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/AP3130LY
The Operator is:	EPR Ely Limited
The Installation is:	Elean Power Station
This Variation Notice number is:	EPR/AP3130LY/V005

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 published on 17th 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 best available techniques (BAT) conclusions ('BAT Conclusions') for large combustion plant 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.

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
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
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 2010 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
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 it 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 1st 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 large combustion plant 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 17th August 2021, which will then ensure that operations meet the revised standard, or
- Justifies why standards will not be met by 17th 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 29/10/18.

We considered that the response did not contain sufficient information for us to commence the permit review. We therefore issued a further information request to the Operator on 09/07/19. Suitable further information to complete the request was provided by the Operator on 26/09/19, 06/03/20, 27/03/20 and 24/04/20.

Further requests for information was sent on 28/04/20. Suitable further information was provided by the operator on 01/05/20.

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 Conclusions 2, 12, 9, 10 and table 8 we consider that improvements are required in respect to current capability stated by the operator as recorded in their Regulation 61 Notice response.

We have therefore included an improvement conditions IC003, IC004 and IC005 in the consolidated variation notice, which requires the Operator to upgrade their operational techniques so that the requirements of the BAT Conclusions are delivered by 17 August 2021. This is discussed in more detail in the key issues section and/or 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 9 characterisation of fuel
- BAT 10 Environment Management System
- BAT 2, 12 and Table 8 Energy Efficiency
- Carbon Monoxide limit not included in the permit

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.

The LCP on site is LCP135, which burns biomass which is combusted on a vibrating grate system. The plant has a thermal input of 114MWth.

This variation introduces the Chapter III, Annex V limits into table S3.1 which will be applicable at the end of the TNP, from 01/07/2020. Revised emission limits and monitoring requirements for emissions to air applicable from 17 August 2021 in line with the BAT Conclusions have been included in table S3.1a.

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

The ELVs and AELs are based on the following operating regime:

- Unlimited hours operation

The following tables outline the limits that have been incorporated into the permit for LCP135, 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 6% volume reference oxygen concentration if flue gases. The emission limits and monitoring requirements have been incorporated into Schedule 3 of the permit.

By the end of the TNP on 30 June 2020, as a minimum plant must meet the limits set out in Annex V of the Industrial Emission Directive subject to BAT assessment and the principle of no backsliding, which is the approach that will be taken at this installation. From the implementation date of the BAT Conclusion in 2021 the relevant AELs will also apply.

NOx limits (mg/Nm^3)						
Averaging	**IED (Annex V Part 1) – Existing**	**BREF (Table 9 BAT-c)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**180**	**180**	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**250**	**None**	**220**[Note 1]	Note 1	MSUL/MSDL to baseload	
Daily	**275**	**220**	**220**	BREF	MSUL/MSDL to baseload	
95th %ile of hr means	**500**	**None**	**500**	IED	MSUL/MSDL to baseload	
Note 1: This is tighter than the IED annex V limit of 250mg/m^3 as the BAT-AEL sets a daily limit of 220mg/m^3. The monthly limit cannot be higher than the daily limit.						

SO_2 limits (mg/Nm^3)						
Averaging	**IED (Annex V Part 1) - Existing**	**BREF (Table 10 BAT-c)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**100**	**100**	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**200**	**None**	**200**	IED	MSUL/MSDL to baseload	
Daily	**220**	**215**	**215**	BREF	MSUL/MSDL to baseload	
95th %ile of hr means	**400**	**None**	**400**	IED	MSUL/MSDL to baseload	

The average sulphur content for biomass cereal straw is 0.2 – 0.4 wt% (dry) as detailed in the DTI report B/U1/00768/00/00 URN 03/1569. As sulphur content is >0.1%wt-% (dry) then footnotes 3 and 4 in table 10 of the LCP BAT Conclusions apply, allowing for a BAT-AEL of 100 mg/Nm^3 for yearly and 215 mg/Nm^3 for daily.

HCl limits (mg/Nm^3)						
Averaging	**IED (Annex V Part 1) - Existing**	**BREF (Table 11 BAT-c)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**25**	**25**	BREF	MSUL/MSDL to baseload	Continuous
Daily	**None**	**None**	**None**	BREF	MSUL/MSDL to baseload	

The average chloride content for biomass cereal straw is 0.1 – 0.6 wt% (dry) as detailed in the DTI report B/U1/00768/00/00 URN 03/1569. As chloride content is >0.1%wt-% (dry) then footnote 1 in table 11 of the LCP BAT Conclusions applies, allowing for a BAT-AEL of 25 mg/Nm^3 for yearly and no daily limit applies.

