Environment Agency

Review of an Environmental Permit for an Installation subject to Chapter II of the Industrial Emissions Directive under the Environmental Permitting (England & Wales) Regulations 2016

Decision document recording our decision-making process following review of a permit

The Permit number is: EPR/DP3030XH
The Operator is: GREP1 Limited
The Installation is: Sleaford Renewable Energy Plant
This Variation Notice number is: EPR/DP3030XH/V007

What this document is about

Article 21(3) of the Industrial Emissions Directive (IED) requires the Environment Agency to review conditions in permits that it has issued and to ensure that the permit delivers compliance with relevant standards, within four years of the publication of updated decisions on best available techniques (BAT) Conclusions.

We have reviewed the permit for this installation against the revised BAT Conclusions for large combustion plant (LCP) published on 17 August 2017. This is our decision document, which explains the reasoning for the consolidated variation notice that we are issuing.

It explains how we have reviewed and considered the techniques used by the Operator in the operation and control of the plant and activities of the installation. This review has been undertaken with reference to the decision made by the European Commission establishing BAT Conclusions for LCP as detailed in document reference IEDC-7-1. It is our record of our decision-making process and shows how we have taken into account all relevant factors in reaching our position. It also provides a justification for the inclusion of any specific conditions in the permit that are in addition to those included in our generic permit template.

As well as considering the review of the operating techniques used by the Operator for the operation of the plant and activities of the installation, the consolidated variation notice takes into account and brings together in a single document all previous variations that relate to the original permit issued. It also modernises the entire permit to reflect the conditions contained in our current generic permit template.

The introduction of new template conditions makes the permit consistent with our current general approach and philosophy and with other permits issued to installations in this sector. Although the wording of some conditions has changed, while others have been removed because of the new regulatory approach, it does not reduce the level of environmental protection achieved by the permit in any way. In this document we therefore address only our determination of substantive issues relating to the new BAT Conclusions.

This is our record of our decision-making process and shows how we have taken into account all relevant factors in reaching our position.

Throughout this document we will use a number of expressions. These are as referred to in the glossary and have the same meaning as described in "Schedule 6 Interpretation" of the permit.

We try to explain our decision as accurately, comprehensively and plainly as possible. We would welcome any feedback as to how we might improve our decision documents in future. A lot of technical terms and acronyms are inevitable in a document of this nature: we provide a glossary of acronyms near the front of the document, for ease of reference.

How this document is structured

Glossary of acronyms used in this document

(Please note that this glossary is standard for our decision documents and therefore not all these acronyms are necessarily used in this document.)

APC	Air Pollution Control
BAT	Best Available Technique(s)
BAT-AEEL	BAT Associated Energy Efficiency Level
BAT-AEL	BAT Associated Emission Level
BATc	BAT conclusion
BREF	Best available techniques reference document
CCGT	Combined Cycle Gas Turbine
CEM	Continuous emissions monitor
CHP	Combined heat and power
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DLN	Dry Low NOx burners
DLN-E	Dry Low NOx effective
EIONET	European environment information and observation network is a partnership network of the European Environment Agency
ELV	Emission limit value derived under BAT or an emission limit value set out in IED
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154)
EWC	European waste catalogue
FSA	Food Standards Agency
IC	Improvement Condition
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
LCP	Large Combustion Plant subject to Chapter III of IED
MSUL/MSDL	Minimum start up load/minimum shut-down load
NOx	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
NPV	Net Present Value
OCGT	Open Cycle Gas Turbine
PHE	Public Health England
SAC	Special Area of Conservation
SGN	Sector guidance note
TGN	Technical guidance note
TNP	Transitional National Plan
TOC	Total Organic Carbon
WFD	Water Framework Directive (2000/60/EC)

1 Our decision

We have decided to issue the consolidated variation notice to the Operator. This will allow them to continue to operate the installation, subject to the conditions in the consolidated variation notice.

We consider that, in reaching that decision, we have taken into account all relevant considerations and legal requirements and that the varied permit will ensure that a high level of protection is provided for the environment and human health.

The consolidated variation notice contains many conditions taken from our standard environmental permit template including the relevant annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the notice, we have considered the techniques identified by the Operator for the operation of their installation, and have accepted that the details are sufficient and satisfactory to make those standard conditions appropriate. This document does, however, provide an explanation of our use of "tailor-made" or installation-specific conditions, or where our permit template provides two or more options.

2 How we reached our decision

2.1 Requesting information to demonstrate compliance with BAT Conclusions for Large Combustion Plant

We issued a Notice under Regulation 61(1) of the Environmental Permitting (England and Wales) Regulations 2016 (a Regulation 61 Notice) on 01 May 2018 requiring the Operator to provide information to demonstrate how the operation of their installation currently meets, or will subsequently meet, the revised standards described in the LCP BAT Conclusions document. The notice also required that where the revised standards are not currently met, the Operator should provide information that:

- Describes the techniques that will be implemented before 17 August 2021, which will then ensure that operations meet the revised standard, or
- Justifies why standards will not be met by 17 August 2021, and confirmation of the date when the operation of those processes will cease within the installation or an explanation of why the revised BAT standard is not applicable to those processes, or
- Justifies why an alternative technique will achieve the same level of environmental protection equivalent to the revised standard described in the BAT Conclusions.

Where the Operator proposed that they were not intending to meet a BAT standard that also included a BAT Associated Emission Level (BAT AEL) described in the BAT Conclusions document, the Regulation 61 Notice requested that the Operator make a formal request for derogation from compliance with that AEL (as provisioned by Article 15(4) of IED). In this circumstance, the notice identified that any such request for derogation must be supported and justified by sufficient technical and commercial information that would enable us to determine acceptability of the derogation request.

The Regulation 61 Notice response from the Operator was received on 26 October 2018.

We considered it was in the correct form and contained sufficient information for us to begin our determination of the permit review but not that it necessarily contained all the information we would need to complete that review: see below.

Request for information	**Received**
Request for information sent 26 February 2020 BAT Conclusions 1, 3, 9 and 25. BAT Conclusions spreadsheet updated, supersedes 26 October 2018 submission.	10 March 2020
Sulphur in fuel analysis and fuel specification data.	09 April 2020
	01 May 2020
Sulphur dioxide (SO_2) monitoring data and lime dosing	18 May 2020

2.2 Review of our own information in respect to the capability of the installation to meet revised standards included in the BAT Conclusions document

Based on our records and previous regulatory activities with the facility we have no reason to consider that the Operator will not be able to comply with the conditions that we include in the permit.

In relation to BAT Conclusion 25 we agree with the Operator in respect to their current stated capability as recorded in their Regulation 61 Notice response that improvements are required.

We have therefore included an improvement condition in the consolidated variation notice, which requires them to review emissions of sulphur dioxide (SO_2). This is discussed in more detail in the key issues section and in the decision checklist regarding relevant BAT Conclusions.

3 The legal framework

The consolidated variation notice will be issued under Regulation 20 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

- an *installation* as described by the IED;
- subject to aspects of other relevant legislation which also have to be addressed.

We consider that the consolidated variation notice will ensure that the operation of the installation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

We explain how we have addressed specific statutory requirements more fully in the rest of this document.

4 The key issues

The key issues arising during this permit review are:

- Emissions to air and the emission limits applied to the plant.
- The energy efficiency levels associated with the Best Available Techniques (BAT-AEELs)
- BAT Conclusion 1 is future compliant requiring the Environmental Management System to be updated prior to the BAT Conclusions implementation date. This is also relevant to BAT Conclusion 10.
- BAT Conclusion 25 is future compliant as the Operator doesn't currently monitor hydrogen fluoride (HF) in the flue gas. Table S3.1a of the permit secures compliance with this BAT Conclusion.
- BAT Conclusion 27 is future compliant as the Operator doesn't currently monitor mercury in the flue gas. Table S3.1a of the permit secures compliance with this BAT Conclusion.

We therefore describe how we determined these issues in most detail in the relevant sections of this document.

4.1 Emissions to air and the emission limits applied to the plant

A number of general principles were applied during the permit review. These included:

- The upper value of the BAT AELs ranges specified were used unless use of the tighter limit was justified.
- The principle of no backsliding where if existing limits in the permit were already tighter than those specified in the BREF, the existing permit limits were retained.
- Where a limit was specified in both IED Annex V and the BAT Conclusions for a particular reference period, the tighter limit was applied and in the majority of cases this was from the BAT Conclusions.
- Where AELs are indicative in the BAT Conclusions, these were applied unless adequate justification was provided by the Operator to demonstrate that an alternative limit was more appropriate.

a. LCP configuration

The plant is a LCP identified as LCP412, with a rated thermal input of 118MW. It generates up to 40MWe of electrical power from the combustion of a biomass fuel (waste straw and untreated wood chips). The power station can combust a maximum of 250,000 tonnes per year of biomass, consisting mainly of baled straw.

Heat recovery is via a steam-raising boiler and power generation utilises a high efficiency steam turbine condensed in an air cooled condenser.

The principal release to the environment comprises combustion gases via a 62m stack at emission point A1.

b. Setting limits

The plant was put into operation before the IED came into force and therefore the existing limits in the permit are from Part 1 of the IED with Annex V limits applicable to existing plant.

The emission limit values (ELVs) and AELs are based on an unlimited hours operating regime.

The following tables outline the limits that have been incorporated into the permit for LCP412, where these were derived from and the reference periods at which they apply. The emission limits refer to concentrations, expressed as mass of emitted substance per volume of flue-gas under the following standard conditions:

- dry gas at a temperature of 273.15 K;
- pressure of 101.3 kPa; and
- 3% volume reference oxygen concentration in flue gases.

The emission limits and monitoring requirements have been incorporated into Schedule 3 of the permit.

