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/VP3530LS
The Operator is:	Drax Power Limited
The Installation is:	Drax Power Station
This Variation Notice number is:	EPR/VP3530LS/V018

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.

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

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 2016 No. 1154)
EWC	European waste catalogue
FSA	Food Standards Agency
IC	Improvement Condition
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
LCP	Large Combustion Plant subject to Chapter III of IED
MSUL/MSDL	Minimum start up load/minimum shut-down load
NOx	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
NPV	Net Present Value
OCGT	Open Cycle Gas Turbine
PHE	Public Health England
SAC	Special Area of Conservation
SGN	Sector guidance note
TGN	Technical guidance note
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 17/08/21, which will then ensure that operations meet the revised standard, or
- Justifies why standards will not be met by 17/08/21, 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 31/10/18.

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 05/09/19 and 17/02/20. Suitable further information was provided by the Operator on 26/09/19, 20/12/19 and 16/01/20, in response to questions asked on 05/09/19. Suitable further information was provided by the Operator on 24/02/20 in response to questions asked on 17/02/20.

A further Regulation 61 notice was sent to the Operator on 23/01/20 requesting the compliance route for the installation and the net electrical efficiency of the combustion plant. A response was received on 30/03/20.

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 4, 9, 5 and 10 we agree with the operator in respect to their current stated capability as recorded in their Regulation 61 Notice response that improvements are required.

We have therefore included an improvement conditions IC46D, IC47D, IC48D and IC49D in the consolidated variation notice, which requires them to upgrade their operational techniques so that the requirements of the BAT Conclusion are delivered by 17/08/21. 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)
- Demonstrating Sufficiently Stable
- Fuel Characterisation
- The review and assessment of the availability of BAT for gas turbines operating <500 hours per year
- Emissions to water and the application of BAT AELs (discussed in Schedule 7)

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 LCPs on site consist of LCP91 and LCP454.

LCP91 consists of six boilers discharging out of a common stack burning biomass (boilers 1-4) and coal (boilers 5-6). The aggregated net rated thermal input is 10,000 MW.

LCP454 consists of three Open Cycle Gad Turbines (OCGT) burning gas oil. The aggregated net rated thermal input is 420 MW.

The permit also lists the Ouse Renewable Energy Plant (no Defra LCP reference number) which has not yet been built. The operator has not applied to surrender this activity so we have included it in the permit but is will not be allowed to operate until the operator has demonstrated compliance with

Chapter III of the IED and the LCP BAT Conclusions (see pre-operational condition 19a in Table S1.4) which will require a permit variation.
The plant (LCP91 and LCP454) 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.

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

- LCP91 –
  Biomass (boilers 4-5): Unlimited hours operation
  Coal (boilers 5 and 6): <1500 hours
- LCP454: <500 hours non-emergency plant

The following tables outline the limits that have been incorporated into the permit for LCP91 and LCP454, where these were derived from and the reference periods at which they apply.

For LCP91, 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 (solid fuels). The emission limits and monitoring requirements have been incorporated into Schedule 3 of the permit.

For LCP91, by the end of the Transitional National Plan (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. From the implementation date of the BAT Conclusion in 2021 the relevant AELs will also apply.

For LCP454, under Chapter III gas turbines and gas engines operating for less than 500 hours per year were considered to be emergency plant and therefore were not covered by the emission limits set out in IED Annex V. However, for the purposes of the LCP BAT review, plants operated for emergency use may only be defined as plants which operate for the sole purpose of providing power at a site during an onsite emergency and/or during a black start and which do not provide balancing services or demand side response services. As this site runs commercially on an intermittent basis to support the Grid, it is not considered emergency plant and therefore indicative BAT applies.

We have set the indicative limits requiring validation through emission factors based on the principle that we will not require plant to fire up with the sole purpose of performing an emission measurement, as set out the UK Regulators Interpretation Document.

There are currently no emission limits specified in the permit for LCP454, hence all relevant indicative BAT-AELs have been incorporated into the permit. For NO_x there is no indicative BAT-AEL for this plant. The operator has confirmed that NOx emissions will meet the indicative BAT-AEL for oil firing on dual fuel boilers. Therefore, this limit has been incorporated into the permit.

LCP91

The six boilers all discharge from a single windshield, within which there are separate flues arising from each of the 6 boilers (units). As described above units 1 and 4 are fired on biomass and units 5 and 6 are fired on coal. Monitoring of emissions is undertaken from each unit. The limits are calculated based upon a weighted average of the fuel based emission limits and BAT-AELs for biomass and coal in the ratio 4:2. For those circumstances where there is not a limit for coal (as it is operated <1500 hours) the limits presented are those for biomass only. When applying the no backsliding rule this is based upon the combined biomass and coal limit as detailed in the existing permit. The permit includes a weighted average limit, a biomass only and a coal only emission limit.

- From 1st July 2020 the TNP limits will no longer apply and limits derived from IED Annex V will apply as described below. At this stage the biomass units will be based upon unlimited hours of operation and the coal fired units will be based upon <1500 hours of operation.
- From 17 August 2021 the IED Annex V limits and the BREF limits will also apply. The limits for biomass are based upon unlimited hours of operation and the limits for coal are based upon operating for <1500 hours.

