | 7.2 | 9.2 | 7.3 | 35.3 | 9.8 | 31.1 | 9.8 | 7.8 | 15.4 | 11.4 | 9.4 | 23.1 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Daily Mean | 1.5 | 1.6 | 1.3 | 1.1 | 1.8 | 1.2 | 0.9 | 1.4 | 1.3 | 3.2 | 0.8 | 1.2 |
| Daily Max | 3.4 | 3.8 | 2.7 | 2.9 | 4.2 | 3.9 | 2.6 | 2.7 | 3.0 | 5.1 | 5.0 | 3.1 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 11 Boiler 1 Annual Emission TOC*

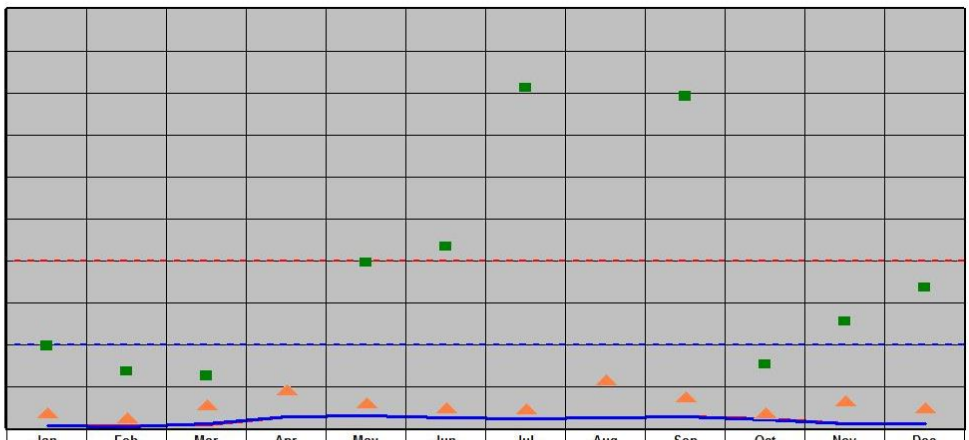
**Annual Reporting of Continuously Monitored Emissions to Air for TOC, Emission Point Line 1 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Monthly 1/2 hr Mean. | 0.6 | 0.6 | 0.4 | 0.5 | 0.7 | 0.9 | 0.5 | 0.6 | 0.7 | 0.9 | 0.5 | 1.0 |
| Monthly 1/2 hr Max | 20.1 | 41.7 | 26.9 | 7.5 | 19.9 | 231.7 | 30.7 | 67.5 | 76.4 | 27.2 | 18.7 | 173.1 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Daily Mean | 0.6 | 0.5 | 0.6 | 0.4 | 0.8 | 1.0 | 0.5 | 0.6 | 0.8 | 2.5 | 0.5 | 1.4 |
| Daily Max | 1.3 | 2.2 | 5.6 | 0.8 | 2.0 | 6.0 | 1.5 | 3.3 | 5.5 | 20.5 | 1.1 | 17.4 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 12 Boiler 2 Annual Emission TOC*

**Annual Reporting of Continuously Monitored Emissions to Air for TOC, Emission Point Line 2 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Monthly 1/2 hr Mean. | 0.4 | 0.3 | 0.5 | 1.5 | 1.5 | 1.3 | 1.2 | 1.3 | 1.4 | 1.2 | 0.5 | 0.6 |
| Monthly 1/2 hr Max | 9.9 | 6.8 | 6.3 | 128.4 | 19.8 | 21.7 | 40.7 | 125.1 | 39.6 | 7.6 | 12.8 | 16.8 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Daily Mean | 0.4 | 0.3 | 0.5 | 1.4 | 1.5 | 1.3 | 1.2 | 1.3 | 1.5 | 1.1 | 0.6 | 0.6 |
| Daily Max | 1.5 | 0.9 | 2.4 | 4.3 | 2.7 | 2.1 | 2.0 | 5.5 | 3.5 | 1.6 | 2.9 | 2.1 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