Oxides of nitrogen (NOx) limits (mg/Nm^3)							
Averaging	**IED (Annex V Part 1) - Existing**	**Existing permit limits**	**BREF (Table 9 BAT C 24)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**None**	**180**	**180**	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**250**	**250**	**None**	**250**	IED	MSUL/MSDL to baseload	
Daily	**275**	**250**	**220**	**220**	BREF	MSUL/MSDL to baseload	
95th %ile of hr means	**500**	**500**	**None**	**500**	IED	MSUL/MSDL to baseload	

Sulphur dioxide (SO_2) limits (mg/Nm^3)							
Averaging	**IED (Annex V Part 1) - Existing**	**Existing permit limits**	**BREF (Table 10 BAT C 25)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**None**	**100** Note 1	**100** Note 1	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**200**	**100**	**None**	**100**	IED	MSUL/MSDL to baseload	
Daily	**220**	**110**	**175**	**110**	IED	MSUL/MSDL to baseload	
95th %ile of hr means	**400**	**150**	**None**	**150**	IED	MSUL/MSDL to baseload	
Note 1: Note 3 to this BAT Conclusion allows a higher limit of 100 mg/Nm^3 for existing plants burning fuels where the average sulphur content is 0.1 wt-% (dry) or higher. The Operator provided evidence to justify why they believe this higher limit is applicable to the plant (see below).							

The Operator provided additional information 09 April 2020, 01 May 2020 and 18 May 2020, to justify the proposed higher 100 mg/Nm^3 SO_2 limit. A summary of this information is as follows:

Fuel analysis data from January 2019 to March 2020 was provided which shows the sulphur content to be >0.1% wt dry, except for one erroneous result in December and two results in August and September 2019 which were marginally below 0.1%. They state that this meets the criterion for the higher limit of 100 mg/Nm^3.

They also note that to achieve a lower yearly average limit of 70 mg/Nm^3 requires a significant increase in abatement chemical which must be disposed of. This is typically sent to landfill, so for a minimal gain in ground level concentrations of pollutants, there is a prohibitively large increase in waste going to landfill.

They provided monitoring data which they summarised as follows:

When the sulphur level in the fuel was slightly below 0.1%, the SO_2 hourly averages are lower, but 54.5% of the validated hourly averages for the month were over 70 mg/Nm^3.

As the sulphur level in the fuel increases then so does the SO_2 production resulting in increased sorbent dosing. This is seen in March 2020 (the average sulphur level in the fuel was 0.148%wt dry) when the SO_2 emission level rose even though the amount of sorbent had also increased slightly, giving a monthly average of 72 mg/Nm^3. 63.8% of all validated hourly averages were above 70 mg/Nm^3 and 33% were above 80 mg/Nm^3.

For two out of the three months, more than 50% of the validated hourly averages were above 70 mg/Nm^3 which would result in a significant increase in sorbent usage, to achieve the lower yearly average.

Even in February, when the trial to reduce SO_2 by increasing sorbent dosing was taking place, the monthly average was 62 mg/Nm^3, with 26.1% of the validated hourly averages above 70 mg/Nm^3.

In total, for quarter 1 of 2020, 46.8% of the validated hourly average SO_2 values were above 70 mg/Nm^3.

They confirm that the lime dosing trial clearly shows the impact of increased dosing to reduce emissions of SO_2 requiring an average of three tonnes/day of additional sorbent.

We are not entirely satisfied with the information provided. We have set the higher SO_2 limit of 100 mg/m^3, which is linked to an improvement condition ensuring a more thorough review of monitoring and operational data over a longer period of time. The review is a balanced approach to a complex issue and will give us the opportunity to fully assess if a reduction of the annual limit is warranted or not.

Dust limits (mg/Nm^3)							
Averaging	**IED (Annex V Part 1) - Existing**	**Existing permit limits**	**BREF (Table 12 BAT C 26)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**None**	**12**	**12**	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**20**	**20**	**None**	**20**	IED	MSUL/MSDL to baseload	
Daily	**22**	**22**	**18**	**18**	BREF	MSUL/MSDL to baseload	
95th %ile of hr means	**40**	**40**	**None**	**40**	IED	MSUL/MSDL to baseload	

Carbon monoxide (CO) limits (mg/Nm^3)							
Averaging	**IED (Annex V Part 1) - Existing**	**Existing permit limits**	**BREF (Table 9 BAT C 24)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**None**	**160**	**160**	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**None**	**None**	**None**	**None**	IED	MSUL/MSDL to baseload	
Daily	**None**	**375**	**None**	**375**	IED	MSUL/MSDL to baseload	
95th %ile of hr means	**None**	**500**	**None**	**500**	IED	MSUL/MSDL to baseload	

Hydrogen chloride (HCl) limits (mg/Nm^3)							
Averaging	**IED (Annex V Part 1) - Existing**	**Existing permit limits**	**BREF (Table 11 BAT C 25)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**None**	**9**	**9**	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**None**	**None**	**None**	**None**	IED	MSUL/MSDL to baseload	
Daily	**None**	**30**	**12**	**12**	IBREF	MSUL/MSDL to baseload	
95th %ile of hr means	**None**	**60**	**None**	**60**	IED	MSUL/MSDL to baseload	

Hydrogen fluoride (HF) limits (mg/Nm^3)							
Averaging	**IED (Annex V Part 1) - Existing**	**Existing permit limits**	**BREF (Table 11 BAT C 25)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**None**	**None**	**None**	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**None**	**None**	**None**	**None**	IED	MSUL/MSDL to baseload	
Daily	**None**	**None**	**None**	**None**	IED	MSUL/MSDL to baseload	
95th %ile of hr means	**None**	**None**	**None**	**none**	IED	MSUL/MSDL to baseload	
Average over the sampling period	**-**	**-**	**<1**	**<1**	BREF	MSUL/MSDL to baseload	Periodic

Ammonia (NH_3) limits (mg/Nm^3)							
Averaging	**IED (Annex V Part 1) - Existing**	**Existing permit limits**	**BREF (BAT C 7)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**None**	**10**	**10**	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**None**	**None**	**None**	**None**	IED	MSUL/MSDL to baseload	
Daily	**None**	**None**	**None**	**None**	IED	MSUL/MSDL to baseload	
95th %ile of hr means	**None**	**None**	**None**	**none**	IED	MSUL/MSDL to baseload	

Mercury (Hg) limits ($\mu g/Nm^3$)							
Averaging	**IED (Annex V Part 1) - Existing**	**Existing permit limits**	**BREF (BAT C 27)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**None**	**None**	**None**	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**None**	**None**	**None**	**None**	IED	MSUL/MSDL to baseload	
Daily	**None**	**None**	**None**	**None**	IED	MSUL/MSDL to baseload	
95th %ile of hr means	**None**	**None**	**None**	**None**	IED	MSUL/MSDL to baseload	
Average over the sampling period	**-**	**-**	**5**	**5**	BREF	MSUL/MSDL to baseload	Periodic

4.2 The energy efficiency levels associated with the Best Available Techniques Conclusions

An energy efficiency level associated with the best available techniques (BAT-AEEL) refers to the ratio between the combustion unit's net energy output(s) and the combustion unit's fuel/feedstock energy input at actual unit design. The net energy output(s) is determined at the combustion unit boundaries, including auxiliary systems (e.g. flue-gas treatment systems), and for the unit operated at full load.

The table below sets out the BAT AEELs specified in the LCP BAT Conclusions for the LCP on the site and the energy efficiency levels confirmed through the Regulation 61 notice response.

The evidence provided to demonstrate that the AEEL is met is set out in Section 5 of this document. We consider this plant is BAT in relation to the AEELs.

BAT AEELs (%)			Plant efficiency (%)		
Net electrical efficiency	Net total fuel utilisation	Net mechanical efficiency	Net electrical efficiency	Net total fuel utilisation	Net mechanical efficiency
LCP412: Solid biomass boiler					
28 - 38	None	None	33.52	NA	NA

4.3 Fuel characterisation

BAT 9 requires the Operator to carry out fuel characterisation. This also applies to standby fuel.

The Operator has committed to fuel characterisation in line with the Joint Environmental Programme (JEP) protocol document. We have therefore incorporated the JEP report – 'Characterisation of power plant fuels for compliance with LCP BREF Conclusion BAT 9' issued October 2019 into table S1.2 of the permit. This document sets out how this will be carried out prior to the implementation date for the BAT Conclusions.

5 Decision checklist regarding relevant BAT Conclusions

BAT Conclusions for LCP were published by the European Commission on 17 August 2017. There are 75 BAT Conclusions. Only the BAT Conclusions relevant to the particular fuel type used on site have been replicated below.

This annex provides a record of decisions made in relation to each relevant BAT Conclusion applicable to the installation. This annex should be read in conjunction with the consolidated variation notice.

The conditions in the permit through which the relevant BAT Conclusions are implemented include but are not limited to the following:

BAT Conclusion requirement topic	**Permit condition(s)**	**Permit table(s)**
Environmental Management System	1.1.1	S1.2
BAT AELs	3.1.1 and 3.5.1	S3.1a
Monitoring	2.3, 3.5 and 3.6	S1.2, S1.4, S3.1a
Energy efficiency	1.2 and 2.3	S3.4
Noise	2.3 and 3.4	S1.2
Other operating techniques	2.3	S1.2

The overall status of compliance with the BAT Conclusion is indicated in the table as:

NA Not applicable
CC Currently compliant
FC Compliant in the future (within 4 years of publication of BAT conclusions)
NC Not compliant
PC Partially compliant

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
General			
1	**In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:** i. commitment of the management, including senior management; ii. definition of an environmental policy that includes the continuous improvement of the installation by the management; iii. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; iv. implementation of procedures (a) Structure and responsibility (b) Training (c) Communication (d) Employee involvement (e) Documentation (f) Efficient process control (g) Maintenance programmes (h) Emergency preparedness and response (i) Safeguarding compliance with environmental legislation v. checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement (see also the Reference Document on the General Principles of Monitoring) (b) corrective and preventive action (c) maintenance of records (d) independent (where practicable) internal and external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; vi. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management; vii. following the development of cleaner technologies; viii. consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new plant, and throughout its operating life; viii. consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new plant, and throughout its operating life;	FC	The Operator confirmed that: The EMS scope is to be increased to cover the requirements of this BAT Conclusion. In their further information response received 10 March 2020, they confirmed that: There are a number of existing procedures, protocols and plans that already meet some of the EMS requirements; these along with additional documents will be brought together and catalogued to form the revised EMS for this BAT Conclusion. (i) The overarching plan will be reviewed, approved and signed off by the senior management team. The overarching policy will hold the senior management team responsible for the maintenance and implementation of the EMS. (ii) The revised EMS will include policy and methodology for continuous monitoring of the effectiveness of the procedures and plans and will further include a methodology for the update based on 'lessons learned'. (iii) Planning of and establishing procedures is already aligned with the existing EMS policy statement. (iv) Most of the sub items are already included in the existing Health Safety and Environment Policy. This will be updated to include items not currently covered; this policy will then be referenced as a critical support document to the EMS. (v) Monitoring and measurement, corrective and preventative action, and maintenance of records are already in place and will come under the cover of the EMS. Auditing already takes place internally by the plant operator and externally by the Owner's Asset Management team, including identification, review and close-out