A monthly limit of 25 mg/Nm^3 has been carried over from the existing permit.

HF limits (mg/Nm^3)						
Averaging	**IED (Annex V Part 1) - Existing**	**BREF (Table 21 BAT-c)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Average over sampling period	**None**	**< 1**	**< 1**	BREF	MSUL/MSDL to baseload	Once per year

Dust limits (mg/Nm^3)						
Averaging	**IED (Annex V Part 1) - Existing**	**BREF (Table 12 BAT-c)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**12**	**12**	BREF	MSUL/MSDL to baseload	Continuous
Monthly	**20**	**None**	**18**[Note 1]	Note 1	MSUL/MSDL to baseload	
Daily	**22**	**18**	**18**	BREF	MSUL/MSDL to baseload	
95th %ile of hr means	**40**	**None**	**40**	IED	MSUL/MSDL to baseload	
Note 1: This is tighter than the IED annex V limit of 20mg/m^3 as the BAT-AEL sets a daily limit of 18mg/m^3. The monthly limit cannot be higher than the daily limit.						

Hg limits (µg/Nm^3)						
Averaging	**IED (Annex V Part 1) - Existing**	**BREF (BAT Conclusion)**	**Expected permit limits**	**Basis**	**Limits apply**	**Monitoring**
Average over sampling period	**None**	**5**	**5**	BREF	MSUL/MSDL to baseload	Once per year

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 large combustion plant on the site and the energy efficiency levels confirmed through the Regulation 61 notice response. The evidence provided to demonstrate that the AEELs are met was in the form of a calculated energy efficiency based on net output and energy input, this is described further in section 4.5. 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**
LCP135: unit description from the AEEL table					
28-38	**None**	**None**	**31.8%**	**NA**	**NA**

4.3 BAT 9 characterisation of fuel

BAT 9 requires the operator to carry out fuel characterisation. The EMS does not contain procedure for the characterisation of fuel. Procedures should be in place for fuel characterisation as required under point i) of this BAT conclusion. Criteria ii) in relation to the regular testing of fuels and iii) in relation to incorporating the fuel characterisation changes identified as a result of regular testing back into the control system to improve performance have not been developed.

We have therefore included improvement condition IC004 in the consolidated variation notice requiring the operator to submit a plan outlining how this will be carried out for approval prior to the implementation date for the BAT Conclusions.

4.4 BAT 10 OTNOC and Environment Management System

BAT 10 requires the operator to have operating procedures as part of the installations management to control emissions during other than normal operating conditions (ONTOC). These procedures are not currently included in the Environment Management System (EMS).

We have therefore included improvement condition IC005 in the consolidated variation notice requiring the operator to confirm when the EMS has been updated and is ready for inspection prior to the implementation date for the BAT Conclusions.

4.5 BAT 2, 12 and Table 8 Energy Efficiency

BAT requires net electrical efficiency to be determined by carrying out a initial performance test at full load and further performance tests after each significant upgrade. The operator has provide a calculated figure for the energy efficiency of the plant which meets the BAT-AEEL range as detailed in section 4.2. This is considered sufficient to meet this BAT conclusion. We have set an improvement condition requiring performance testing to be undertaken. This is to ensure that the calculated value is representative of the net electrical efficiency of the plant. The operator has confirmed that performance testing will be undertaken by a third party consultant to the appropriate standard.

We have therefore included improvement condition IC003 in the consolidated variation notice requiring the operator to submit a report detailing the electrical efficiency of the plant following performance testing for approval prior to the implementation date for the BAT Conclusions.