NOx limits (mg/Nm^3)									
Averaging	**IED (Annex V Part 1) – for existing plant** [Note 1]	**BREF (Table 3 and Table 9 BAT-C)**	**BREF (Table 3 and Table 9 BAT-C) Weighted Average**	**Existing to 30 June 2020 TNP ELV Weighted Average**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021 IED ELV Weighted Average**	**Permit limits from 17 August 2021 Weighted Average**	**Basis**	**Limits apply**	**Monitoring**
Annual: biomass	**None**	**160**	**160**	**None**	**None**	**160**	BREF	MSUL/MSDL to baseload	Continuous
Annual: coal		**No limit**							
Monthly: biomass	**200**	**None**	**None**	**450**	**283**	**283**	IED	MSUL/MSDL to baseload	
Monthly: coal	**450**								
Daily: biomass	**220**	**200**	**247**	**550 (95% daily means)**	**312**	**247**	BREF	MSUL/MSDL to baseload	
Daily: coal	**495**	**340**							
95th %ile of hr means: biomass	**400**	**None**	**None**	**None**	**567**	**567**	IED	MSUL/MSDL to baseload	
95th %ile of hr means: coal	**900**								

SOx limits (mg/Nm^3)									
Averaging	**IED (Annex V Part 1) – for existing plant** Note 1	**BREF (Table 4 and Table 10 BAT-C)** Note 1	**BREF (Table 4 and Table 10 BAT-C) Weighted Average**	**Existing to 30 June 2020 TNP ELV Weighted Average**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021 IED ELV Weighted Average**	**Permit limits from 17 August 2021 Weighted Average**	**Basis**	**Limits apply**	**Monitoring**
Annual: biomass	**None**	**100** Note 2	**100** Note 2	**None**	**None**	**100**	BREF	MSUL/MSDL to baseload	Continuous
Annual: coal		**No limit**							
Monthly: biomass	**200**	**None**	**None**	**350**	**250**	**250**	IED and Existing Permit	MSUL/MSDL to baseload	
Monthly: coal	**800**								
Daily: biomass	**220**	**165** Note 3	**165** Note 3	**440 (95% daily means)**	**293**	**183**	BREF	MSUL/MSDL to baseload	
Daily: coal	**800** Note 4	**220**							
Hourly	**400**	**None**	**None**	**None**	**500**	**500**	IED and Existing Permit	MSUL/MSDL to baseload	
Hourly	**1600**Note 5								
Note 1: The first limit in each split box is for biomass and the second is for coal.									

Note 2: For existing plants burning fuels where the average sulphur content is 0,1 wt-% (dry) or higher, the higher end of the BAT-AEL range is 100 mg/Nm^3.

Note 3: For existing plants burning fuels where the average sulphur content is 0,1 wt-% (dry) or higher, the higher end of the BAT-AEL range is 165 mg/Nm^3, or 215 mg/Nm3 if those plants have been put into operation no later than 7 January 2014 and/or are FBC boilers combusting peat.

Note 4: The daily limit for Coal in the existing permit was 440 mg/Nm^3. IED specified a value of 800mg/m^3. Under the principle of 'no backsliding' we have carried over the limit of 440mg/m^3

Note 5: The hourly limit for Coal <1500 hours is 700 mg/Nm^3 this is based upon 200% of the monthly limit from the existing permit (350mgNm^3). This figure has been used instead of 1600 mg/Nm^3 when calculating the weighted average for the IED ELV.

Dust limits (mg/Nm^3)									
Averaging	**IED (Annex V Part 1) – for existing plant**	**BREF (Table 6 and Table 12 BAT-C) Weighted Average**	**BREF (Table 6 and Table 12 BAT-C) Weighted Average**	**Existing to 30 June 2020 TNP ELV Weighted Average**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021 IED ELV Weighted Average**	**Permit limits from 17 August 2021 Weighted Average**	**Basis**	**Limits apply**	**Monitoring**
Annual: biomass	**None**	**10**	**10**	**None**	**None**	**10**	BREF	MSUL/MSDL to baseload	Continuous
Annual: coal		**No limit**							
Monthly: biomass	**20**	**None**	**None**	**20**	**20**	**20**	IED	MSUL/MSDL to baseload	
Monthly: coal									
Daily: biomass	**22**	**16**	**15**	**35**	**22**	**15**	BREF	MSUL/MSDL to baseload	
Daily: coal		**14**							
Hourly	**40**	**None**	**None**	**None**	**40**	**40**	IED	MSUL/MSDL to baseload	
Hourly									

Indicative CO limits (mg/Nm^3)									
Averaging	**IED (Annex V Part 1) – for existing plant**	**BREF (end of Table 3 and end of Table 9 BAT-C)**	**BREF (end of Table 3 and end of Table 9 BAT-C)**	**Existing to 30 June 2020 TNP ELV**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021 IED ELV**	**Permit limits from 17 August 2021 Weighted Average** Note 1	**Basis**	**Limits apply**	**Monitoring**
Annual: biomass	**None**	**80**	**80**	**None**	**None**	**400**	Historic CO concertation	MSUL/MSDL to baseload	Continuous
Annual: coal		**No limit**							
Note 1: The operator has provided a historic PPC benchmark CO concertation of 400mg/Nm^3, which has been used as the limit in the permit.									