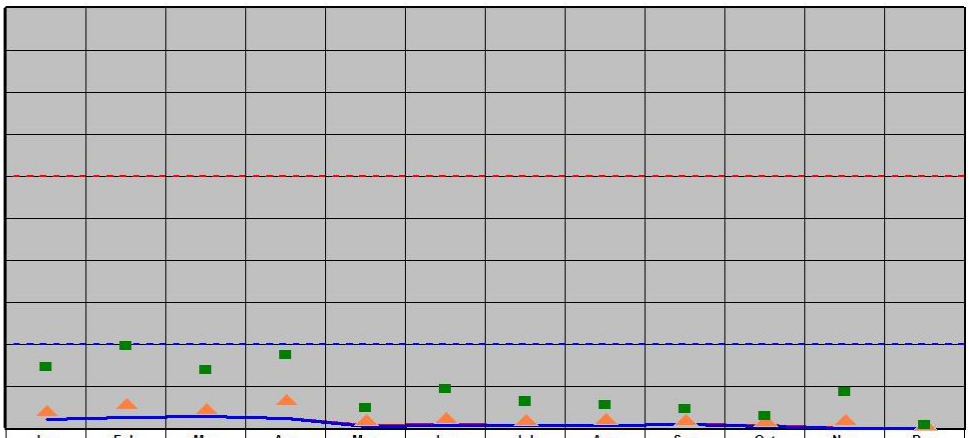
*Figure 13 Boiler 1 Annual Emission Dust*

**Annual Reporting of Continuously Monitored Emissions to Air for Dust, Emission Point Line 1 Rep. for 2020**


| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| Monthly 1/2 hr Mean. | 2.1 | 2.2 | 1.4 | 0.8 | 0.3 | 0.4 | 0.5 | 0.8 | 0.2 | 0.3 | 0.2 | 0.2 |
| Monthly 1/2 hr Max | 4.5 | 5.6 | 18.9 | 4.2 | 1.6 | 1.0 | 1.7 | 6.0 | 1.4 | 7.2 | 0.5 | 0.8 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Daily Mean | 2.1 | 2.2 | 1.5 | 0.7 | 0.3 | 0.3 | 0.5 | 0.8 | 0.2 | 0.3 | 0.2 | 0.2 |
| Daily Max | 2.8 | 3.6 | 4.1 | 1.3 | 1.0 | 0.6 | 0.8 | 1.8 | 0.9 | 2.4 | 0.3 | 0.3 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Figure 14 Boiler 2 Annual Emission Dust*

**Annual Reporting of Continuously Monitored Emissions to Air for Dust, Emission Point Line 2 Rep. for 2020**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 min ELV | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| Monthly 1/2 hr Mean. | 1.1 | 1.3 | 1.4 | 1.2 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 | 0.4 | 0.0 | 0.0 |
| Monthly 1/2 hr Max | 7.3 | 9.8 | 7.0 | 8.8 | 2.5 | 4.7 | 3.2 | 2.8 | 2.3 | 1.5 | 4.4 | 0.4 |
| Daily ELV | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Daily Mean | 1.1 | 1.3 | 1.4 | 1.2 | 0.3 | 0.4 | 0.3 | 0.4 | 0.4 | 0.3 | 0.0 | -0.0 |
| Daily Max | 1.7 | 2.6 | 2.0 | 3.1 | 0.6 | 1.0 | 0.6 | 0.8 | 0.7 | 0.6 | 0.7 | 0.1 |
| Invalid days, total = 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Mass Emissions from CEMS**

A summary table of mass emission from the continuous monitoring system is included as Appendix 1 at the end of this report.

## Periodic Monitoring

As required by Condition 6.4.5

Periodic monitoring reports were submitted for the first 6 months and second 6 months of 2020 for stack emissions to air. All components were compliant with Permit ELVs.

*Figure 15 Total Mass Emissions from Periodic Monitoring*

| Total Mass Emissions Periodic Monitoring | | | |
|---|---|---|---|
| Parameter | Boiler 1 kg/y | Boiler 2 kg/y | Total Mass Emission kg |
| Dioxins & Furans | 7.90E-07 | 2.08E-06 | 2.86924E-06 |
| Cd & Th | 0.38 | 0.1690 | 0.54979 |
| Heavy metals | 4.94 | 6.1716 | 11.10713 |
| Hg | 0.1283 | 0.3220 | 0.45032 |
| HF | 23.97 | 18.7831 | 42.75572 |
| $NH_3$ | 91.66 | 183.8058 | 275.46592 |
| PCB | 1.16E-07 | 0.0000 | 2.26332E-07 |
| PAH | 0.6628 | 0.7111 | 1.37385 |

## Variations to Permit

The following key aspects of the Permit were subject to variation in 2020.

