

Margam Green Energy Limited

# Margam Green Energy Plant

Response to NRW further information request – IC2

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## 1 Introduction

An Environmental Permit (EP) (Ref: EPR/DP3137EG) for the operation of the Margam Green Energy Plant, (the Facility) was granted to Margam Green Energy Limited (MGEL) by Natural Resource Wales (NRW) on 20 November 2014. Construction of the Facility commenced on 23 January 2015. Commissioning of the Facility commenced on 22 May 2018 and was completed on 20 June 2019.

The EP includes several Pre-Operational and Improvement Conditions. Improvement condition 2 (IC2) which is required to be complete within 6 months of the completion of commissioning, states:

*"The Operator shall submit a written proposal to Natural Resource Wales to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission point A1, identifying the fractions within the PM<sub>10</sub> and PM<sub>2.5</sub> ranges. The proposal shall include a timetable for approval by Natural Resources Wales to carry out such tests and produce a report on the results. On receipt of written agreement by Natural Resources Wales to the proposal and the timetable, the Operator shall carry out the tests and submit to Natural Resources Wales a report on the results"*

Tests to determine the size distribution of the particulate matter in the exhaust gas emissions from emission point A1 were conducted on 25 October 2020 by Environmental Compliance Limited (ECL). Following submission of ECL's report to NRW, NRW has requested additional information from MGEL to provide confirmation of the total particulate concentration measured during the test.

Fichtner Consulting Engineers Ltd ("Fichtner") has been engaged by MGEL to produce a report to provide the additional information requested by NRW.

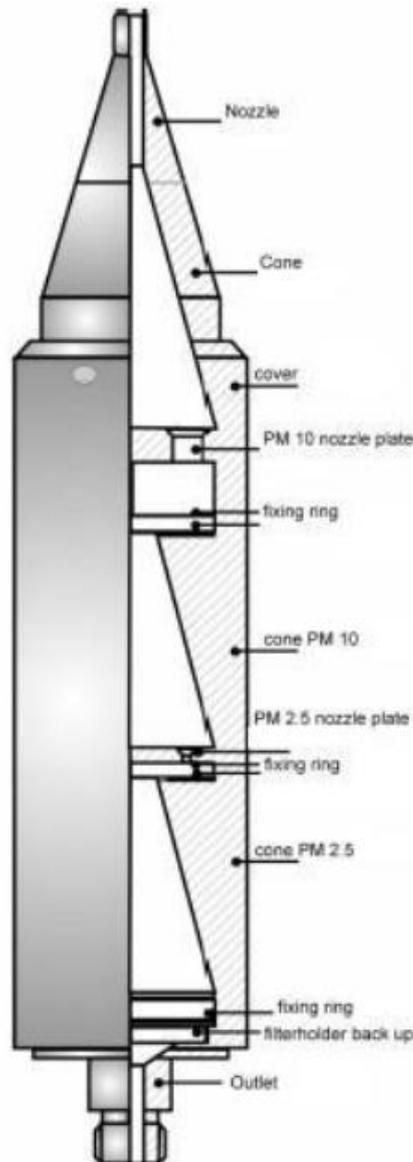
## 2 Particulate size distribution tests

As presented in ECL's report, which was issued to MGEL on 15 January 2021, particulate size distribution (PSD) tests were undertaken to quantify the concentration of PM<sub>10</sub> and PM<sub>2.5</sub> in the exhaust gas emissions to air from emissions point A1. ECL's report confirms that the PSD tests were conducted in accordance with European standard BS EN 23210:2009. This is the standard reference method for periodic extractive monitoring for PM<sub>10</sub> / PM<sub>2.5</sub> as required by MCERTS guidance "Monitoring stack emissions: techniques and standards for periodic monitoring".

In accordance with BS EN 23210:2009, PSD sampling is required to be completed using a two-stage cascade impactor (the impactor). The impactor contains a number of nozzles and impaction plates which separate the particles according to their aerodynamic diameter. Each stage of the impactor contains a pre-weighed filter which is conditioned and weighed following the test to determine the mass of particulate collected. Figure 1 contains a schematic of a two-stage cascade impactor. During testing, the impactor is positioned in the stack so that it points in the same direction of the flow. A

known volume of stack gas is extracted through the impactor at a fixed flow rate as close to isokinetic conditions as possible. The volume extracted, corrected to standard reference conditions, is then used to determine the concentration of PM<sub>10</sub> and PM<sub>2.5</sub> within the flue gas.

Figure 1: Two-stage cascade impactor



Within a two-stage impactor, the particulates are divided into the following three fractions:

1. impactor 1 –  $> 10 \mu\text{m}$ ;
2. impactor 2 –  $< 10 \mu\text{m}$  and  $> 2.5 \mu\text{m}$
3. back up filter –  $< 2.5 \mu\text{m}$

Therefore, to calculate the PM<sub>10</sub> fraction collected, the mass collected within impactor 2 is added to the mass collected on the back up filter. The PM<sub>2.5</sub> concentration is determined from the mass collected on the back up filter.

MCERTS guidance “Monitoring stack emissions: techniques and standards for periodic monitoring” confirms that EN ISO 23210 cannot be used to measure total mass concentration of particulates. EN ISO 23210 states that impactors always exhibit losses of mainly coarse particulates diffusively

on the walls and the nozzle plates of the cascade impactor which prevent the standard being used to provide a result for total particulate matter.

### 3 Results

Test 1 was conducted over a two-hour period between 09:20 and 12:20 on 25 November 2020. Test 2 was conducted over a two-hour period between 13:00 and 16:00 on 25 November 2020. Extracting the results from the ECL report, the calculation for the total particulate matter concentration is summarised in Table 1.

Table 1: Particulate size distribution test results

Parameter	Test 1	Test 2
Mass collected on impactor 1 filter / mg	0.04	0.54
Mass collected on impactor 2 filter / mg	3.38	2.83
Mass collected on back up filter / mg	0.53	0.58
Total mass collected / mg	3.95	3.95
Volume sampled / Nm <sup>3</sup>	5.276	5.183
Total particulate concentration / mg/Nm <sup>3</sup>	<b>0.75</b>	<b>0.76</b>

### 4 Conclusion

As outlined in section 3, the total particulate concentration measured during the PSD testing was 0.75 mg/Nm<sup>3</sup> for Test 1 and 0.76 mg/Nm<sup>3</sup> for Test 2. The emission limit values (ELVs) provided within the EP for particulate matter are 45 mg/Nm<sup>3</sup> as a half hourly average and 15 mg/Nm<sup>3</sup> as a daily average. Therefore, the reported monitored concentrations of particulate matter from the extractive periodic monitoring are well within the half hourly and daily average emission limit values stated in the EP.

As noted in section 2, MCERTS guidance “Monitoring stack emissions: techniques and standards for periodic monitoring” identifies that EN ISO 23210 shouldn’t be used to measure total mass concentration of particulates. CEMS are installed at the Facility which measure particulate concentration continuously to demonstrate ongoing compliance with the particulate matter ELV. These are installed and maintained according to European standard BS EN 14181 as required by the EP.

Yours sincerely

FICHTNER Consulting Engineers Limited



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