NH_3 limits (mg/Nm^3) Note 1								
Averaging	**IED (Annex V Part 1) – for existing plant**	**BREF (BAT 7 BAT-C)**	**Existing to 30 June 2020 TNP ELV**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021 IED ELV**	**Permit limits from 17 August 2021**	**Basis**	**Limits apply**	**Monitoring**
Daily	**None**	**None**	**10**	**10**	**None**	Existing Permit	MSUL/MSDL to baseload	Continuous
Annual	**None**	**10**	**None**	**None**	**10**	BREF	MSUL/MSDL to baseload	Continuous
Note 1: SNCR is fitted to boilers 1-4 and not units 5 and 6. The limit is not fuel specific and applies to all plant with SNCR installed.								

HCl limits (mg/Nm^3)									
Averaging	**IED (Annex V Part 1) – for existing plant**	**BREF (Table 5 and Table 11 BAT-C) Note 1**	**BREF (Table 5 and Table 11 BAT-C) Weighted Average**	**Existing to 30 June 2020 TNP ELV Weighted Average**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021 IED ELV Weighted Average**	**Permit limits from 17 August 2021 Weighted Average**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**5** **20**	**10**	**None**	**None**	**10**	BREF	MSUL/MSDL to baseload	Note 2
Daily	**None**	**12** **No limit**	**12**	**None**	**None**	**12**	BREF	MSUL/MSDL to baseload	Note 2
Note 1: The first limit in each split box is for biomass and the second is for coal. Note 2: operator is proposing to demonstrate sufficiently stable conditions in line with Improvement Condition Monitoring frequency will be available following completion this IC.									

HF limits (mg/Nm^3)									
Averaging	**IED (Annex V Part 1) – for existing plant**	**BREF (Table 5 and Table 11 BAT-C)**	**BREF (Table 5 and Table 11 BAT-C) Weighted Average**	**Existing to 30 June 2020 TNP ELV Weighted Average**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021 IED ELV Weighted Average**	**Permit limits from 17 August 2021 Weighted Average**	**Basis**	**Limits apply**	**Monitoring**
Annual: biomass	**None**	**< 1**	**3**	**None**	**None**	**3**	BREF	MSUL/MSDL to baseload	Note 1
Annual: coal		**7**							
Note 1: operator is proposing to demonstrate sufficiently stable conditions in line with Improvement Condition Monitoring frequency will be available following completion this IC.									

Hg limits (mg/Nm^3)										
Averaging	**IED (Annex V Part 1) – for existing plant**	**BREF (Table 7 and BAT27 BAT-C)** Note 1,	**BREF (Table 7 and BAT27 BAT-C) Weighted Average**	**Existing to 30 June 2020 TNP ELV Weighted Average**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021 IED ELV Weighted Average**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021 Weighted Average**	**Permit limits from 17 August 2021 Weighted Average**	**Basis**	**Limits apply**	**Monitoring**
Annual: biomass	**None**	**5**	**5**	**None**	**None**	**None**	**5**	BREF	MSUL/MSDL to baseload	Note 1
Annual: coal		**4**								
Note 1: operator is proposing to demonstrate sufficiently stable conditions in line with Improvement Condition Monitoring frequency will be available following completion this IC.										

LCP454

NOx limits (mg/Nm^3) – indicative in italics							
Averaging	**IED (Annex V Part 1) – for existing plant**	**BREF (BAT 38 BAT-C)**	**Existing to 30 June 2020 TNP ELV**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021**	**Permit limits from 17 August 2021**	**Basis Note1**	**Limits apply**
Annual	**None**	**None**	**None**	**None**	**None**	N/A	N/A
Monthly	**None**	**None**	**None**	**None**	**None**	N/A	N/A
Daily	**None**	**None**	**None**	**None**	***250***	BREF	Concentration by calculation
95th %ile of hr means	**None**	**None**	**None**	**None**	**None**	N/A	N/a
Note 1: The only indicative BAT-AEL is for oil firing on dual combustors. Operator has confirmed that NO_x emissions are within this BAT-AEL which has been included in the permit.							

CO (mg/Nm^3) – indicative in *italics*							
Averaging	**IED (Annex V Part 1) – for existing plant** [Note 2]	**BREF (BAT 38 BAT-C)**	**Existing to 30 June 2020 TNP ELV**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021**	**Permit limits from 17 August 2021**	**Basis**	**Limits apply**
Annual	**None**	**None** [Note1]	**None**	**None**	**None**	N/A	N/A
Monthly	**None**	**None**	**None**	**None**	**None**	N/A	N/A
Daily	**None**	**None**	**None**	**None**	***None***	N/A	N/A
95th %ile of hr means	**None**	**None**	**None**	**None**	**None**	N/A	N/A
Note 1: Footnote 1 to Table 22 of BAT-C specifies that the annual AELs are not applicable to plants operating <1500 hours.							

SOx limits (mg/Nm^3) - indicative in italics							
Averaging	**IED (Annex V Part 1) – for existing plant**	**BREF (Table 22 BAT-C)**	**Existing to 30 June 2020 TNP ELV**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021**	**Permit limits from 17 August 2021**	**Basis**	**Limits apply**
Annual	**None**	**None** [Note 1]	**None**	**None**	**None**	N/A	N/A
Monthly	**None**	**None**	**None**	**None**	**None**	N/A	N/A
Daily	**None**	***66***	**None**	**None**	***66***	BREF	Concertation by Calculation
95th %ile of hr means	**None**	**None**	**None**	**None**	**None**	N/A	N/A
Note 1: Footnote 1 to Table 22 of BAT-C specifies that the annual AELs are not applicable to plants operating <1500 hours.							