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	ix. application of sectoral benchmarking on a regular basis. Etc - see BAT Conclusions **Applicability**. The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have.		procedures. This will be included under the EMS. (vi) See also (i) above; this will be developed and included in the EMS by 17 August 2021. (vii) The EMS will include protocols for reviewing cleaner technology development in the industry and reviewing suitability for use at the plant. (viii) The site is working on a decommissioning plan that will cover the aspects of the end of life requirements. This will become part of the EMS. (ix) They stated they are a leading Operator in similar biomass plants and can benchmark against its other assets - evidence of benchmarking to be shown periodically and linked with (ii) & (v) above. (x) The specifications for, and monitoring of adherence to specification as detailed in BAT Conclusion 9 will come under the EMS. (xi) The EMS will include methodologies for reviewing data and determining lessons learned and improvements possible, in line with (ii) above. (xii) The existing waste management procedures will be reviewed and updated and included in the EMS. (xiii) The existing environmental compliance obligations will be reviewed and updated where required regarding the identification, assessment and mitigation of any loss of containment regarding fuels, oils and abatement chemicals; also, the safe storage of fuels to mitigate overheating or decomposition. (xiv) Dust is proactively managed on site, associated documentation will be reviewed and incorporated into the EMS as the dust management plan.

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td></td><td></td><td>(xv) Noise is proactively managed and monitored on site, associated documentation will be reviewed and incorporated into the EMS as a noise management plan.

(xvi) Odour is proactively managed on site, associated documentation will be reviewed and incorporated into the EMS as the odour management plan. Where additional fuel is planned to be used, an odour assessment will be undertaken to BSEN13725: 2003 by a UKAS accredited operator.

We have incorporated the updated EMS into table S1.2 of the permit.

We agree with the Operator’s stated compliance.</td></tr>
<tr><td>2</td><td>BAT is to determine the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the gasification, IGCC and/or combustion units by carrying out a performance test at full load (1), according to EN standards, after the commissioning of the unit and after each modification that could significantly affect the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the unit. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</td><td>CC</td><td>The Operator confirmed that:

A full load efficiency test was undertaken immediately after commissioning.

Additionally efficiency is monitored on an ongoing basis using fuel input data and electrical generation data. This is reported in the monthly report produced by the plant Operator.

We agree with the Operator’s stated compliance.</td></tr>
<tr><td>3</td><td>BAT is to monitor key process parameters relevant for emissions to air and water including those given below.
<table>
<tr><th>Stream</th><th>Parameter(s)</th><th>Monitoring</th></tr>
<tr><td rowspan="3">Flue-gas</td><td>Flow</td><td>Periodic or continuous determination</td></tr>
<tr><td>Oxygen content, temperature, and pressure</td><td rowspan="2">Periodic or continuous measurement</td></tr>
<tr><td>Water vapour content (3)</td></tr>
<tr><td>Waste water from flue-gas treatment</td><td>Flow, pH, and temperature</td><td>Continuous measurement</td></tr>
</table></td><td>CC</td><td>The Operator confirmed that:

Flue gas flow, oxygen content, temperature and pressure are all measured continuously by the CEMS system.

In their further information response received 10 March 2020, they confirmed that water vapour content is also measured continuously by the CEMs system.

There is no wet flue gas treatment on site, hence no flue gas treatment waste water.</td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td></td><td></td><td>We agree with the Operator’s stated compliance.</td></tr>
<tr><td>4</td><td>BAT is to monitor emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.
<table>
<tr><th>Substance/Parameter</th><th>Fuel/Process/Type of combustion plant</th><th>Combustion plant total rated thermal input</th><th>Standard(s) ([4])</th><th>Minimum monitoring frequency ([5])</th><th>Monitoring associated with</th></tr>
<tr><td>NH_3</td><td>— When SCR and/or SNCR is used</td><td>All sizes</td><td>Generic EN standards</td><td>Continuous ([6]) ([7])</td><td>BAT 7</td></tr>
<tr><td>NO_X</td><td>— Coal and/or lignite including waste co-incineration
— Solid biomass and/or peat including waste co-incineration
— HFO- and/or gas-oil-fired boilers and engines
— Gas-oil-fired gas turbines
— Natural-gas-fired boilers, engines, and turbines
— Iron and steel process gases
— Process fuels from the chemical industry
— IGCC plants</td><td>All sizes</td><td>Generic EN standards</td><td>Continuous ([6]) ([8])</td><td>BAT 20
BAT 24
BAT 28
BAT 32
BAT 37
BAT 41
BAT 42
BAT 43
BAT 47
BAT 48
BAT 56
BAT 64
BAT 65
BAT 73</td></tr>
<tr><td></td><td>— Combustion plants on offshore platforms</td><td>All sizes</td><td>EN 14792</td><td>Once every year ([9])</td><td>BAT 53</td></tr>
</table></td><td>FC</td><td>The Operator confirmed that:

NH_3 - continuously monitored – CC
NOx - continuously monitored – CC

N_2O - no requirement, not fluidised bed - NA

CO - continuously monitored – CC

SO_2 - continuously monitored – CC

SO_3 - not applicable – NA

HCl - continuously monitored – CC – On the basis of no backsliding continuous monitoring shall be retained. Permit condition 3.6.7 has been amended to include the 95% confidence interval of 40%.

HF - system of HF monitoring will need to be implemented on a once per year strategy – FC

Dust - continuously monitored – CC

Metals and metalloids - evidence of Sb, As, Cd, Cr, Co, Cu, Pb, Mn, Hg, Ni, Sn, V & Zn stability in fuel will be available as this is laboratory tested monthly from aggregated samples – FC

We have not included the annual monitoring requirement as there is no applicable BAT AEL.

Hg - evidence of stability in fuel will be available as this is laboratory tested monthly from aggregated samples. Once proven a periodic monitoring regime will be implemented – FC

We have included the annual monitoring requirement with a footnote consistent with note 19 of this BAT Conclusion.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	N_2O	— Coal and/or lignite in circulating fluidised bed boilers — Solid biomass and/or peat in circulating fluidised bed boilers	All sizes	EN 21258	Once every year [10]	BAT 20 BAT 24		Note 19 to the table states 'If the emission levels are proven to be sufficiently stable due to the low mercury content in the fuel, periodic measurements may be carried out only each time that a change of the fuel characteristics may have an impact on the emissions'. We agree with the Operator's stated compliance.
	CO	— Coal and/or lignite including waste co-incineration — Solid biomass and/or peat including waste co-incineration — HFO- and/or gas-oil-fired boilers and engines — Gas-oil-fired gas turbines — Natural-gas-fired boilers, engines, and turbines — Iron and steel process gases — Process fuels from the chemical industry — IGCC plants	All sizes	Generic EN standards	Continuous [6] [8]	BAT 20 BAT 24 BAT 28 BAT 33 BAT 38 BAT 44 BAT 49 BAT 56 BAT 64 BAT 65 BAT 73		
		— Combustion plants on offshore platforms	All sizes	EN 15058	Once every year [9]	BAT 54		
	SO_2	— Coal and/or lignite incl waste co-incineration — Solid biomass and/or peat incl waste co-incineration	All sizes	Generic EN standards and EN 14791	Continuous [6] [11] [12]	BAT 21 BAT 25 BAT 29 BAT 34 BAT 39 BAT 50 BAT 57 BAT 66 BAT 67		

BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement

	— HFO- and/or gas-oil-fired boilers — HFO- and/or gas-oil-fired engines — Gas-oil-fired gas turbines — Iron and steel process gases — Process fuels from the chemical industry in boilers — IGCC plants				BAT 74
SO_3	— When SCR is used	All sizes	No EN standard available	Once every year	—
Gaseous chlorides, expressed as HCl	— Coal and/or lignite — Process fuels from the chemical industry in boilers	All sizes	EN 1911	Once every three months (6) (13) (14)	BAT 21 BAT 57
	— Solid biomass and/or peat	All sizes	Generic EN standards	Continuous (15) (16)	BAT 25
	— Waste co-incineration	All sizes	Generic EN standards	Continuous (6) (16)	BAT 66 BAT 67
HF	— Coal and/or lignite — Process fuels from the chemical industry in boilers	All sizes	No EN standard available	Once every three months (6) (13) (14)	BAT 21 BAT 57
	— Solid biomass and/or peat	All sizes	No EN standard available	Once every year	BAT 25
	— Waste co-incineration	All sizes	Generic EN standards	Continuous (6) (16)	BAT 66 BAT 67
Dust	— Coal and/or lignite — Solid biomass and/or peat — HFO- and/or gas-	All sizes	Generic EN standards and EN 13284-1 and EN 13284-2	Continuous (6) (17)	BAT 22 BAT 26 BAT 30 BAT 35 BAT 39

BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
		oil-fired boilers — Iron and steel process gases — Process fuels from the chemical industry in boilers — IGCC plants — HFO- and/or gas-oil-fired engines — Gas-oil-fired gas turbines				BAT 51 BAT 58 BAT 75		
		— Waste co-incineration	All sizes	Generic EN standards and EN 13284-2	Continuous	BAT 68 BAT 69		
	Metals and metalloids except mercury (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V, Zn)	— Coal and/or lignite — Solid biomass and/or peat — HFO- and/or gas-oil-fired boilers and engines	All sizes	EN 14385	Once every year (18)	BAT 22 BAT 26 BAT 30		
		— Waste co-incineration	< 300 MW_{th}	EN 14385	Once every six months (13)	BAT 68 BAT 69		
			≥ 300 MW_{th}	EN 14385	Once every three months (19) (13)			
		— IGCC plants	≥ 100 MW_{th}	EN 14385	Once every year (18)	BAT 75		
	Hg	— Coal and/or lignite including waste co-incineration	< 300 MW_{th}	EN 13211	Once every three months (13) (20)	BAT 23		
			≥ 300 MW_{th}	Generic EN standards and EN 14884	Continuous (16) (21)			
		— Solid biomass and/or peat	All sizes	EN 13211	Once every year (22)	BAT 27		
		— Waste co-incineration with solid biomass and/or peat	All sizes	EN 13211	Once every three months (13)	BAT 70		

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement

	— IGCC plants	≥ 100 MW_{th}	EN 13211	Once every year [23]	BAT 75
TVOC	— HFO- and/or gas-oil-fired engines — Process fuels from chemical industry in boilers	All sizes	EN 12619	Once every six months [13]	BAT 33 BAT 59
	— Waste co-incineration with coal, lignite, solid biomass and/or peat	All sizes	Generic EN standards	Continuous	BAT 71
Formaldehyde	— Natural-gas in spark-ignited lean-burn gas and dual fuel engines	All sizes	No EN standard available	Once every year	BAT 45
CH_4	— Natural-gas-fired engines	All sizes	EN ISO 25139	Once every year [24]	BAT 45
PCDD/F	— Process fuels from chemical industry in boilers — Waste co-incineration	All sizes	EN 1948-1, EN 1948-2, EN 1948-3	Once every six months [13] [25]	BAT 59 BAT 71

5	BAT is to monitor emissions to water from flue-gas treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	NA	The Operator confirmed that: The site does not use a wet flue gas treatment system. Whilst the Operator stated CC it is our view that this BAT Conclusion is not applicable to the activities carried out at the installation.