4.6 Carbon Monoxide limit not included in the permit

The operator has provided a report (EPR Ely Limited Response to Additional Questions pursuant to 2017 LCP BAT Conclusions Implementation provided 26/09/19) explaining why they would not be able to meet the indicative CO limit stipulated in the LCP BAT Conclusions. The reasoning set out in this report is summarised below:

-The plant was built in 1999 and the control of CO was not considered in the design as a CO limit was not a requirement of the Integrated Pollution Prevention and Control Regulations (IPPC) in force at the time. The infrastructure is not in place for the control or minimisation of CO.
-There have been a number of ongoing projects from 2006 - 2019 in an attempt to reduce CO, these are listed in the report.
- An independent combustion specialist has reviewed the attempts to control CO concluding that the boiler grate design is not conductive to CO control. In addition combustion control is not feasible due to the inconsistency of the fuel and the difficulty in balancing the controlling of both CO and NO_x

- The prohibitive costs of achieving the indicative CO limit in the BAT conclusions is detailed in a high level estimate of the costs of further upgrades (submitted on 24/04/20).
- There is no environmental impact form the CO emissions from the plant as demonstrated in the air quality assessment for this installation (EPR Ely Power Station Air Quality Assessment, ref. s0776-0020-0028smo ely aqa.doc, dated 28/03/06 and produced by Fichtner).

For these reasons the plant will not be able to meet the indicative BAT-AEL for CO of 250 mg/Nm^3. It is not considered that setting an indicative limit above 250 mg/Nm^3 would be appropriate for this plant. The design of the plant is not suitable for the control or minimisation of CO. Therefore, it would be difficult for the Operator to comply with any limit set as effective and reliable CO control mechanisms are not feasible.

We agree with the Operators reasoning and conclusion that a CO limit should not be included in the permit.

5 Decision checklist regarding relevant BAT Conclusions

BAT Conclusions for large combustion plant, were published by the European Commission on 17th 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	S3.1, S3.1a
Monitoring	2.3, 3.5 and 3.6	S1.2, S3.1a, S3.2
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 Concn. Number	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; ix. application of sectoral benchmarking on a regular basis. Etc - see BAT Conclusions	CC	There is an EMS in place which is certified to meet the requirements of ISO140001:2015. The EMS incorporates all of the requirements identified under BAT1.

<table>
<tr><th>BAT Concn. Number</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>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.</td><td></td><td></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>Following the commissioning of the plant no formal energy efficiency testing was undertaken. The Net energy efficiency has been calculated by dividing the net output by the energy input. The calculated energy efficiency is 31.8%, which is the figure that has been used in the decision document.

The figure provided is within the BAT-AEEL range, however we’ve set an improvement condition which requires the operator to undertaken a performance test at full load in order to obtain the energy efficiency of the plant. This is to ensure that the calculated value is representative of the net electrical efficiency of the plant.</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 installation has a continuous monitoring system in place which measures flow, oxygen content and water vapour content.

Temperature and pressure are continuously monitored by calibrated process instruments.</td></tr>
</table>

<table>
<tr><th>BAT Concn. Number</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>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>
<tr><td>N_2O</td><td>— Coal and/or lignite in circulating fluidised bed boilers
— Solid biomass and/or peat in circulating fluidised bed boilers</td><td>All sizes</td><td>EN 21258</td><td>Once every year (10)</td><td>BAT 20
BAT 24</td></tr>
</table></td><td>FC</td><td>All relevant substances/parameters are monitored to the required standard and to the specified frequency.

The only exceptions to this are HF, Hg and metals and metalloids. The operator has confirmed in their regulation 61 notice response that monitoring to the required standards is being introduced. It is not necessary for an improvement condition as annual reporting of these parameters is already required by the permit. If any parameter is not monitored to the required standard under BAT 4 by 31/07/21 then it will become a compliance issue.</td></tr>
</table>

BAT Concn. Number	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
	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 — 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	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 74		
	SO_3	— When SCR is used	All sizes	No EN standard available	Once every year	—		

BAT Concn. Number	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
	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-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	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 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	— Coal and/or lignite — Solid biomass and/or peat	All sizes	EN 14385	Once every year [18]	BAT 22 BAT 26 BAT 30		

BAT Concn. Number	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
	(As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V, Zn)	—	HFO- and/or gas-oil-fired boilers and engines					
		—	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	
		—	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	