Dust limits (mg/Nm^3) - indicative in italics							
Averaging	**IED (Annex V Part 1) – for existing plant** [Note 2]	**BREF (Table 22 BAT-C)**	**Existing to 30 June 2020 TNP ELV**	**Permit limits from 01 July 2020 (after TNP) to 16 August 2021**	**Permit limits from 17 August 2021**	**Basis**	**Limits apply**
Annual	**None**	**None** [Note1]	**None**	**None**	**None**	N/A	N/A
Monthly	**None**	**None**	**None**	**None**	**None**	N/A	N/A
Daily	**None**	***10***	**None**	**None**	***10***	BREF	Concentration by Calculation
95th %ile of hr means	**None**	**None**	**None**	**None**	**None**	N/A	N/A
Note 1: Footnote 1 to Table 22 of BAT-C specifies that the annual AELs are not applicable to plants operating <1500 hours.							

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.

LCP454

Table 21 of the LCP BAT Conclusions sets out the BAT-AEELs for gas oil fired gas turbines. A footnote to the table specifies that the BAT-AEELs are not applicable to plant operating <1500 hours per year. The energy efficiency level of the plant is therefore not considered further in relation to this BAT Conclusion. We have however included a process monitoring requirement in table S3.5 of the consolidated variation notice. This is required to demonstrate that efficiency levels are maintained following any significant overhauls of equipment in order to fulfil the requirement of BAT Conclusion 2.

The operator provided a calculation of energy efficiency, rather than a full performance test, which we consider adequate for this plant.

LCP91

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 statement provided in the operators regulation61 response of 30/03/20. 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**
LCP91: unit description from the AEEL table (units 1-4 Biomass)					
28 – 38%	**None**	**None**	**41%**	**NA**	**NA**
LCP91: unit description from the AEEL table (units 5 and 6 Coal)					
35.4 – 44%	**None**	**None**	**41%**	**NA**	**NA**

4.3 Demonstrating Sufficiently Stable

When coal is used as a fuel BAT 4 requires the operator to carry out monitoring of HCl and HF once every three months, and monitoring of Hg on a continuous basis. The frequency of monitoring can be reduced for these parameters where sufficiently stable conditions can be demonstrated, as

detailed at the end of BAT4 in footnotes 10 and 13 respectively. The operator has proposes to demonstrate sufficiently stable conditions.

We have therefore included an improvement condition (IC) in the consolidated variation notice IC47D 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 Fuel characterisation

BAT 9 requires the operator to carry out fuel characterisation. Not all of the substances listed are currently characterised. As a result the fuels have not yet been fully characterised as required under point i) and ii) of this BAT conclusion.

We have therefore included an improvement condition (IC) in the consolidated variation notice IC46D 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.

4.5 The review and assessment of Best Available Techniques for gas turbines operating less than 500 hours per year

Joint Environmental Programme (JEP) produced a document *'BAT Assessment for Existing Gas and Liquid Fuel Fired OCGTs, CCGTs and Dual-fuel GTs with a Thermal Input Rating of 50MWth or Greater Operating <500 Hours Per Year'* dated October 2018. The content of this document has been agreed in principle by the Environment Agency and we have therefore taken the document into account during our determination of this variation.

For the gas turbine LCP454, the operator has provided BAT assessment for emissions of NOx that follows the approach described in this JEP report.

The techniques considered in the BAT assessment submitted by the operator, are those potentially applicable to gas turbines firing gas oil and operating less than 500 hours per year, according to BAT conclusion 37, namely:

a. Water/Steam injection;
b. Use of Dry Low NOx burners.

The technical information on the Olympus B gas turbines installed in LCP454, provided in support of this assessment, can be found in the JEP report JEP19AIB08 / UTG/18/PMP/774/R, '*BAT Assessment for Existing Gas and Liquid Fuel Fired OCGTs, CCGTs and Dual-fuel GTs with a Thermal Input Rating of 50MWth or Greater Operating <500 Hours Per Year*'.

According to this report, endorsed by us, the original equipment manufacturer and third-party service organisations advise that there are no commercially available options for NOx reduction for Olympus B gas turbines when firing on gas oil.

Based on this supporting information, and in line with the methodology set out in the JEP report '*BAT Assessment for Existing Gas and Liquid Fuel Fired OCGTs, CCGTs and Dual-fuel GTs with a Thermal Input Rating of 50MWth or Greater Operating <500 Hours Per Year'*, the Operator has concluded that techniques a. and b. of BATc 37 are not available for LCP454 and that the currently permitted performance, along with continued appropriate maintenance, are BAT to prevent or reduce emissions of NOx from these gas turbines.

In all cases, the minimum BAT requirements are considered to be: i) the continued compliance with any permit requirements already in place to protect air quality and ii) the demonstration of an appropriate maintenance regime to maintain plant emissions performance.

We agree with the conclusions of the assessment provided by the operator and we consider accordingly that the techniques reported under BATc 37 are not applicable to LCP454.