Substance/Parameter	Standard(s)	Minimum monitoring frequency	Monitoring associated with
Total organic carbon (TOC) [26]	EN 1484	Once every month	BAT 15
Chemical oxygen demand (COD) [26]	No EN standard available		
Total suspended solids (TSS)	EN 872		

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<table><tr><td colspan="2">Fluoride (F^-)</td><td>EN ISO 10304-1</td><td></td><td></td></tr><tr><td colspan="2">Sulphate (SO_4^{2-})</td><td>EN ISO 10304-1</td><td></td><td></td></tr><tr><td colspan="2">Sulphide, easily released (S^{2-})</td><td>No EN standard available</td><td></td><td></td></tr><tr><td colspan="2">Sulphite (SO_3^{2-})</td><td>EN ISO 10304-3</td><td></td><td></td></tr><tr><td rowspan="7">Metals and metalloids</td><td>As</td><td rowspan="6">Various EN standards available (e.g. EN ISO 11885 or EN ISO 17294-2)</td><td rowspan="8"></td><td rowspan="8"></td></tr><tr><td>Cd</td></tr><tr><td>Cr</td></tr><tr><td>Cu</td></tr><tr><td>Ni</td></tr><tr><td>Pb</td></tr><tr><td>Zn</td></tr><tr><td>Hg</td><td>Various EN standards available (e.g. EN ISO 12846 or EN ISO 17852)</td></tr><tr><td colspan="2">Chloride (Cl^-)</td><td>Various EN standards available (e.g. EN ISO 10304-1 or EN ISO 15682)</td><td>—</td></tr><tr><td colspan="2">Total nitrogen</td><td>EN 12260</td><td>—</td></tr></table>		
6	In order to improve the general environmental performance of combustion plants and to reduce emissions to air of CO and unburnt substances, BAT is to ensure optimised combustion and to use an appropriate combination of the techniques given below. <table><tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>a.</td><td>Fuel blending and mixing</td><td>Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type</td><td>Generally applicable</td></tr><tr><td>b.</td><td>Maintenance of the</td><td>Regular planned maintenance according to suppliers'</td><td></td></tr></table>	CC	The Operator confirmed that: a. The site uses cereal straw and Grade A waste wood, this is mixed in varying quantities to optimise combustion. b. The combustion system is maintained through the computerised maintenance management system (CMMS). c. There is an ABB 800XA advance control system. d. The combustion system is purpose built for the fuels. We agree with the Operator’s stated compliance.

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<table><tr><td></td><td>combustion system</td><td>recommendations</td><td></td></tr><tr><td>c.</td><td>Advanced control system</td><td>See description in Section 8.1</td><td>The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system</td></tr><tr><td>d.</td><td>Good design of the combustion equipment</td><td>Good design of furnace, combustion chambers, burners and associated devices</td><td>Generally applicable to new combustion plants</td></tr><tr><td>e.</td><td>Fuel choice</td><td>Select or switch totally or partially to another fuel(s) with a better environmental profile (e.g. with low sulphur and/or mercury content) amongst the available fuels, including in start-up situations or when back-up fuels are used</td><td>Applicable within the constraints associated with the availability of suitable types of fuel with a better environmental profile as a whole, which may be impacted by the energy policy of the Member State, or by the integrated site's fuel balance in the case of combustion of industrial process fuels. For existing combustion plants, the type of fuel chosen may be limited by the configuration and the design of the plant</td></tr></table>		
7	In order to reduce emissions of ammonia to air from the use of selective catalytic reduction (SCR) and/or selective non-catalytic reduction (SNCR) for the abatement of NO_X emissions, BAT is to optimise the design and/or operation of SCR and/or SNCR (e.g. optimised reagent to NO_X ratio, homogeneous reagent distribution and optimum size of the reagent drops). **BAT-associated emission levels** The BAT-associated emission level (BAT-AEL) for emissions of NH_3 to air from the use of SCR and/or SNCR is < 3–10 mg/Nm^3 as a yearly average or average over the sampling period. The lower end of the range can be achieved when using SCR and the upper end of the range can be achieved when using SNCR without wet abatement techniques. In the case of plants combusting biomass and operating at variable loads as well as in the case of engines combusting HFO and/or gas oil, the higher end of the BAT-AEL range is 15 mg/Nm^3.	CC	The Operator confirmed that: SNCR is used and has been optimised to limit the amount of reagent consistent with achieving the NOx ELV. The system is automatically controlled by a dedicated PLC managing the injection points in use on the monitored combustion zone profile, with feedback on NOx and NH_3 slip from the main DCS. CEMS monitors the ammonia in the flue gas and this is within the BAT AEL specified. We have set the BAT AEL for ammonia in table S3.1a of the permit. The existing permit has no NH_3 limit but requires continuous monitoring.

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			We agree with the Operator's stated compliance.
8	In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.	CC	The Operator confirmed that: Abatement systems consist of SNCR for NOx, Sorbacal (lime) injection for SOx and HCl and bag filters for dust. All are designed, operated and maintained to meet permit requirements. We agree with the Operator's stated compliance.
9	In order to improve the general environmental performance of combustion and/or gasification plants and to reduce emissions to air, BAT is to include the following elements in the quality assurance/quality control programmes for all the fuels used, as part of the environmental management system (see BAT 1): (i) Initial full characterisation of the fuel used including at least the parameters listed below and in accordance with EN standards. ISO, national or other international standards may be used provided they ensure the provision of data of an equivalent scientific quality; (ii) Regular testing of the fuel quality to check that it is consistent with the initial characterisation and according to the plant design specifications. The frequency of testing and the parameters chosen from the table below are based on the variability of the fuel and an assessment of the relevance of pollutant releases (e.g. concentration in fuel, flue-gas treatment employed); (iii) Subsequent adjustment of the plant settings as and when needed and practicable (e.g. integration of the fuel characterisation and control in the advanced control system (see description in Section 8.1)). ***Description*** Initial characterisation and regular testing of the fuel can be performed by the operator and/or the fuel supplier. If performed by the supplier, the full results are	FC	In their further information response received 10 March 2020, they confirmed that: (i) Fuel Characterisation of typical fuel in the area (local straw and clean waste wood) was undertaken prior to the plant design. This was shared with the selected plant contractor to enable optimal design based on fuel characteristics. The fuel has been initially characterised and fuel specification developed as per the 'Characterisation of power plant fuels for compliance with LCP BREF Conclusion BAT 9' by JEP, October 2019. (ii) Fuel is visually inspected at delivery where fuel that is degraded (in the case of straw) or contaminated (wood) is rejected. The straw is further tested prior to acceptance for moisture content, with overly wet straw being rejected. Overly wet or degraded straw bales may also be rejected on the fuel line, as a result of inline measurements. As per the 'Characterisation of power plant fuels for compliance with LCP BREF Conclusion BAT 9' by JEP, October 2019, all biomass

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>provided to the operator in the form of a product (fuel) supplier specification and/or guarantee.
<table>
<tr><th>Fuel(s)</th><th>Substances/Parameters subject to characterisation</th></tr>
<tr><td>Biomass/peat</td><td>— LHV
— moisture</td></tr>
<tr><td></td><td>— Ash
— C, Cl, F, N, S, K, Na
— Metals and metalloids (As, Cd, Cr, Cu, Hg, Pb, Zn)</td></tr>
<tr><td>Coal/lignite</td><td>— LHV
— Moisture
— Volatiles, ash, fixed carbon, C, H, N, O, S</td></tr>
<tr><td></td><td>— Br, Cl, F</td></tr>
<tr><td></td><td>— Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)</td></tr>
<tr><td>HFO</td><td>— Ash
— C, S, N, Ni, V</td></tr>
<tr><td>Gas oil</td><td>— Ash
— N, C, S</td></tr>
<tr><td>Natural gas</td><td>— LHV
— CH_4, C_2H_6, C_3, C_4+, CO_2, N_2, Wobbe index</td></tr>
<tr><td>Process fuels from the chemical industry (27)</td><td>— Br, C, Cl, F, H, N, O, S
— Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)</td></tr>
<tr><td>Iron and steel process gases</td><td>— LHV, CH_4 (for COG), C_XH_Y (for COG), CO_2, H_2, N_2, total sulphur, dust, Wobbe index</td></tr>
<tr><td>Waste (28)</td><td>— LHV
— Moisture</td></tr>
</table></td><td></td><td>fuel is sampled, and combined samples are tested on a monthly basis by a UKAS accredited laboratory for LHV, moisture content, ash, volatile matter, % biomass content, As, C, Cd, Cl, Co, Cr, Cu, H, Hg, Mn, N, Ni, Pb, S, Sb, Sn, V & Zn.

(iii) Moisture content of the straw is measured on the fuelling line, allowing the wood/straw mix, feed rate and the combustion parameters to be adjusted.

Reference to requirements and standards will be included in the updated EMS.