<table>
<tr><th>BAT Concn. Number</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>5</td><td>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.
<table>
<tr><th colspan="2">Substance/Parameter</th><th>Standard(s)</th><th>Minimum monitoring frequency</th><th>Monitoring associated with</th></tr>
<tr><td colspan="2">Total organic carbon (TOC) (26)</td><td>EN 1484</td><td rowspan="13">Once every month</td><td>BAT 15</td></tr>
<tr><td colspan="2">Chemical oxygen demand (COD) (26)</td><td>No EN standard available</td><td></td></tr>
<tr><td colspan="2">Total suspended solids (TSS)</td><td>EN 872</td><td></td></tr>
<tr><td colspan="2">Fluoride (F^-)</td><td>EN ISO 10304-1</td><td></td></tr>
<tr><td colspan="2">Sulphate (SO_4^{2-})</td><td>EN ISO 10304-1</td><td></td></tr>
<tr><td colspan="2">Sulphide, easily released (S^{2-})</td><td>No EN standard available</td><td></td></tr>
<tr><td colspan="2">Sulphite (SO_3^{2-})</td><td>EN ISO 10304-3</td><td></td></tr>
<tr><td rowspan="8">Metals and metalloids</td><td>As</td><td rowspan="7">Various EN standards available (e.g. EN ISO 11885 or EN ISO 17294-2)</td><td></td></tr>
<tr><td>Cd</td><td></td></tr>
<tr><td>Cr</td><td></td></tr>
<tr><td>Cu</td><td></td></tr>
<tr><td>Ni</td><td></td></tr>
<tr><td>Pb</td><td></td></tr>
<tr><td>Zn</td><td></td></tr>
<tr><td>Hg</td><td>Various EN standards available (e.g. EN ISO 12846 or EN ISO 17852)</td><td></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></td><td>NA</td><td>No flue gas treatment is undertaken at the installation. The site does not need to comply with the requirements of BAT 5.</td></tr>
<tr><td>6</td><td>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>Technique</th><th>Description</th><th>Applicability</th></tr>
</table></td><td>CC</td><td>The installation implements the following techniques</td></tr>
</table>

<table>
<tr><th>BAT Concn. Number</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>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 combustion system</td><td>Regular planned maintenance according to suppliers' 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>
</td><td></td><td>A-fuel blending is not practical as the straw is delivered and loaded into the combustion unit as bales.

B-Maintenance of the combustion equipment is undertaken during the annual plant shut down by third part contractors.

C-Combustion is controlled from a central control room. Real time emissions data allows for further refinement of the combustion process.

D/E- The combustion plant was specifically designed for the combustion of agricultural straw with a small amount of virgin wood chip.</td></tr>
<tr><td>7</td><td>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.</td><td>NA</td><td>NOx is controlled through the combustion process. It is not necessary for SNCR/SNR to be fitted to the installation.</td></tr>
<tr><td>8</td><td>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.</td><td>CC</td><td>The installation has a bag filter which is subject to in-house routine maintenance including</td></tr>
</table>

<table>
<tr><th>BAT Concn. Number</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>undertaking any necessary repairs. Contractors also undertake annual servicing and maintenance of the bag filters.

In order to control acid gases hydrated lime is injected into the flue gas path. Routine maintenance and rectification of any breakdowns or failures is managed by an in-house team.</td></tr>
<tr><td>9</td><td>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 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 rowspan="2">Biomass/peat</td><td>— LHV
— moisture</td></tr>
<tr><td>— Ash
— C, Cl, F, N, S, K, Na</td></tr>
</table></td><td>FC</td><td>The fuel has not been subject to characterisation. Procedures are to be included in the EMS requiring that initial fuel characterisation is undertaken and that there is regular ongoing testing.

An improvement condition IC004 has been included in the permit requiring the submission of a plan detailing how fuel characterisation will be carried out prior to the implementation of the BAT conclusions.</td></tr>
</table>

BAT Concn. Number	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
		— Metals and metalloids (As, Cd, Cr, Cu, Hg, Pb, Zn)		
	Coal/lignite	— LHV — Moisture — Volatiles, ash, fixed carbon, C, H, N, O, S		
		— Br, Cl, F		
		— Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)		
	HFO	— Ash — C, S, N, Ni, V		
	Gas oil	— Ash — N, C, S		
	Natural gas	— LHV — CH_4, C_2H_6, C_3, C_4+, CO_2, N_2, Wobbe index		
	Process fuels from the chemical industry ([27])	— Br, C, Cl, F, H, N, O, S — Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)		
	Iron and steel process gases	— LHV, CH_4 (for COG), C_XH_Y (for COG), CO_2, H_2, N_2, total sulphur, dust, Wobbe index		
	Waste ([28])	— LHV — Moisture — 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:		FC	The EMS does not currently contain procedures with regards ONNOC. The operator has confirmed that the EMS will be updated to include these prior to

BAT Concn. Number	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
	— 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.		the implementation of the BAT conclusions. An improvement condition IC005 has been included in the permit requiring the operator to submit the OTNOC procedures.
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 installation has Continuous Emissions Monitoring (CEMS) in place which measures NO_x, HCl, SO_2 and Dust. This is during both normal operations and OTNOC. Periodic measurements of HF and Hg will be in place prior to the implementation of the BAT conclusions. Single one off tests happen during one major start up and one major shut down per year, to provide sufficient data to monitor start up and shut down. The trade effluent discharge is regulated through the Anglian Water Discharge consent. Temperature, pH, flow rate and volume are measured continuously.