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, S3.2, S3.2a
Monitoring	2.3, 3.5 and 3.6	S1.2, S3.1, S3.1a, S3.2, S3.2a
Energy efficiency	1.2 and 2.3	S3.5
Noise	3.4 and 2.3	S2.1
Other operating techniques	1.2	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	The operator has confirmed the following: <u>LCP91 and LCP454</u> The installation has implemented and adheres to an Environment Management System which incorporates all of the features (i) to (xv). The requirements detailed under point (xvi) are not necessary as malodours substances are not combusted at the installation.

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
	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.		
2	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.	CC	The operator has confirmed the following: LCP91 The net electrical efficiency of the plant is calculated based upon performance testing at full load. The gross net electrical efficiency of the plant is 41% (reg61 response submitted on 30/03/20) LCP454 The gas turbine engines are Rolls Royce Olympus 'B' rated dedicated oil fired engines. Their name plate efficiency according to JEP report UTG/18/ERG/773/R is 26.2%. There have been no upgrades to the plant since it was originally commissioned. As a result there has been no further energy efficiency testing has been undertaken.
3	**BAT is to monitor key process parameters relevant for emissions to air and water including those given below.**	CC	The operator has confirmed the following:

<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>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></td><td>LCP91

All parameters listed with regards to Flue-gas and Waste water from flue-gas treatment are monitored on a continuous basis , except for temperature which is monitored on a periodic basis.

LCP454

Not applicable to OCGT operating for <500 hours</td></tr>
<tr><td>4</td><td>BAT is to monitor emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.
<table>
<tr><th>Substance/Parameter</th><th>Fuel/Process/Type of combustion plant</th><th>Combustion plant total rated thermal input</th><th>Standard(s) (4)</th><th>Minimum monitoring frequency (5)</th><th>Monitoring associated with</th></tr>
<tr><td>NH_3</td><td>— When SCR and/or SNCR is used</td><td>All sizes</td><td>Generic EN standards</td><td>Continuous (6) (7)</td><td>BAT 7</td></tr>
<tr><td>NO_X</td><td>— Coal and/or lignite including waste co-incineration
— Solid biomass and/or peat including waste co-incineration
— HFO- and/or gas-oil-fired boilers and engines
— Gas-oil-fired gas turbines
— Natural-gas-fired boilers, engines, and turbines
— Iron and steel process gases</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>
</table>
</td><td>FC</td><td>The operator has confirmed the following:

LCP91

The operator has confirmed that they will meet the monitoring standards in accordance with EN standards and specified frequencies as listed under BAT 4.

Where existing monitoring standards are in the permit these have been copied across into this review.

No standards have been put forward for CO, HF, HCl and CO when burning biomass and coal. These shall be agreed in writing with the Environment Agency prior to the 31/08/21.</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
		— Process fuels from the chemical industry — IGCC plants						For HCL, HF and Hg when burning coal the operator proposes to demonstrate sufficiently stable conditions. This information is requested through an improvement condition (IC47D) which should be provided before 01/06/21 Biomass **NH_3** - BS EN 14181 - Continuous **NO_x** - BS EN 14181 - Continuous **N_2O** – EN21258 – once every year **CO** – To be agreed - Continuous **SO_2** - BS EN 14181 - Continuous **SO_3** – SCR is not used **HCl** – To be agreed - Continuous **HF** - To be agreed - once every year **Dust**- BS EN 14181 - Continuous **Metals and Metalloids** – EN14385 – once every year **Hg** – EN13211 – once every year Coal **NH_3** - BS EN 14181 - Continuous **NO_x** - BS EN 14181 - Continuous **N_2O** - EN21258 – once every year **CO** - To be agreed - Continuous **SO_2** - BS EN 14181 - Continuous **SO_3** – SCR is not used
		— Combustion plants on offshore platforms	All sizes	EN 14792	Once every year [9]	BAT 53		
	N_2O	— Coal and/or lignite in circulating fluidised bed boilers — Solid biomass and/or peat in circulating fluidised bed boilers	All sizes	EN 21258	Once every year [10]	BAT 20 BAT 24		
	CO	— Coal and/or lignite including waste co-incineration — Solid biomass and/or peat including waste co-incineration — HFO- and/or gas-oil-fired boilers and engines — Gas-oil-fired gas turbines — Natural-gas-fired boilers, engines, and turbines — Iron and steel process gases — Process fuels from the chemical industry — IGCC plants	All sizes	Generic EN standards	Continuous [6] [8]	BAT 20 BAT 24 BAT 28 BAT 33 BAT 38 BAT 44 BAT 49 BAT 56 BAT 64 BAT 65 BAT 73		
		— Combustion plants on offshore platforms	All sizes	EN 15058	Once every year [9]	BAT 54		
	SO_2	— Coal and/or lignite incl waste co-incineration — Solid biomass and/or peat incl waste co-incineration	All sizes	Generic EN standards and EN 14791	Continuous [6] [11] [12]	BAT 21 BAT 25 BAT 29 BAT 34 BAT 39 BAT 50 BAT 57		