A variation was agreed for parallel operation of the existing lines 1 & 2 to continue operating for a maximum period of up to 10 years in parallel with line 3. This variation increases waste incineration capacity within Scotland thus helping divert waste from landfill.

This comprehensive variation includes a variety of new Permit conditions that will have to be met with designated timescales in place and will format future reports.

## Permit Compliance

**Incidents Reported**

In total there were 18 incident reports reported to SEPA during 2020.

15 of these reports were related to breakdown situations requiring maintenance and inspection and the start-up process of coming back onto waste.

1 of these incidents' reports was related to a daily average exceedance level of HCl due to an adjusted calibration function being implemented. A subsequent audit after the calibration function was adjusted identified a marginal HCl exceedance of 0.46mg/$Nm^3$ above the daily average emission limit value that is set at 10mg/$Nm^3$. This incident was set aside by SEPA as it could not have been foreseen until the calibration function was implemented and it could have been easily controlled via abatement with Calcium Hydroxide, Ca(OH)2 during normal operation. The incident has been recorded into SEPA's classification information system; however, it will not be considered a breach of the Permit requirements.

1 incident report was submitted for a daily average emission limit value exceedance of 207.73 mg/$Nm^3$ for $NO_x$ on the 22nd of June with SEPA confirming a minor breach which impacted our compliance assessment score with a subsequent advisory letter received requesting further investigation and information within a timescale of the 10th of August.

1 incident was submitted after a site fire in one of the site's waste processing areas that occurred on the 22nd of June. The cause of the fire was unable to be positively identified, but more than likely to be battery related causing ignition along with an accelerant resulting in the site team being unable to safely tackle the fire. The local Fire and Rescue Service had to attend site to safely extinguish the fire. An advisory letter was sent to the site from SEPA as contaminated fire water has entered the Scottish Water surface drainage system and then discharged into the local water course. This has been recorded as a minor emission limit control (ELC) against permit condition 7.1.2 with further investigations and requested information submitted to SEPA as requested.

**Complaints**

Several complaints were received via the site and SEPA. These were dealt with accordingly via site procedures.

12 odour complaints were received from the north east of the site on the following dates: 10th of February, 7th of April, the 6th, 7th, 9th, 21st and 25th of May, the 21st of July, the 5th & 7th of August and 20th & 27th of September. All these complaints were all dealt with accordingly via the site procedures with incident forms submitted to SEPA.

2 noise complaints were received from the north of the site.

The first noise complaint was on the 1st of June and reported direct to the site with an incident and investigation report sent to SEPA via our onsite procedures.

The second was an external complaint received via the local authorities Environmental Health Department on the 18th of December due to a nearby resident complaining about a specifically described noise. This was thoroughly investigated and considered not related to the site with information passed onto SEPA and the local authority accordingly.

These complaints were subsequently found not substantiated by SEPA.

**Total Organic Carbon (TOC) in Bottom Ash**

Condition 5.1.1 a) and 8.1.5

TOC analysis of bottom ash was carried out in Q1-Q4 inclusive and reports forwarded to SEPA. Results were consistently extremely low and well below the limit of 3% required by Condition 5.1.1.a)

**Fly Ash and Cyclone Ash**
Condition 2.4.1 and 8.1.6

Ash analysis for Q1 – Q4 2020 for both fly ash and cyclone ash was carried out and reports reported to SEPA.

All results of analysis were typical of previous years.

**CEMS Calibration Checks**

QAL 3 checks and drift review were carried out by MEB in accordance with Condition 6.2.11 of the Permit.

An annual surveillance test (AST) along with service and linearity checks were conducted during November 2020.

**Permitted Quantities of Waste**
Condition 4.2.2.a) limits the Fluidised Bed Plant to 150000 tonnes of waste incinerated in any calendar year.

In 2020, the total of waste received was 98303 tonnes, of which 96231 tonnes was incinerated, and 2072 tonnes rejected to landfill.

Detailed, itemised quarterly returns of waste(s) incinerated (by EWC code) were sent to SEPA's Waste Data Unit throughout 2020.

**Energy Recovery**

The fluidised bed plant is optimised for recovery of electrical energy only, and no heat is exported.