<table>
<tr><th>BAT Concn. Number</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>12</td><td>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.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Combustion optimisation</td><td>See description in Section 8.2.
Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues</td><td rowspan="4">Generally applicable</td></tr>
<tr><td>b.</td><td>Optimisation of the working medium conditions</td><td>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</td></tr>
<tr><td>c.</td><td>Optimisation of the steam cycle</td><td>Operate with lower turbine exhaust pressure by utilisation of the lowest possible temperature of the condenser cooling water, within the design conditions</td></tr>
<tr><td>d.</td><td>Minimisation of energy consumption</td><td>Minimising the internal energy consumption (e.g. greater efficiency of the feed-water pump)</td></tr>
<tr><td>e.</td><td>Preheating of combustion air</td><td>Reuse of part of the heat recovered from the combustion flue-gas to preheat the air used in combustion</td><td>Generally applicable within the constraints related to the need to control NO_X emissions</td></tr>
<tr><td>f.</td><td>Fuel preheating</td><td>Preheating of fuel using recovered heat</td><td>Generally applicable within the constraints associated with the boiler design and the need to control NO_X emissions</td></tr>
<tr><td>g.</td><td>Advanced control system</td><td>See description in Section 8.2.
Computerised control of the main combustion parameters enables the combustion efficiency to be improved</td><td>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</td></tr>
<tr><td>h.</td><td>Feed-water preheating using recovered heat</td><td>Preheat water coming out of the steam condenser with recovered heat, before reusing it in the boiler</td><td>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</td></tr>
<tr><td>i.</td><td>Heat recovery by cogeneration (CHP)</td><td>Recovery of heat (mainly from the steam system) for producing hot water/steam to be used in</td><td>Applicable within the constraints associated with the local heat and power demand.</td></tr>
</table></td><td>CC</td><td>The installation implements the following techniques.

A-The responses to BAT6 detail how the installation optimises the combustion process in order to meet environmental standards.

To maximise the efficiency of the flue gas path the super heaters and economiser are fitted with soot blowers which remove unwanted build up from the boiler tubes.

P-heat losses are minimised through insulation of pipework in accordance with manufacturers manuals and the British standard.

R-The efficiency of the steam turbine is optimised by increasing the pressures used. It consists of a single flow ten stage high pressure turbine and a single flow eight stage low pressure turbine through a parallel shaft to a common generator. The installation receives upgrade notifications should they arise.</td></tr>
</table>

BAT Concn. Number	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

		industrial processes/activities or in a public network for district heating. Additional heat recovery is possible from: — flue-gas — grate cooling — circulating fluidised bed	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 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

<table>
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<tr><td></td><td>
<table>
<tr><td>q.</td><td>Advanced materials</td><td>Use of advanced materials proven to be capable of withstanding high operating temperatures and pressures and thus to achieve increased steam/combustion process efficiencies</td><td>Only applicable to new plants</td></tr>
<tr><td>r.</td><td>Steam turbine upgrades</td><td>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</td><td>The applicability may be restricted by demand, steam conditions and/or limited plant lifetime</td></tr>
<tr><td>s.</td><td>Supercritical and ultra-supercritical steam conditions</td><td>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</td><td>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</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>13</td><td>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.
<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>CC</td><td>The installation has the following in place in order to reduce water usage.

A closed loop design is in place which returns condensed steam from the turbine to the furnace for re-heating.

There is also a closed water cooling system for the stoker jackets, feed water pumps and the generator.