BAT 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
		— HFO- and/or gas-oil-fired boilers — HFO- and/or gas-oil-fired engines — Gas-oil-fired gas turbines — Iron and steel process gases — Process fuels from the chemical industry in boilers — IGCC plants				BAT 66 BAT 67 BAT 74		**HCl** – demonstrate sufficiently stable conditions IC47D **HF** – demonstrate sufficiently stable conditions IC47D **Dust** - BS EN 14181 - Continuous **Metals and Metalloids** **Hg** – demonstrate sufficiently stable conditions IC47D LCP 404 OCGTs operating for <500 hours and are subject to indicative daily BAT-ELVs only. Under footnote it is stated that, the requirements described in BAT 4 do not apply where plant operation would be for the sole purpose of performance or emission measurement.
	SO_3	— When SCR is used	All sizes	No EN standard available	Once every year	—		
	Gaseous chlorides, expressed as HCl	— Coal and/or lignite — Process fuels from the chemical industry in boilers	All sizes	EN 1911	Once every three months [6] [13] [14]	BAT 21 BAT 57		
		— Solid biomass and/or peat	All sizes	Generic EN standards	Continuous [15] [16]	BAT 25		
		— Waste co-incineration	All sizes	Generic EN standards	Continuous [6] [16]	BAT 66 BAT 67		
	HF	— Coal and/or lignite — Process fuels from the chemical industry in boilers	All sizes	No EN standard available	Once every three months [6] [13] [14]	BAT 21 BAT 57		
		— Solid biomass and/or peat	All sizes	No EN standard available	Once every year	BAT 25		
		— Waste co-incineration	All sizes	Generic EN standards	Continuous [6] [16]	BAT 66 BAT 67		
	Dust	— Coal and/or lignite — Solid biomass and/or peat — HFO- and/or gas-oil-fired boilers	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 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
		— Iron and steel process gases — Process fuels from the chemical industry in boilers — IGCC plants — HFO- and/or gas-oil-fired engines — Gas-oil-fired gas turbines				BAT 75		
		— Waste co-incineration	All sizes	Generic EN standards and EN 13284-2	Continuous	BAT 68 BAT 69		
	Metals and metalloids except mercury (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V, Zn)	— Coal and/or lignite — Solid biomass and/or peat — HFO- and/or gas-oil-fired boilers and engines	All sizes	EN 14385	Once every year [18]	BAT 22 BAT 26 BAT 30		
		— Waste co-incineration	< 300 MW_{th}	EN 14385	Once every six months [13]	BAT 68 BAT 69		
			≥ 300 MW_{th}	EN 14385	Once every three months [19] [13]			
		— IGCC plants	≥ 100 MW_{th}	EN 14385	Once every year [18]	BAT 75		
	Hg	— Coal and/or lignite including waste co-incineration	< 300 MW_{th}	EN 13211	Once every three months [13] [20]	BAT 23		
			≥ 300 MW_{th}	Generic EN standards and EN 14884	Continuous [16] [21]			
		— Solid biomass and/or peat	All sizes	EN 13211	Once every year [22]	BAT 27		
		— Waste co-incineration with solid biomass and/or peat	All sizes	EN 13211	Once every three months [13]	BAT 70		
		— IGCC plants	≥ 100 MW_{th}	EN 13211	Once every year [23]	BAT 75		
	TVOC	— HFO- and/or gas-oil-fired engines	All sizes	EN 12619	Once every six months [13]	BAT 33 BAT 59		

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

	— Process fuels from chemical industry in boilers				
	— Waste co-incineration with coal, lignite, solid biomass and/or peat	All sizes	Generic EN standards	Continuous	BAT 71
Formaldehyde	— Natural-gas in spark-ignited lean-burn gas and dual fuel engines	All sizes	No EN standard available	Once every year	BAT 45
CH_4	— Natural-gas-fired engines	All sizes	EN ISO 25139	Once every year (24)	BAT 45
PCDD/F	— Process fuels from chemical industry in boilers — Waste co-incineration	All sizes	EN 1948-1, EN 1948-2, EN 1948-3	Once every six months (13) (25)	BAT 59 BAT 71

5

BAT is to monitor emissions to water from flue-gas treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

Substance/Parameter		Standard(s)	Minimum monitoring frequency	Monitoring associated with
Total organic carbon (TOC) (26)		EN 1484	Once every month	BAT 15
Chemical oxygen demand (COD) (26)		No EN standard available		
Total suspended solids (TSS)		EN 872		
Fluoride (F^-)		EN ISO 10304-1		
Sulphate (SO_4^{2-})		EN ISO 10304-1		
Sulphide, easily released (S^{2-})		No EN standard available		
Sulphite (SO_3^{2-})		EN ISO 10304-3		
Metals and metalloids	As	Various EN standards available (e.g. EN ISO 11885 or EN ISO 17294-2)		
	Cd			
	Cr			

FC

The operator has confirmed the following:

LCP91

The sampling frequency will be adjusted to meet the frequencies specified where appropriate. Where analysis does not meet the required standards it will be revised accordingly by 17/08/21.

Where existing monitoring standards are in the permit these have been copied across into this review.