They also confirm that gas oil is used on site for auxiliary boiler firing during start-up, and in the emergency standby generator. It is purchased from recognised suppliers and specified to 252 Gasoil BS EN 590. In addition Nitrogen content is specified as per Table 11 in the JEP report 'Characterisation of power plant fuels for compliance with LCP BREF Conclusion BAT 9' October 2019.

The site has investigated the use of olive pellets as an additional fuel. A mechanical handling trial was carried out only. A combustion trial has not yet been undertaken as the mechanical trial highlighted the need for a new transport/storage mechanism (silo and conveyor) to feed the pellets into the process. The required mechanical and civil works to install this system is yet to be undertaken and the project is currently on hold.

We have incorporated the JEP report ('Characterisation of power plant fuels for compliance with LCP BREF Conclusion BAT 9' October 2019) into table S1.2 of the permit.

Also refer to Section 4.3 above.

We agree with the Operator's stated compliance.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	— Volatiles, ash, Br, C, Cl, F, H, N, O, S — Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)		
10	In order to reduce emissions to air and/or to water during other than normal operating conditions (OTNOC), BAT is to set up and implement a management plan as part of the environmental management system (see BAT 1), commensurate with the relevance of potential pollutant releases, that includes the following elements: — appropriate design of the systems considered relevant in causing OTNOC that may have an impact on emissions to air, water and/or soil (e.g. low-load design concepts for reducing the minimum start-up and shutdown loads for stable generation in gas turbines), — set-up and implementation of a specific preventive maintenance plan for these relevant systems, — review and recording of emissions caused by OTNOC and associated circumstances and implementation of corrective actions if necessary, — periodic assessment of the overall emissions during OTNOC (e.g. frequency of events, duration, emissions quantification/estimation) and implementation of corrective actions if necessary.	FC	The Operator confirmed that: The abatement equipment is designed to keep the emissions within the permitted ELVs where possible. The Operator committed to further expanding the existing EMS to include methodologies for reviewing data and determine lessons learnt and improvements possible. Refer to BAT Conclusion 1 above. We agree with the Operator's stated compliance.
11	BAT is to appropriately monitor emissions to air and/or to water during OTNOC. ***Description*** The monitoring can be carried out by direct measurement of emissions or by monitoring of surrogate parameters if this proves to be of equal or better scientific quality than the direct measurement of emissions. Emissions during start-up and shutdown (SU/SD) may be assessed based on a detailed emission measurement carried out for a typical SU/SD procedure at least once every year, and using the results of this measurement to estimate the emissions for each and every SU/SD throughout the year.	CC	The Operator confirmed that: The CEMS continues to operate and record emissions to air during OTNOC. We agree with the Operator's stated compliance.
12	In order to increase the energy efficiency of combustion, gasification and/or IGCC units operated ≥ 1 500 h/yr, BAT is to use an appropriate combination of the techniques given below. **Technique** / **Description** / **Applicability** a. Combustion optimisation — See description in Section 8.2. Optimising the combustion — Generally applicable	CC	The Operator confirmed that: a. The Operator in conjunction with the control system is continuously monitoring combustion to achieve as efficient a burn as possible within the constraints of fuel variability. b. The system was designed to operate a specific set of conditions and it is not practical to vary from these designed conditions.

BAT C No.	Summary of BAT Conclusion requirement				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			minimises the content of unburnt substances in the flue-gases and in solid combustion residues			c. (See d, also). Plans are in place to improve the air cooled condenser (ACC) performance, this will impact on the efficiency of the steam cycle. There is also work going on to ensure all the feed water heaters are operating to design parameters. d. The plant has recently been modelled using live data and the output is being used to identify areas where efficiency improvements can be made. There are already plans to improve the ACC efficiency which will have a significant impact on overall performance. e. The plant design includes an air pre-heater fed from the boiler feed water system, and air for the forced draught (FD) fan is taken from inside the top of the boiler house where it is at its warmest. f. No current plans to pre-heat the fuel and in fact the stoker jackets have to be cooled to ensure the fuel doesn't pre-ignite before getting to the furnace. g. An advanced control system is in place and operational. h. Feed water pre-heating is in place and operational. i. The plant already operates as a CHP plant. k. The plant uses a 'flue gas cooler' used to heat the feed water as it is not possible to cool the flue gas below 120°C to meet the requirements of the bag filter. l. Thermal storage is not applicable due to the heat demand of the DH system compared to the size of the heat output. m. The use of a wet stack system is not applicable. There are issues with reducing stack temperature regarding sorbent dosing and pluming. o. Straw stacks provide some natural drying. Bulk density of fuel makes it uneconomic to do anything more. p. The plant systems are already well insulated, to minimise convective and radiative losses. q. Advanced materials are already used in the boiler to maximise operating temperatures and pressures. r. Modifications to the steam turbine may be considered at the next major overhaul in 2020/21, although practicality will be dependent on the findings of inspections. s. Not applicable as plant is <600MWth. We agree with the Operator's stated compliance.
		b.	Optimisation of the working medium conditions	Operate at the highest possible pressure and temperature of the working medium gas or steam, within the constraints associated with, for example, the control of NO_X emissions or the characteristics of energy demanded		
		c.	Optimisation of the steam cycle	Operate with lower turbine exhaust pressure by utilisation of the lowest possible temperature of the condenser cooling water, within the design conditions		
		d.	Minimisation of energy consumption	Minimising the internal energy consumption (e.g. greater efficiency of the feed-water pump)		
		e.	Preheating of combustion air	Reuse of part of the heat recovered from the combustion flue-gas to preheat the air used in combustion	Generally applicable within the constraints related to the need to control NO_X emissions	
		f.	Fuel preheating	Preheating of fuel using recovered heat	Generally applicable within the constraints associated with the boiler design and the need to control NO_Xemissions	
		g.	Advanced control system	See description in Section 8.2. Computerised control of the main combustion parameters enables the combustion efficiency to be improved	Generally applicable to new units. The applicability to old units may be constrained by the need to retrofit the combustion system and/or control command system	
		h.	Feed-water preheating using recovered heat	Preheat water coming out of the steam condenser with recovered heat, before reusing it in the boiler	Only applicable to steam circuits and not to hot boilers. Applicability to existing units may be limited due to constraints associated with the plant configuration and the amount of recoverable heat	
		i.	Heat recovery	Recovery of heat (mainly from the	Applicable within the constraints	

BAT C No.	Summary of BAT Conclusion requirement				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
		by cogeneration (CHP)	steam system) for producing hot water/steam to be used in industrial processes/activities or in a public network for district heating. Additional heat recovery is possible from: — flue-gas — grate cooling — circulating fluidised bed	associated with the local heat and power demand. The applicability may be limited in the case of gas compressors with an unpredictable operational heat profile		
	j.	CHP readiness	See description in Section 8.2.	Only applicable to new units where there is a realistic potential for the future use of heat in the vicinity of the unit		
	k.	Flue-gas condenser	See description in Section 8.2.	Generally applicable to CHP units provided there is enough demand for low-temperature heat		
	l.	Heat accumulation	Heat accumulation storage in CHP mode	Only applicable to CHP plants. The applicability may be limited in the case of low heat load demand		
	m.	Wet stack	See description in Section 8.2.	Generally applicable to new and existing units fitted with wet FGD		
	n.	Cooling tower discharge	The release of emissions to air through a cooling tower and not via a dedicated stack	Only applicable to units fitted with wet FGD where reheating of the flue-gas is necessary before release, and where the unit cooling system is a cooling tower		
	o.	Fuel pre-drying	The reduction of fuel moisture content before combustion to improve combustion conditions	Applicable to the combustion of biomass and/or peat within the constraints associated with spontaneous combustion risks (e.g. the moisture content of peat is kept above 40 % throughout the delivery chain). The retrofit of existing plants may be restricted by the extra		

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement

			calorific value that can be obtained from the drying operation and by the limited retrofit possibilities offered by some boiler designs or plant configurations
p.	Minimisation of heat losses	Minimising residual heat losses, e.g. those that occur via the slag or those that can be reduced by insulating radiating sources	Only applicable to solid-fuel-fired combustion units and to gasification/IGCC units
q.	Advanced materials	Use of advanced materials proven to be capable of withstanding high operating temperatures and pressures and thus to achieve increased steam/combustion process efficiencies	Only applicable to new plants
r.	Steam turbine upgrades	This includes techniques such as increasing the temperature and pressure of medium-pressure steam, addition of a low-pressure turbine, and modifications to the geometry of the turbine rotor blades	The applicability may be restricted by demand, steam conditions and/or limited plant lifetime
s.	Supercritical and ultra-supercritical steam conditions	Use of a steam circuit, including steam reheating systems, in which steam can reach pressures above 220,6 bar and temperatures above 374 °C in the case of supercritical conditions, and above 250 – 300 bar and temperatures above 580 – 600 °C in the case of ultra-supercritical conditions	Only applicable to new units of ≥ 600 MW_{th} operated > 4 000 h/yr. Not applicable when the purpose of the unit is to produce low steam temperatures and/or pressures in process industries. Not applicable to gas turbines and engines generating steam in CHP mode. For units combusting biomass, the applicability may be constrained by high-temperature corrosion in the case of certain biomasses

13	In order to reduce water usage and the volume of contaminated waste water discharged, BAT is to use one or both of the techniques given below.	CC	The Operator confirmed that:

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Water recycling</td><td>Residual aqueous streams, including run-off water, from the plant are reused for other purposes. The degree of recycling is limited by the quality requirements of the recipient water stream and the water balance of the plant</td><td>Not applicable to waste water from cooling systems when water treatment chemicals and/or high concentrations of salts from seawater are present</td></tr>
<tr><td>b.</td><td>Dry bottom ash handling</td><td>Dry, hot bottom ash falls from the furnace onto a mechanical conveyor system and is cooled down by ambient air. No water is used in the process.</td><td>Only applicable to plants combusting solid fuels. There may be technical restrictions that prevent retrofitting to existing combustion plants</td></tr>
</table>
</td><td></td><td>The site has rain water harvesting capability for use in non-critical processes. All surface water run-off drains go to the swale/lagoon which has a fully functioning reed bed filtering system before the water is returned to the River Slea.

There is a plant improvement under consideration to collect process drains water for recycling.