Boiler blow down water and water from the water treatment plant are</td></tr>
</table>

BAT Concn. Number	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
			used to quench the hot bottom ash. Run-off from the wet ash conveyor is continuously circulated without discharging to minimise the volume of contaminated water discharge. B-The installation was commissioned with a wet bottom ash handling system. A feasibility study looked at a dry bottom ash process but concluded it would be impractical without a complete furnace re-design requiring major capital investment.
14	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.	CC	There are two waste water streams from the installation. Surface water runoff and trade effluent. Surface water is collected via an interceptor and held in an underground storage tank. This is subsequently discharged to the surface water drainage system via three subversive electric pumps. Trade effluent from boiler blow down and the water treatment plant is collected in two above ground tanks. The discharge is continuously monitored for pH temperature and flow before being discharged to the foul water sewer.

<table>
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<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 carbon</td><td>Organic compounds, mercury (Hg)</td><td>Generally applicable</td></tr>
<tr><td>c.</td><td>Aerobic biological treatment</td><td>Biodegradable organic compounds, ammonium (NH_4^+)</td><td>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)</td></tr>
<tr><td>d.</td><td>Anoxic/anaerobic biological treatment</td><td>Mercury (Hg), nitrate (NO_3^-), nitrite (NO_2^-)</td><td>Generally applicable</td></tr>
<tr><td>e.</td><td>Coagulation and flocculation</td><td>Suspended solids</td><td>Generally applicable</td></tr>
<tr><td>f.</td><td>Crystallisation</td><td>Metals and metalloids, sulphate (SO_4^{2-}), fluoride (F^-)</td><td>Generally applicable</td></tr>
<tr><td>g.</td><td>Filtration (e.g. sand filtration, microfiltration, ultrafiltration)</td><td>Suspended solids, metals</td><td>Generally applicable</td></tr>
<tr><td>h.</td><td>Flotation</td><td>Suspended solids, free oil</td><td>Generally applicable</td></tr>
<tr><td>i.</td><td>Ion exchange</td><td>Metals</td><td>Generally applicable</td></tr>
<tr><td>j.</td><td>Neutralisation</td><td>Acids, alkalis</td><td>Generally applicable</td></tr>
<tr><td>k.</td><td>Oxidation</td><td>Sulphide (S^{2-}), sulphite (SO_3^{2-})</td><td>Generally applicable</td></tr>
<tr><td>l.</td><td>Precipitation</td><td>Metals and metalloids, sulphate (SO_4^{2-}), fluoride (F^-)</td><td>Generally applicable</td></tr>
<tr><td>m.</td><td>Sedimentation</td><td>Suspended solids</td><td>Generally applicable</td></tr>
<tr><td>n.</td><td>Stripping</td><td>Ammonia (NH_3)</td><td>Generally applicable</td></tr>
</table></td><td>NA</td><td>The installation is not fitted with wet flue gas treatment system.</td></tr>
</table>

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<tr><td></td><td>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
<table>
<tr><th colspan="2" rowspan="2">Substance/Parameter</th><th>BAT-AELs</th></tr>
<tr><th>Daily average</th></tr>
<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>Technique</th><th>Description</th><th>Applicability</th></tr>
</table></td><td>NA</td><td>The installation is not fitted with a wet flue gas treatment system.</td></tr>
</table>

<table>
<tr><th>BAT Concn. Number</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>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 industry). The quality of limestone used in the wet FGD influences the purity of the gypsum produced</td><td>Generally applicable within the constraints associated with the required gypsum quality, the health requirements associated to each specific 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></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
— provisions for noise control during maintenance activities</td><td>Generally applicable</td></tr>
</table>
</td><td>CC</td><td>The installation implements the following techniques:

A- Staff are trained on environmental impacts of noise, how to identify and deal with noise issues and the requirement to keep doors closed whenever reasonably possible.

Routine inspection and maintenance of plant equipment and building fabric is undertaken to ensure optimum performance.</td></tr>
</table>

<table>
<tr><th>BAT Concn. Number</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>b.</td><td>Low-noise equipment</td><td>This potentially includes compressors, pumps and disks</td><td>Generally applicable when the equipment is new or replaced</td></tr>
<tr><td>c.</td><td>Noise attenuation</td><td>Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings</td><td>Generally applicable to new plants. In the case of existing plants, the insertion of obstacles may be restricted by lack of space</td></tr>
<tr><td>d.</td><td>Noise-control equipment</td><td>This includes:
— noise-reducers
— equipment insulation
— enclosure of noisy equipment
— soundproofing of buildings</td><td>The applicability may be restricted by lack of space</td></tr>
<tr><td>e.</td><td>Appropriate location of equipment and buildings</td><td>Noise levels can be reduced by increasing the distance between the emitter and the receiver and by using buildings as noise screens</td><td>Generally applicable to new plant</td></tr>
</table>
</td><td></td><td>D- Noisy equipment within the building is further segregated with barriers e.g. boiler feed and cooling pumps. Or it is fitted with acoustic enclosures e.g. compressors.