No standards have been put forward for TOC, F^-, SO_4^{2-}, As, Cr, Pb and Zn These shall be agreed

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
		Cu				in writing with the Environment Agency. For S^{2-} and SO_3^{2-} there is currently no agreed monitoring standard for these parameters. Monitoring can only commence once a suitable standard is developed. All monitoring is undertaken from discharge point W", which is directly from the FGD plant. TOC - to be agreed – once every month TSS - ISO 17025:2017 – once every month F^- - to be agreed – once every month SO_4^{2-} - to be agreed – once every month S^{2-} - - to be agreed – once every month SO_3^{2-} - to be agreed – once every month As - to be agreed – once every month Cd - ISO17025:2017 – once every month Cr - to be agreed – once every month Cu - ISO17025:2017 – once every month Ni - ISO17025:2017 – once every month
		Ni				
		Pb				
		Zn				
		Hg	Various EN standards available (e.g. EN ISO 12846 or EN ISO 17852)			
	Chloride (Cl^-)		Various EN standards available (e.g. EN ISO 10304-1 or EN ISO 15682)		—	
	Total nitrogen		EN 12260		—	

<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>Pb - to be agreed – once every month
Zn - to be agreed – once every month
Hg - BS EN 13506 – once every month
Cl^- - ISO17025:2017 – once every month
Total nitrogen – BS6068 - Weekly (measured from discharge point W1 – discharge off site into the River Ouse)

<u>LCP 404</u>

Not applicable - OCGT does not have flue-gas treatment</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 colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Fuel blending and mixing</td><td>Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type</td><td rowspan="2">Generally applicable</td></tr>
<tr><td>b.</td><td>Maintenance of the combustion system</td><td>Regular planned maintenance according to suppliers' recommendations</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>
</table></td><td>CC</td><td>The operator has confirmed that the following techniques are implemented at this installation:

<u>LCP91</u>

All of the techniques have been identified as being used at this installation.

Due to the inverse relationship between CO and NOx, CO was made an indicative parameter within the decision document. Its management will be balanced with minimising NOx emissions while operating within safety and other</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.	Fuel choice	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	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		parameters of the boiler. This will be a combination of primary techniques which are also used to effectively manage NOx emissions as indicated this could form any combination of fuel choice, fuel blending or mixing, maintenance of combustion systems, good design and advanced control systems. The primary purposes of the above techniques will be for NOx control but with CO control feeding in to those processes. LCP454 **B** - Maintenance of Combustion System – maintenance based approach is taken to manage emissions. The maintenance required typically comprises of an annual inspection and a bi-annual inspection and cleaning of the fuel injection nozzles. **C** - Fuel choice – fuel is restricted to 0.1% by mass in line with sulphur content regulations. **D** - Good design of the combustion equipment - Drax have invested to extend their life to support the stations generation activities, with the last to be completed in 2019.

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
7	In order to reduce emissions of ammonia to air from the use of selective catalytic reduction (SCR) and/or selective non-catalytic reduction (SNCR) for the abatement of NO_X emissions, BAT is to optimise the design and/or operation of SCR and/or SNCR (e.g. optimised reagent to NO_X ratio, homogeneous reagent distribution and optimum size of the reagent drops). **BAT-associated emission levels** The BAT-associated emission level (BAT-AEL) for emissions of NH_3 to air from the use of SCR and/or SNCR is < 3–10 mg/Nm^3 as a yearly average or average over the sampling period. The lower end of the range can be achieved when using SCR and the upper end of the range can be achieved when using SNCR without wet abatement techniques. In the case of plants combusting biomass and operating at variable loads as well as in the case of engines combusting HFO and/or gas oil, the higher end of the BAT-AEL range is 15 mg/Nm^3.	CC	The operator has confirmed the following: LCP91 SNCR is installed on 5 of the 6 units. It will be optimised on biomass units (1-4) to meet IED Annex V ELVs from July 2020 until August 2021. From August 2021 the SNCR system will be optimised to ensure compliance with the BAT conclusions under the proposed compliance route. LCP454 Not applicable - OCGT not fitted with SCR/SNCR
8	In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.	CC	The operator has confirmed the following: LCP91 The operator has confirmed that to reduce emissions to air during normal operating conditions that by appropriate design, operation and maintenance the emission abatement systems are used at optimal capacity and availability.

<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><u>LCP454</u>

Not applicable - OCGT not fitted with emissions abatement</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
— Metals and metalloids (As, Cd, Cr, Cu, Hg, Pb, Zn)</td></tr>
<tr><td>Coal/lignite</td><td>— LHV
— Moisture
— Volatiles, ash, fixed carbon, C, H, N, O, S</td></tr>
</table></td><td>FC</td><td>The operator has confirmed the following:

<u>LCP91</u>

i) Initial fuel characterisation has been undertaken in accordance with the site management system.

ii) Regular testing of fuel is undertaken in accordance with the site management system.

iii) The boilers are operated using an advanced control system that utilises real time data adjusting the operation of the unit to ensure through a range of fuel qualities that the necessary operational requirements are adjusted, managed and combustion optimised in line with the required parameters (safety, environmental, efficiency etc.).

Not all of the parameters listed for Biomass and Coal are currently monitored. An Improvement Condition has been included requesting that an updated</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
		— Br, Cl, F		procedure for Fuel Characterisation is provided that includes characterisation of all parameters listed in this BAT conclusion. LCP454 The operator has confirmed that they will meet the requirements of the JEP document: 'Characterisation of Power Plant Fuels for Compliance with LCP BREF Conclusions BAT9', as is described below. The fuel oil is purchased to a specific BS standard BS2869 Class A2 /D and as such has very specific criteria in relation to ash and Sulphur. Regular testing is undertaken in accordance with the requirements of EU-ETS. So as per the JEP BREF conclusions for BAT 9 the requirement is achieved through use of a fuel conforming to the applicable standard, testing for EUETS purposes and homogenous nature of the product. Analysis and the specification will be retained on site as stated in the JEP document.
		— 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)		