Electrical energy produced and exported showed significant decrease from the previous year's figures in the 2019 report from the 2020 figures below.

*Figure 16 Electrical Energy Produced*

| Electrical Energy Produced (2020) | | |
|---|---|---|
| Gross generated | 48834 | (down 25.57%) |
| Exported | 33800 | (down 28.28%) |
| Imported | 466 | (up 34.29% |

These figures are significantly different from the previous 2019 annual submission and are mainly due to the site having to operate without a turbine since the 10th of October.

This was due to a planned outage to include a major overhaul of the turbine. This major overall exposed significant repair work that was required to prevent a possible catastrophic plant

breakdown scenario with specialist contractor work employed. Further detailed information will follow in the annual planned outage report.

A further concealed efficiency loss was the direct export of 405 MWh provided to supply the construction site and Contractors' Village, thus avoiding the adverse impact of using diesel generators for the construction period and which will continue into 2021.

## Abnormal Operation and Breakdowns

No Abnormal Operating Events were recorded under the provisions of Section 5.4 Abnormal Operation and Breakdowns.

### Summary of Breakdown, Outages, and Interruptions to Normal Operation

**Total Running Time**
For each of Line 1/2 was as follows:

Line 1 – 7122 hours, or 81.30% run time (decrease in run time from 82.81% in 2019)

Line 2 – 6776 hours, or 77.35% run time (decrease in run time from 83.69% in 2019)

### Planned Outage Periods

The Spring maintenance outage for MVV Environment Baldovie took place in March 2020 with both boilers stopping waste combustion between 10 pm and midnight on 7th March. Boiler 1 returned to waste combustion on 12th March 2020 and boiler 2 on 13th March.

The period was considerably reduced in comparison to traditional maintenance outages at the plant for a variety of reasons including the fact that the Permit has not been varied. Shortly before the maintenance outage it had been identified that there could also be a requirement to stop processing waste at lines 1 & 2 to allow commissioning of line 3 on waste. For this reason, only essential work was carried out with a view to postponing most work that was not urgent. Work completed during the outage included statutory inspections of the boilers and various other items of pressure equipment, cleaning and inspection of the cooling tower, replacement of all flue gas filter bags on stream 1, repair of a water leak on the condenser, and investigations to help prepare for future tube replacement on boiler 2. The flue gas treatment plant was also cleaned and inspected as well as a small amount of repair work to a cyclone ash conveyor where a chain was identified as worn.

The Autumn maintenance outage for MVV Environment Baldovie started on October 10th, 2020 with both boilers and the turbine coming offline on this date. Boiler 1 returned to waste on the 23rd of October and boiler 2 on the 3rd of November.

Significant planned work included:

- Major overhaul of turbine

- Boiler 2 side wall, middle wall, and roof tube replacements to replace thinned sections
- Inconel cladding of tubes in both boilers
- High pressure water jet cleaning of economisers, and manual cleaning of superheaters and flue gas treatment plant
- Cooling tower clean and inspection plus partial replacement of packing, drift eliminators and wooden frame
- Replacement of filter bags and support cages for line 2 flue gas treatment plant
- Replacement of wear parts on conveyors
- Rope access cleaning in RDF store

The major overhaul of the turbine was originally scheduled for 21 days but problems were encountered during the original scope of works during the cleaning and subsequent inspections revealed damage in the following key areas.

- The last 3 rows of LP blading showed significant erosion damage. (There are 27 rows of main rotor blading) These blades could not be rebuilt in situ due to previous metal treatment so required to be machined out and new blades made
- Steam cutting to internal HP/IP/LP blade carriers – high velocity oxygen fuelled (HVOF) metal spray build up and machining
- Main radial bearing journal and thrust collar – HVOF repair and rebuild and machine white metal bearings
- Labyrinth seal damage – new sections to be made
- Main upper and lower casing damage requiring weld build-up and machining
- Damage to gearbox pinion shaft and bull shaft requiring HVOF repair and machining
- Various oil seal collars and seals
- Wear to barring gear shaft and sleeve – remanufacture replacements
- Control valve spindles and plugs scuffed – repair/replace

Many of these spare parts required to conduct repairs have to be made specially for this job, either from drawings where available, or 'reverse engineered' from the original components that require sufficient time to manufacture.

This has resulted in the turbine being offline until week commencing the 11$^{th}$ of January with a further update to be reported in the quarter 1 2021 submission.