We agree with the Operator’s stated compliance.</td></tr>
<tr><td>14</td><td>In order to prevent the contamination of uncontaminated waste water and to reduce emissions to water, BAT is to segregate waste water streams and to treat them separately, depending on the pollutant content.
Description
Waste water streams that are typically segregated and treated include surface run-off water, cooling water, and waste water from flue-gas treatment.
Applicability
The applicability may be restricted in the case of existing plants due to the configuration of the drainage systems.</td><td>CC</td><td>The Operator confirmed that:

Waste water streams are segregated on site. Surface water, rainwater drainage, and flows from sumps are maintained in one system (with oil separation as appropriate) with final discharge through the attenuation lagoon. All process water is maintained in a separate system and treated for sediment and pH prior to discharge into the foul sewer.

We agree with the Operator’s stated compliance.</td></tr>
<tr><td>15</td><td>In order to reduce emissions to water from flue-gas treatment, BAT is to use an appropriate combination of the techniques given below, and to use secondary techniques as close as possible to the source in order to avoid dilution.
<table>
<tr><th colspan="2">Technique</th><th>Typical pollutants prevented/abated</th><th>Applicability</th></tr>
<tr><td colspan="4">Primary techniques</td></tr>
<tr><td>a.</td><td>Optimised combustion (see BAT 6) and flue-gas treatment systems (e.g. SCR/SNCR, see BAT 7)</td><td>Organic compounds, ammonia (NH_3)</td><td>Generally applicable</td></tr>
<tr><td colspan="4">Secondary techniques ([29])</td></tr>
<tr><td>b.</td><td>Adsorption on activated</td><td>Organic compounds,</td><td>Generally applicable</td></tr>
</table>
</td><td>NA</td><td>The Operator confirmed that:

There is no wet flue gas treatment. BAT AELs don't apply.

We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement

	carbon	mercury (Hg)	
c.	Aerobic biological treatment	Biodegradable organic compounds, ammonium (NH_4^+)	Generally applicable for the treatment of organic compounds. Aerobic biological treatment of ammonium (NH_4^+) may not be applicable in the case of high chloride concentrations (i.e. around 10 g/l)
d.	Anoxic/anaerobic biological treatment	Mercury (Hg), nitrate (NO_3^-), nitrite (NO_2^-)	Generally applicable
e.	Coagulation and flocculation	Suspended solids	Generally applicable
f.	Crystallisation	Metals and metalloids, sulphate (SO_4^{2-}), fluoride (F^-)	Generally applicable
g.	Filtration (e.g. sand filtration, microfiltration, ultrafiltration)	Suspended solids, metals	Generally applicable
h.	Flotation	Suspended solids, free oil	Generally applicable
i.	Ion exchange	Metals	Generally applicable
j.	Neutralisation	Acids, alkalis	Generally applicable
k.	Oxidation	Sulphide (S^{2-}), sulphite (SO_3^{2-})	Generally applicable
l.	Precipitation	Metals and metalloids, sulphate (SO_4^{2-}), fluoride (F^-)	Generally applicable
m.	Sedimentation	Suspended solids	Generally applicable
n.	Stripping	Ammonia (NH_3)	Generally applicable

The BAT-AELs refer to direct discharges to a receiving water body at the point where the emission leaves the installation.

BAT-AELs for direct discharges to a receiving water body from flue-gas treatment

Substance/Parameter	BAT-AELs
	Daily average

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><td colspan="2">Total organic carbon (TOC)</td><td>20–50 mg/l [30] [31] [32]</td></tr>
<tr><td colspan="2">Chemical oxygen demand (COD)</td><td>60–150 mg/l [30] [31] [32]</td></tr>
<tr><td colspan="2">Total suspended solids (TSS)</td><td>10–30 mg/l</td></tr>
<tr><td colspan="2">Fluoride (F^-)</td><td>10–25 mg/l [32]</td></tr>
<tr><td colspan="2">Sulphate (SO_4^{2-})</td><td>1,3–2,0 g/l [32] [33] [34] [35]</td></tr>
<tr><td colspan="2">Sulphide (S^{2-}), easily released</td><td>0,1–0,2 mg/l [32]</td></tr>
<tr><td colspan="2">Sulphite (SO_3^{2-})</td><td>1–20 mg/l [32]</td></tr>
<tr><td rowspan="8">Metals and metalloids</td><td>As</td><td>10–50 µg/l</td></tr>
<tr><td>Cd</td><td>2–5 µg/l</td></tr>
<tr><td>Cr</td><td>10–50 µg/l</td></tr>
<tr><td>Cu</td><td>10–50 µg/l</td></tr>
<tr><td>Hg</td><td>0,2–3 µg/l</td></tr>
<tr><td>Ni</td><td>10–50 µg/l</td></tr>
<tr><td>Pb</td><td>10–20 µg/l</td></tr>
<tr><td>Zn</td><td>50–200 µg/l</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>16</td><td>In order to reduce the quantity of waste sent for disposal from the combustion and/or gasification process and abatement techniques, BAT is to organise operations so as to maximise, in order of priority and taking into account life-cycle thinking:
(a) waste prevention, e.g. maximise the proportion of residues which arise as by-products;
(b) waste preparation for reuse, e.g. according to the specific requested quality criteria;
(c) waste recycling;
(d) other waste recovery (e.g. energy recovery),
by implementing an appropriate combination of techniques such as:
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Generation of gypsum as a by-product</td><td>Quality optimisation of the calcium-based reaction residues generated by the wet FGD so that they can be used as a substitute for mined gypsum (e.g. as raw material in the plasterboard</td><td>Generally applicable within the constraints associated with the required gypsum quality, the health requirements associated to each specific</td></tr>
</table>
</td><td>CC</td><td>The Operator confirmed that:

An annual pollution inventory is produced which is in the public domain which includes all waste produced on site .

Bottom ash goes to a third party for road fill and building blocks manufacture. Fly ash achieved REACH registration in May 2018 and is now going through the End of Waste approval process for its use in making a water soluble, nitrogen free fertiliser. The fly ash is currently transported to a landfill site for disposal pending the End of Waste decision.

Oversize wood chip currently goes off-site for reprocessing and re-use but will soon be processed on site and returned to the fuel system.

Waste straw goes off-site to be processed and recycled. A future plant improvement is under consideration to return the straw to the</td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><td></td><td></td><td>industry). The quality of limestone used in the wet FGD influences the purity of the gypsum produced</td><td>use, and by the market conditions</td></tr>
<tr><td>b.</td><td>Recycling or recovery of residues in the construction sector</td><td>Recycling or recovery of residues (e.g. from semi-dry desulphurisation processes, fly ash, bottom ash) as a construction material (e.g. in road building, to replace sand in concrete production, or in the cement industry)</td><td>Generally applicable within the constraints associated with the required material quality (e.g. physical properties, content of harmful substances) associated to each specific use, and by the market conditions</td></tr>
<tr><td>c.</td><td>Energy recovery by using waste in the fuel mix</td><td>The residual energy content of carbon-rich ash and sludges generated by the combustion of coal, lignite, heavy fuel oil, peat or biomass can be recovered for example by mixing with the fuel</td><td>Generally applicable where plants can accept waste in the fuel mix and are technically able to feed the fuels into the combustion chamber</td></tr>
<tr><td>d.</td><td>Preparation of spent catalyst for reuse</td><td>Preparation of catalyst for reuse (e.g. up to four times for SCR catalysts) restores some or all of the original performance, extending the service life of the catalyst to several decades. Preparation of spent catalyst for reuse is integrated in a catalyst management scheme</td><td>The applicability may be limited by the mechanical condition of the catalyst and the required performance with respect to controlling NO_X and NH_3 emissions</td></tr>
</table>
</td><td></td><td>fuel system via the vacuum clean-up system.

We agree with the Operator’s stated compliance.</td></tr>
<tr><td>17</td><td>In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Operational measures</td><td>These include:
— improved inspection and maintenance of equipment
— closing of doors and windows of enclosed areas, if possible
— equipment operated by experienced staff
— avoidance of noisy activities at night, if possible</td><td>Generally applicable</td></tr>
</table>
</td><td>CC</td><td>The Operator confirmed that:

The site has provided a number of measures through design and operation:

a. Operational measures are in place where applicable - the site is operated by experienced staff, the plant has a rigorous maintenance programme managed in the CMMS and where possible noise transmission paths (doors, windows etc.) are kept closed or are attenuated, and external activities such as fuel deliveries are not permitted overnight, or at weekends.

b. Low noise equipment was specified in the original build in order to meet noise level requirements in the specification.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			c. Noise attenuation was applied where relevant at the time of design and where not in conflict with other operational requirements, additional attenuation scope is limited. d. Noise control equipment is provided where applicable - the site has boundary embankments with planting, all plant is enclosed in sound attenuating buildings, equipment is insulated. Noise monitoring is undertaken. e. During design the buildings were oriented to minimise noise pollution to the local community. We agree with the Operator's stated compliance.

		— provisions for noise control during maintenance activities	
b.	Low-noise equipment	This potentially includes compressors, pumps and disks	Generally applicable when the equipment is new or replaced
c.	Noise attenuation	Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings	Generally applicable to new plants. In the case of existing plants, the insertion of obstacles may be restricted by lack of space
d.	Noise-control equipment	This includes: — noise-reducers — equipment insulation — enclosure of noisy equipment — soundproofing of buildings	The applicability may be restricted by lack of space
e.	Appropriate location of equipment and buildings	Noise levels can be reduced by increasing the distance between the emitter and the receiver and by using buildings as noise screens	Generally applicable to new plant

BAT Conclusions 18 to 23 are not applicable - combustion of coal and/or lignite

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>2.2.1 Table 8</td><td>BAT-associated energy efficiency levels (BAT-AEELs) for the combustion of solid biomass and/or peat
<table>
<tr><th rowspan="2">Type of combustion unit</th><th colspan="4">BAT-AEELs [73] [74]</th></tr>
<tr><th colspan="2">Net electrical efficiency (%) [75]</th><th colspan="2">Net total fuel utilisation (%) [76] [77]</th></tr>
<tr><th>New unit [78]</th><th>Existing unit</th><th>New unit</th><th>Existing unit</th></tr>
<tr><td>Solid biomass and/or peat boiler</td><td>33,5–to > 38</td><td>28–38</td><td>73–99</td><td>73–99</td></tr>
</table></td><td>CC</td><td>The Operator confirmed that:

A full load efficiency test was undertaken at commissioning and the full test results are available. The reported efficiency from this was 33.52%.