Fabric filter, ash handling systems and pressure relief systems are all fitted with silencers.

E–The installation was built in a location that sought to maximise the distance from residential receptors. Noise attenuation is provided by the installations location 10m below ground level and with it being surrounded by an embankment and an established woodland.</td></tr>
<tr><td colspan="4">Combustion of solid fuels only</td></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="3">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>FC</td><td>Following the commissioning of the plant no formal energy efficiency testing was undertaken. The Net energy efficiency has been calculated by dividing the net output by the energy input. The calculated energy efficiency is 31.8%, which is the figure that has been used in the decision document.</td></tr>
</table>

<table>
<tr><th>BAT Concn. Number</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>An improvement condition has been included in the permit IC003, which requires the operator to undertake a performance test at full load in order to obtain the energy efficiency of the plant.</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="5">See descriptions in Section 8.3</td><td rowspan="5">Generally applicable</td></tr>
<tr><td>b.</td><td>Low-NO_X burners (LNB)</td></tr>
<tr><td>c.</td><td>Air staging</td></tr>
<tr><td>d.</td><td>Fuel staging</td></tr>
<tr><td>e.</td><td>Flue-gas recirculation</td></tr>
<tr><td>f.</td><td>Selective non-catalytic reduction (SNCR)</td><td>See description in Section 8.3.
Can be applied with ‘slip’ SCR</td><td>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</td></tr>
<tr><td>g.</td><td>Selective catalytic reduction (SCR)</td><td>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</td><td>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}</td></tr>
</table></td><td>CC</td><td>NO_x emissions are controlled through combustion optimisation. Air staging allows for the use of over fire and under fire.

If there is abnormally high NO_x conditions the installation can fire natural gas up to 10% energy replacement to provide re-burn.

An indicative CO limit has not been included in the permit. The operator has provided suitable justification for this which is summarised in section 4.6 of this decision document.</td></tr>
</table>

<table>
<tr><th>BAT Concn. Number</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>
BAT-associated emission levels (BAT-AELs) for NO_X 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 (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 (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="4">See descriptions in Section 8.4</td><td rowspan="4">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>
</table>
</td><td>CC</td><td>In order to prevent/reduce SO_x, HCl and HF.

A-boiler sorbent injection

B-duct sorbent injection (DSI) – Hydrate lime is stored in a dedicated silo and transported to flue gas ductwork through a series of conveyors and rotary valve where the lime is discharged into the duct and reacts with the flue gas. The residues are collected by the bag filter and fly ash handling</td></tr>
</table>

BAT Concn. Number	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

e.	Wet scrubbing		
f.	Flue-gas condenser		
g.	Wet flue-gas desulphurisation (wet FGD)		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
h.	Fuel choice		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

BAT-associated emission levels (BAT-AELs) for SO_2 emissions to air from the combustion of solid biomass and/or peat

Combustion plant total rated thermal input (MW_{th})	BAT-AELs for SO_2 (mg/Nm^3)			
	Yearly average		Daily average or average over the sampling period	
	New plant	Existing plant (87)	New plant	Existing plant (88)
< 100	15–70	15–100	30–175	30–215
100–300	< 10–50	< 10–70 (89)	< 20–85	< 20–175 (90)
≥ 300	< 10–35	< 10–50 (89)	< 20–70	< 20–85 (91)

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

Combustion plant total rated thermal input (MW_{th})	BAT-AELs for HCl (mg/Nm^3) (92) (93)				BAT-AELs for HF (mg/Nm^3)	
	Yearly average or average of samples obtained during one year		Daily average or average over the sampling period		Average over the sampling period	
	New plant	Existing plant (94) (95)	New plant	Existing plant (96)	New plant	Existing plant (96)
< 100	1–7	1–15	1–12	1–35	< 1	< 1,5

system before being sent for manufacture of fertiliser.

D-circulating fluidised bed (CFB) dry scrubber.

F-flue-gas condenser

The installation burns 100% biomass cereal straw. The DTI report B/U1/00768/00/00 URN 03/1569 identified that Sulphur concentration was 0.2-0.4 wt/dry and the Chloride content was 0.1-0.6 wt% dry. The limits as specified under section 4.1 of this decision document apply.