**Unplanned Downtime**

A summary of planned/unplanned downtime due to breakdowns was presented for all quarters in 2020.

The most frequent cause of unplanned downtime or forced outage was boiler tube leakage, blocked ash drains and poor fluidisation of the beds in 2020. All these breakdown situations were rectified with repairs conducted.

## Summary of Overall Performance

The decreased throughput of waste compared to previous years' (99551 t in 2019, 94150 t in 2020) and the loss of the turbine reflects in this years' figures compared to 2019.

Due to the ongoing delays to commissioning of the Moving Grate CHP plant, sorted and pre-shredded waste continues to be sent for incineration from the Waste Transfer Station, with the activity being regulated under a separate Waste Management Licence.

Consumable use continues to be stable, with specific consumption of lime and ammonia reflecting good process control.

The upgraded bagfilter media and rigorous maintenance regime for the baghouse continues to show improvements in emissions to air, with dust emissions and dioxin and furan emission values the lowest ever recorded on site. This augurs well for the lifetime extension and demonstrates that critical criteria of the recent BAT Ref for Incineration of Waste are achievable for the fluidised bed plant.

Electrical energy export has been severely impacted by the conscious decision to take the steam turbine out of service for major inspection and as subsequently discovered, critical repairs. Further but misleading impairment of export efficiency was caused by provision of the majority of energy for construction and amenities for the new moving grate plant.

Overall, the greatest challenges faced by MEB in 2020 have been the continuing effects and detriment caused by the COVID 19 pandemic, with the necessary restrictions and preventive measures issued by the Scottish Government bearing heavily on the operation of the fluidised bed plant and seriously delaying the commissioning of the new Moving Grate plant.

However, the resilience and focus of the MEB team working both on and off-site has meant the critical service of waste disposal has continued at full load and almost uninterrupted.

A summary of Inputs and Outputs to the Fluidised Bed Plant is shown in the following table.

*Figure 17 Material Inputs and Outputs*

| Material | Tonnes |
|---|---|
| MSW received | 94150 |
| Rejects to landfill | 1891 |
| Bottom ash | 13262 |
| Cyclone ash | 4506 |
| Filter ash | 2547 |
| Ferrous metal recovered | 2451 |
| Non-ferrous metal recovered | 48 |
| | |
| Electricity energy exported | 33800 MWh |
| Specific energy production | 359 kWh/t of waste |

## Appendix 1 Summary of Mass Emissions from CEMS 2020

*Figure 18 Mass Emissions from CEMS 2020*

| BOILER # 1 | | | | BOILER # 2 | | | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|
| | Hrs Run | | Run time | | Hrs Run | | Run time | Total Hrs On Waste | Waste Received / tonnes |
| | 7122.00 | | 81.30% | | 6776.00 | | 77.35% | 13898.00 | 94149.82 |
| Parameter | Yearly Hrly Avg mg N $m^3$ | Mass Emission Rate kg/hr | Yearly Mass Emission Kg | Parameter | Yearly Hrly Avg mg N $m^3$ | Mass Emission Rate kg/hr | Yearly Mass Emission Kg | Total Mass Emission tonnes | Specific Mass Emission kg / tonnes waste |
| HCl | 6.48 | 0.2566 | 1827.56 | HCl | 5.91 | 0.2340 | 1585.83 | 3.41 | 0.000036 |
| SO2 | 2.20 | 0.0871 | 620.47 | SO2 | 1.70 | 0.0673 | 456.16 | 1.08 | 0.000011 |
| VOC | 0.64 | 0.0253 | 180.50 | VOC | 0.96 | 0.0380 | 257.60 | 0.44 | 0.000005 |
| Dust | 0.82 | 0.0325 | 231.27 | Dust | 0.65 | 0.0257 | 174.41 | 0.41 | 0.000004 |
| NOX | 169.80 | 6.7241 | 47888.90 | NOX | 154.20 | 6.1063 | 41376.42 | 89.27 | 0.000948 |
| CO | 16.90 | 0.6692 | 4766.33 | CO | 20.10 | 0.7960 | 5393.42 | 10.16 | 0.000108 |
| $CO_2$ | | 6996.3 | 49827944.68 | $CO_2$ | | 6996.3 | 47407210.49 | 97235.2 | 1032.8 |