No major plant modifications have been made subsequent to this, so this is still valid.

The plant is electrically led, but also exports heat to the connected district heating network, hence the net electrical efficiency AEEL has been used, as per footnote 2 (see below):

[2] In the case of CHP units, only one of the two BAT AEELs ‘Net electrical efficiency’ or ‘Net total fuel utilisation’ applies, depending on the CHP unit design (i.e. either more oriented towards electricity generation or towards heat generation).

Fuel consumption and electrical output are monitored continuously although the wood chip fuel measurement is based on some assumptions about bulk density. The main issue is CV which is measured using an Ofgem approved methodology every month from samples taken during the month. It is not practical to do on-line CV measurement. Efficiency is therefore calculated based on monthly data.

Also refer to section 4.2 of this document.

We agree with the Operator’s stated compliance.</td></tr>
<tr><td>24</td><td>In order to prevent or reduce NO_X emissions to air while limiting CO and N_2O emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Combustion optimisation</td><td rowspan="2">See descriptions in Section 8.3</td><td rowspan="2">Generally applicable</td></tr>
<tr><td>b.</td><td>Low-NO_X burners</td></tr>
</table></td><td>CC</td><td>The Operator confirmed that:

CO and NOx are monitored continuously by the CEMS.

a. Combustion optimisation is used via the ABB 800XA advanced control system

b. Air staging is used in a primary, secondary, ignition, and over-fire</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement

	(LNB)		
c.	Air staging		
d.	Fuel staging		
e.	Flue-gas recirculation		
f.	Selective non-catalytic reduction (SNCR)	See description in Section 8.3. Can be applied with 'slip' SCR	Not applicable to combustion plants operated < 500 h/yr with highly variable boiler loads. The applicability may be limited in the case of combustion plants operated between 500 h/yr and 1 500 h/yr with highly variable boiler loads. For existing combustion plants, applicable within the constraints associated with the required temperature window and residence time for the injected reactants
g.	Selective catalytic reduction (SCR)	See description in Section 8.3. The use of high-alkali fuels (e.g. straw) may require the SCR to be installed downstream of the dust abatement system	Not applicable to combustion plants operated < 500 h/yr. There may be economic restrictions for retrofitting existing combustion plants of < 300 MW_{th}. Not generally applicable to existing combustion plants of < 100 MW_{th}

BAT-associated emission levels (BAT-AELs) for NO_X emissions to air from the combustion of solid biomass and/or peat

Combustion plant total rated thermal input	BAT-AELs (mg/Nm^3)	
	Yearly average	Daily average or average over the sampling period

configuration.

c. SNCR is currently used on the plant.

A review of operational parameters and procedures has shown the plant is compliant with the higher end of the BAT AEL range for NOx and CO.

NOx yearly average: 50 - 180 mg/Nm^3
NOx daily average: 100 - 220 mg/Nm^3
CO yearly average: <30 - 160 mg/Nm^3

We have set limits as detailed in section 4.1 of this document.

We agree with the Operator's stated compliance.

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><th>(MW_{th})</th><th>New plant</th><th>Existing plant (79)</th><th>New plant</th><th>Existing plant (80)</th></tr>
<tr><td>50–100</td><td>70–150 (81)</td><td>70–225 (82)</td><td>120–200 (83)</td><td>120–275 (84)</td></tr>
<tr><td>100–300</td><td>50–140</td><td>50–180</td><td>100–200</td><td>100–220</td></tr>
<tr><td>≥ 300</td><td>40–140</td><td>40–150 (85)</td><td>65–150</td><td>95–165 (86)</td></tr>
</table>
As an indication, the yearly average CO emission levels will generally be:
— < 30–250 mg/Nm^3 for existing combustion plants of 50–100 MW_{th} operated ≥ 1 500 h/yr, or new combustion plants of 50–100 MW_{th},
— < 30–160 mg/Nm^3 for existing combustion plants of 100–300 MW_{th} operated ≥ 1 500 h/yr, or new combustion plants of 100–300 MW_{th},
— < 30–80 mg/Nm^3 for existing combustion plants of ≥ 300 MW_{th} operated ≥ 1 500 h/yr, or new combustion plants of ≥ 300 MW_{th}.</td><td></td><td></td></tr>
<tr><td>25</td><td>In order to prevent or reduce SO_X, HCl and HF emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Boiler sorbent injection (in-furnace or in-bed)</td><td rowspan="6">See descriptions in Section 8.4</td><td rowspan="6">Generally applicable</td></tr>
<tr><td>b.</td><td>Duct sorbent injection (DSI)</td></tr>
<tr><td>c.</td><td>Spray dry absorber (SDA)</td></tr>
<tr><td>d.</td><td>Circulating fluidised bed (CFB) dry scrubber</td></tr>
<tr><td>e.</td><td>Wet scrubbing</td></tr>
<tr><td>f.</td><td>Flue-gas condenser</td></tr>
</table></td><td>FC</td><td>The Operator confirmed that:

SO_2 and HCl are monitored continuously by the CEMS. HF isn't currently monitored in the flue gas, but testing of the ash for F is done on a monthly basis.

Techniques:
a. Boiler sorbent injection is not used at the plant.
b. A DSI system is installed and operational, using Sorbacal (see document SREP 4.5 provided 10 March 2020 for details)
c. SDA is not used at the plant.
d. The plant does not use a CFB scrubber.
e. The plant does not use wet scrubbing.
f. The plant does not use a flue-gas condenser.
g. The plant does not use wet FGD.
h. The plant has limited capacity to alter the straw/woodchip mix, and is not able to vary fuel specification.

A review of operational parameters and procedures has shown the plant is compliant with the top of band BAT AEL's for SO_2 (permit value of 110mg/Nm^3) and HCl systems will be implemented for</td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><td>g.</td><td>Wet flue-gas desulphurisation (wet FGD)</td><td></td><td>Not applicable to combustion plants operated < 500 h/yr.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</td></tr>
<tr><td>h.</td><td>Fuel choice</td><td></td><td>Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td></tr>
</table>
BAT-associated emission levels (BAT-AELs) for SO_2 emissions to air from the combustion of solid biomass and/or peat
<table>
<tr><th rowspan="2">Combustion plant total rated thermal input (MW_{th})</th><th colspan="4">BAT-AELs for SO_2 (mg/Nm^3)</th></tr>
<tr><th colspan="2">Yearly average</th><th colspan="2">Daily average or average over the sampling period</th></tr>
<tr><th>New plant</th><th>Existing plant (87)</th><th>New plant</th><th>Existing plant (88)</th></tr>
<tr><td>< 100</td><td>15–70</td><td>15–100</td><td>30–175</td><td>30–215</td></tr>
<tr><td>100–300</td><td>< 10–50</td><td>< 10–70 (89)</td><td>< 20–85</td><td>< 20–175 (90)</td></tr>
<tr><td>≥ 300</td><td>< 10–35</td><td>< 10–50 (89)</td><td>< 20–70</td><td>< 20–85 (91)</td></tr>
</table>
BAT-associated emission levels (BAT-AELs) for HCl and HF emissions to air from the combustion of solid biomass and/or peat
<table>
<tr><th rowspan="3">Combustion plant total rated thermal input (MW_{th})</th><th colspan="4">BAT-AELs for HCl (mg/Nm^3) (92) (93)</th><th colspan="2">BAT-AELs for HF (mg/Nm^3)</th></tr>
<tr><th colspan="2">Yearly average or average of samples obtained during one year</th><th colspan="2">Daily average or average over the sampling period</th><th colspan="2">Average over the sampling period</th></tr>
<tr><th>New</th><th>Existing</th><th>New</th><th>Existin</th><th>Ne</th><th>Existi</th></tr>
</table>
</td><td></td><td>suitable periodic monitoring of HF.

SO_2 yearly average: <10 - 70 mg/Nm^3
(For existing plants burning fuels where the average sulphur content is 0,1 wt-% (dry) or higher, the higher end of the BAT-AEL range is 100 mg/Nm^3)

SO_2 daily average: <20 - 110 mg/Nm^3
HCl yearly average: 1 - 9 mg/Nm^3
HCl daily average: 1 - 12 mg/Nm^3
HF: <1 mg/Nm^3

We have set limits as detailed in section 4.1 of this document.

This BAT Conclusion is FC as the Operator doesn't currently monitor HF in the flue gas. Table S3.1a of the permit will secure compliance with this.

We have also set an improvement condition for a review of the higher SO_2 limit.

We agree with the Operator's stated compliance.</td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><th></th><th>plant</th><th>plant (94) (95)</th><th>plant</th><th>g plant (96)</th><th>w plant</th><th>ng plant (96)</th></tr>
<tr><td>< 100</td><td>1–7</td><td>1–15</td><td>1–12</td><td>1–35</td><td>< 1</td><td>< 1,5</td></tr>
<tr><td>100–300</td><td>1–5</td><td>1–9</td><td>1–12</td><td>1–12</td><td>< 1</td><td>< 1</td></tr>
<tr><td>≥ 300</td><td>1–5</td><td>1–5</td><td>1–12</td><td>1–12</td><td>< 1</td><td>< 1</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>26</td><td>
In order to reduce dust and particulate-bound metal emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Electrostatic precipitator (ESP)</td><td rowspan="2">See description in Section 8.5</td><td rowspan="2">Generally applicable</td></tr>
<tr><td>b.</td><td>Bag filter</td></tr>
<tr><td>c.</td><td>Dry or semi-dry FGD system</td><td rowspan="2">See descriptions in Section 8.5
The techniques are mainly used for SO_X, HCl and/or HF control</td><td></td></tr>
<tr><td>d.</td><td>Wet flue-gas desulphurisation (wet FGD)</td><td>See applicability in BAT 25</td></tr>
<tr><td>e.</td><td>Fuel choice</td><td>See description in Section 8.5</td><td>Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td></tr>
</table>
BAT-associated emission levels (BAT-AELs) for dust emissions to air from the combustion of solid biomass and/or peat
<table>
<tr><th rowspan="3">Combustion plant total rated thermal input (MW_{th})</th><th colspan="4">BAT-AELs for dust (mg/Nm^3)</th></tr>
<tr><th colspan="2">Yearly average</th><th colspan="2">Daily average or average over the sampling period</th></tr>
<tr><th>New plant</th><th>Existing plant (97)</th><th>New plant</th><th>Existing plant (98)</th></tr>
</table>
</td><td>CC</td><td>The Operator confirmed that:

Dust is monitored continuously by the CEMS.

b. The plant has a bag filter system installed and is fully operational.