<table>
<tr><th>BAT Concn. Number</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>100–300</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>
<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>CC</td><td>The installation has a bag filter fitted in order to reduced dust and particle bound metal emissions.</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.</td><td>CC</td><td>The installation has a bag filter fitted in order to reduce mercury</td></tr>
</table>

<table>
<tr><th>BAT Concn. Number</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 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 for SO_X, HCl and/or HF control</td><td>See applicability in BAT 25</td></tr>
<tr><td>g.</td><td>Wet flue-gas desulphurisation (wet FGD)</td><td></td></tr>
</table>
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.
</td><td></td><td>emissions. The fuel choice is also specified by the operator as a technique.

The installation commissioned a mercury baseline assessment in 2017 carried out by the NPL report reference ELY/MAR2017/MAINSTACK/ HM&HG/V1. The average result from triplicate tests was 0.52 ug/Nm^3 which is below the BAT-AEL of 5 ug/Nm^3.</td></tr>
</table>

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.

As part of their Regulation 61 Note response, the operator has not requested a derogation from compliance with any AEL values.

7. Emissions to Water

The consolidated permit incorporates one discharges to sewer identified as S1 consisting of site effluent and one discharge to surface water drains identified a W1 consisting of surface water from the installation. 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 6 of this document.

There are no BAT AELs specified in the BAT Conclusions for this type of plant. 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:

Black start

In the event of a black out National Grid would call on combustion plant to operate and may require them to do so outside their permitted conditions. We have dedicated black start plant and they are permitted to run as such but this scenario is relevant to the rest of the large combustion plant which could be called depending on the circumstances.

A risk assessment will be carried out by Energy UK/Joint Environmental Programme on behalf of Large Combustion Plant connected to the National Transmission System. Air emissions modelling will be based on generic black start scenarios to establish whether they have the potential to have local impact on the environment or not (on a national basis). If the modelling demonstrates that no significant impacts are likely, the plant can operate under condition 2.3.7. This conditions allows the hourly ELVs for plants operating under a black start instruction to be discounted for the purpose of reporting. We would also require there to be a procedure in place for minimisation of emissions in the case of a black start event and for reporting in the event of a black start. This modelling and the procedures have not been agreed in advance of the issue of the permit review and therefore a condition linking back to an improvement condition have been included in the permit.

Permit condition 4.3.1

Amended to correct an error. The condition now makes reference to permit condition 2.3.6 instead of 2.3.13.

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 site	
Extent of the site of the facility	The operator has provided a plan (on 01/05/20) which we consider is satisfactory, showing the extent of the site of the facility and the location of the part of the installation to which this permit applies on that site. The plan is included in schedule 7 of the permit. The updated plan shows the location of emission point form the emergency diesel generator, that has been included in the permit as part of this variation in tables S1.1, S3.1 and S3.1a.
Biodiversity, heritage, landscape and nature conservation	The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat. A full assessment of the application and its potential to affect the site(s)/species/habitat has not been carried out as part of the permit review process. We consider that the review will not affect the features of the site(s)/species/habitat 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.

Aspect considered	Decision
	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 Agency initiated variation	We have varied the permit as stated in the variation notice.
Improvement programme	Based on the information on the application, we consider that we need to impose an improvement programme. We have imposed an improvement programme to ensure that: • Electrical efficiency of the plant is provided following a third party performance test. • The operator will have a plan in place to ensure that the fuel is characterised in line with BAT 9.

Aspect considered	Decision
	• The EMS includes details of procedures for OTNOC. Permit condition 2.3.7 has been included in the permit with corresponding improvement condition IC006 requiring the operator to submit a report in relation to potential black start operation of the plant. See Section 8 for further information.
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 Section 5 of this document. It is considered that the ELVs/equivalent parameters or technical measures 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 S3.5 Process monitoring requirements was amended to include the requirement to monitor energy efficiency after overhauls on site in line with BAT2. Based on the information in the application 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 following parameters: • Nitrogen dioxide • Nitrous Oxide • Carbon monoxide • Sulphur dioxide

Aspect considered	Decision
	• Hydrogen Chloride • Hydrogen Fluoride • Dust • Mercury 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 them to comply with the permit conditions.
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

Aspect considered	Decision
	sector and have been set to achieve the required legislative standards.