A review of operational parameters and procedures has shown the plant is compliant with the higher end of the BAT AEL range.

Dust yearly average: 2 -12 mg/Nm^3
Dust daily average: 2 -18 mg/Nm^3

We have set limits as detailed in section 4.1 of this document.

We agree with the Operator’s stated compliance.</td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><td>< 100</td><td>2–5</td><td>2–15</td><td>2–10</td><td>2–22</td></tr>
<tr><td>100–300</td><td>2–5</td><td>2–12</td><td>2–10</td><td>2–18</td></tr>
<tr><td>≥ 300</td><td>2–5</td><td>2–10</td><td>2–10</td><td>2–16</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>27</td><td>In order to prevent or reduce mercury emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td colspan="4">Specific techniques to reduce mercury emissions</td></tr>
<tr><td>a.</td><td>Carbon sorbent (e.g. activated carbon or halogenated activated carbon) injection in the flue-gas</td><td rowspan="3">See descriptions in Section 8.5</td><td>Generally applicable</td></tr>
<tr><td>b.</td><td>Use of halogenated additives in the fuel or injected in the furnace</td><td>Generally applicable in the case of a low halogen content in the fuel</td></tr>
<tr><td>c.</td><td>Fuel choice</td><td>Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td></tr>
<tr><td colspan="4">Co-benefit from techniques primarily used to reduce emissions of other pollutants</td></tr>
<tr><td>d.</td><td>Electrostatic precipitator (ESP)</td><td rowspan="2">See descriptions in Section 8.5. The techniques are mainly used for dust control</td><td rowspan="2">Generally applicable</td></tr>
<tr><td>e.</td><td>Bag filter</td></tr>
<tr><td>f.</td><td>Dry or semi-dry FGD system</td><td rowspan="2">See descriptions in Section 8.5. The techniques are mainly used</td><td></td></tr>
<tr><td>g.</td><td>Wet flue-gas desulphurisation (wet</td><td>See applicability in BAT 25</td></tr>
</table>
</td><td>FC</td><td>The Operator confirmed that:

Mercury is not currently monitored in the stack emissions, however it is tested for on a monthly basis in the fuel and ash and is well below the point where action would be expected to be required.

The plant has a bag filter system installed and fully operational.

The fuel analysis records will be supplied to the Environment Agency to be used to determine the required monitoring period, this will then be implemented.

Hg daily average: <1 - 5 µg/Nm^3

We have set the limit as detailed in section 4.1 of this document.

This BAT Conclusion is FC as the Operator doesn't currently monitor Hg in the flue gas. Table S3.1a of the permit will secure compliance with this BAT Conclusion.

We agree with the Operator's stated compliance.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	FGD) for SO_X, HCl and/or HF control The BAT-associated emission level (BAT-AEL) for mercury emissions to air from the combustion of solid biomass and/or peat is < 1–5 µg/Nm^3 as average over the sampling period.		
BAT Conclusions 28 to 39 are not applicable - combustion of liquid fuels **BAT Conclusions 40 to 51 are not applicable - combustion of gaseous fuels (natural gas and iron and steel process gas)** **BAT Conclusions 52 to 54 are not applicable - combustion of gaseous and/or liquid fuels on offshore platforms** **BAT Conclusions 55 to 59 are not applicable - combustion of process fuels from the chemical industry** **BAT Conclusions 60 to 71 are not applicable - co-incineration of waste in combustion plants** **BAT Conclusions 72 to 75 are not applicable - gasification and IGCC plants**			

6 Review and assessment of derogation requests made by the operator in relation to BAT Conclusions which include an associated emission level (AEL) value

The IED enables a competent authority to allow derogations from BAT AELs stated in BAT Conclusions under specific circumstances as detailed under Article 15(4):

By way of derogation from paragraph 3, and without prejudice to Article 18, the competent authority may, in specific cases, set less strict emission limit values. Such a derogation may apply only where an assessment shows that the achievement of emission levels associated with the best available techniques as described in BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to:

> *(a) the geographical location or the local environmental conditions of the installation concerned; or*
>
> *(b) the technical characteristics of the installation concerned.*

We have not received any such request.

7 Emissions to Water

The consolidated permit incorporates surface water drainage to controlled waters identified as W1. There are no limits set by the existing permit.

As part of our delivery of the Water Framework Directive (WFD) requirements, we need to identify and assess the impact of sources of hazardous pollutants to surface waters from regulated industry. This is relevant to discharges to surface water and/or sewer where there are flue gas treatment activities to which BAT Conclusion 15 applies.

BAT Conclusion 15 requires a reduction in emissions to water from flue-gas treatment. The Operator confirmed that this is not applicable as there is no wet flue-gas treatment at the installation. We agree with the applicability of this BAT Conclusion, refer to Section 5 of this document.

There are no BAT AELs specified in the BAT Conclusions for this type of plant. There are also no additional treatment options identified as BAT for the installation. We have therefore not carried out any additional assessment of the emissions to water as part of this review.

8 Additional IED Chapter II requirements:

Condition	Justification
Condition 2.2.1 amended	'land shown edged in green' amended to 'land shown edged in red', consistent with the site plan in schedule 7 of the permit.
Condition 2.3.3	Date of IED compliance protocol updated from February 2015 to December 2015.
Condition 2.4.2 added	This is a standard condition.
Condition 3.6.7 amended	To include the 95% confidence interval for hydrogen chloride.
Table S1.1 amended	To include the gas-oil fired start-up burner and the gas-oil fired emergency standby generator.
Table S1.2 amended	To correct date received for variation application EPR/DP3030XH/V003 form 28/05/13 to 20/08/13.
Table S1.3 amended	To confirm completion of improvement conditions. Regarding IC2, the Operator does not expect to require SCR to meet the NOx limits that will apply from 17 August 2021. Regarding IC3, the Operator have applied for end of waste status for the fly ash. We have agreed that we will sign this one off and take it forward as part of the ongoing regulatory activities at the site.
Table S3.1 amended	To update the source for 'As required by the Method Implementation Document for BS EN 15259' from LCP413 to LCP412.
	To include the emission point for and the gas-oil fired emergency standby generator. The gas-oil fired start-up burner release is via existing emission point A1.
Table S3.2 amended	The source of W1 is amended from 'Surface water drainage' to 'Uncontaminated surface water drainage'.
Table S4.4 amended	To include reporting forms for hydrogen chloride, hydrogen fluoride, ammonia and mercury emissions to air.
Schedule 6 Interpretation	Removed the definition for "background concentration" which is not relevant.
	Removed definition:

	"Energy efficiency" the ISO base load net plant efficiency means the performance value established by acceptance testing following commissioning or performance testing following improvements made to the plant that could affect the efficiency. Replaced with: "Energy efficiency" the annual net plant energy efficiency means the value calculated from the operational data collected over the year.
Companies house address changed	From: Eversheds House, 70 Great Bridgewater Street, Manchester, M1 5ES To: 4th Floor, The Peak, 5 Wilton Road London, SW1V 1AN

9 Review and assessment of changes that are not part of the BAT Conclusions derived permit review.

This document should be read in conjunction with the application, supporting information and notice.

Aspect considered	Decision
Receipt of application	
Confidential information	A claim for commercial or industrial confidentiality has not been made.
Identifying confidential information	We have not identified information provided as part of the application that we consider to be confidential.
The facility	
The regulated facility	We considered the extent and nature of the facilities at the site in accordance with RGN2 'Understanding the meaning of regulated facility', Appendix 2 of RGN 2 'Defining the scope of the installation', Appendix 1 of RGN 2 'Interpretation of Schedule 1', guidance on waste recovery plans and permits. We have included the gas-oil fired auxiliary boiler firing during start-up and the gas-oil fired emergency standby generator.

Aspect considered	Decision
	The extent of the facilities are defined in the site plan and in the permit. The activities are defined in table S1.1 of the permit.
The site	
Biodiversity, heritage, landscape and nature conservation	The application is within the relevant distance criteria of six local wildlife sites. A full assessment of the application and its potential to affect the sites has not been carried out as part of the permit review process. We consider that the review will not affect the features of the sites as the conditions will provide at least the same level of protection as those in the previous permit and in some cases will provide a higher level of protection to those in the previous permit. We have not consulted Natural England on the application. The decision was taken in accordance with our guidance.
Operating techniques	
General operating techniques	We have reviewed the techniques used by the Operator where they are relevant to the BAT Conclusions and compared these with the relevant guidance notes. The permit conditions ensure compliance with the relevant BREF, BAT Conclusions. The ELVs deliver compliance with the BAT AELs.
Permit conditions	
Updating permit conditions during consolidation	We have updated permit conditions to those in the current generic permit template as part of permit consolidation. The conditions will provide at least the same level of protection as those in the previous permit and in some cases will provide a higher level of protection to those in the previous permit.
Changes to the permit conditions due to an Environment	We have varied the permit as stated in the variation notice.

Aspect considered	Decision
Agency initiated variation	
Emission limits	We have decided that emission limits should be set for the parameters listed in the permit. These are described in the relevant BAT Conclusions in Sections 4.1 and 5 of this document. It is considered that the ELVs described above will ensure that significant pollution of the environment is prevented and a high level of protection for the environment is secured.
Monitoring	We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified. These are described in the relevant BAT Conclusions in Section 5 of this document. Table S3.4 Process monitoring requirements was added to include the requirement to monitor energy efficiency after overhauls on site in line with BAT Conclusion 2. Based on the information in the Regulation 61 response we are satisfied that the Operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.
Reporting	We have specified reporting in the permit for the parameters listed in schedule 3 of the permit. These are described in the relevant BAT Conclusions in Section 5 of this document.
Operator competence	
Management system	There is no known reason to consider that the Operator will not have the management system to enable it to comply with the permit conditions.

Aspect considered	Decision
Growth Duty	
Section 108 Deregulation Act 2015 – Growth duty	We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit. Paragraph 1.3 of the guidance says: "The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation." We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections. We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate Operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.