<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>10</td><td>In order to reduce emissions to air and/or to water during other than normal operating conditions (OTNOC), BAT is to set up and implement a management plan as part of the environmental management system (see BAT 1), commensurate with the relevance of potential pollutant releases, that includes the following elements:
— appropriate design of the systems considered relevant in causing OTNOC that may have an impact on emissions to air, water and/or soil (e.g. low-load design concepts for reducing the minimum start-up and shutdown loads for stable generation in gas turbines),
— set-up and implementation of a specific preventive maintenance plan for these relevant systems,
— review and recording of emissions caused by OTNOC and associated circumstances and implementation of corrective actions if necessary,
— periodic assessment of the overall emissions during OTNOC (e.g. frequency of events, duration, emissions quantification/estimation) and implementation of corrective actions if necessary.</td><td>CC</td><td>LCP91 and LCP454

The operator has confirmed that an Environment Management System is in place at the installation which includes details of plant operation during OTNOC.</td></tr>
<tr><td>11</td><td>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.</td><td>CC</td><td>LCP91 and LCP454

The operator has confirmed that ongoing monitoring is undertaken during OTNOC.</td></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="3">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>
</table></td><td>CC</td><td>The operator has confirmed the following:

LCP91

Techniques a, b, c, d, e, f, g (partial), h, o, p and r, are in place at this installation.

These techniques are all parts of an overall efficiency management system that is monitored and managed at a micro level to optimisation the plant efficiency in the short, medium and long term. This is monitored through a heat</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
	d.	Minimisation of energy consumption	Minimising the internal energy consumption (e.g. greater efficiency of the feed-water pump)			loss accounting system, which identifies any losses allowing targeted improvement planning within an appropriate timescale. Examples of a selection of projects undertaken to maintain and improve efficiency are High Pressure and Low Pressure barrel improvements across all 6 units. IP upgrades to biomass units, installation of Zolabos combustion monitoring on units 1 to 3, and cooling tower repacking along with numerous other smaller improvements. <u>LCP454</u> Not applicable - OCGT operating <500 hours
	e.	Preheating of combustion air	Reuse of part of the heat recovered from the combustion flue-gas to preheat the air used in combustion	Generally applicable within the constraints related to the need to control NO_X emissions		
	f.	Fuel preheating	Preheating of fuel using recovered heat	Generally applicable within the constraints associated with the boiler design and the need to control NO_X emissions		
	g.	Advanced control system	See description in Section 8.2. Computerised control of the main combustion parameters enables the combustion efficiency to be improved	Generally applicable to new units. The applicability to old units may be constrained by the need to retrofit the combustion system and/or control command system		
	h.	Feed-water preheating using recovered heat	Preheat water coming out of the steam condenser with recovered heat, before reusing it in the boiler	Only applicable to steam circuits and not to hot boilers. Applicability to existing units may be limited due to constraints associated with the plant configuration and the amount of recoverable heat		
	i.	Heat recovery by cogeneration (CHP)	Recovery of heat (mainly from the steam system) for producing hot water/steam to be used in industrial processes/activities or in a public network for district heating. Additional heat recovery is possible from: — flue-gas — grate cooling — circulating fluidised bed	Applicable within the constraints associated with the local heat and power demand. The applicability may be limited in the case of gas compressors with an unpredictable operational heat profile		
	j.	CHP readiness	See description in Section 8.2.	Only applicable to new units where there is a realistic potential for the future use of heat in the vicinity of the unit		
	k.	Flue-gas condenser	See description in Section 8.2.	Generally applicable to CHP units provided there is enough demand for low-temperature heat		
	l.	Heat accumulation	Heat accumulation storage in CHP mode	Only applicable to CHP plants. The applicability may be limited in the case of low heat load demand		

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
	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		
	q.	Advanced materials	Use of advanced materials proven to be capable of withstanding high operating temperatures and pressures and thus to achieve increased steam/combustion process efficiencies	Only applicable to new plants		
	r.	Steam turbine upgrades	This includes techniques such as increasing the temperature and pressure of medium-pressure steam, addition of a low-pressure turbine, and modifications to the geometry of the turbine rotor blades	The applicability may be restricted by demand, steam conditions and/or limited plant lifetime		
	s.	Supercritical and ultra-supercritical steam conditions	Use of a steam circuit, including steam reheating systems, in which steam can reach pressures above 220,6 bar and temperatures above 374 °C in the case of supercritical conditions, and above 250 – 300 bar and temperatures above 580 – 600 °C in the case of ultra-supercritical conditions	Only applicable to new units of ≥ 600 MW_{th} operated > 4 000 h/yr. Not applicable when the purpose of the unit is to produce low steam temperatures and/or pressures in process industries. Not applicable to gas turbines and engines generating steam in CHP mode. For units combusting biomass, the applicability may be constrained by high-		

<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></td><td></td><td></td><td>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 operator has confirmed the following:

<u>LCP91</u>

A – Cooling water is recirculated around the cooling system via numerous pumps while being monitored chemically. Cooling water is added and purged from the system as required to maintain the effectiveness of the cooling system and to optimise efficiency.

<u>LCP454</u>

Not applicable - no process waters generated from OCGT engines</td></tr>
<tr><td>14</td><td>In order to prevent the contamination of uncontaminated waste water and to reduce emissions to water, BAT is to segregate waste water streams and to treat them separately, depending on the pollutant content.
Description
Waste water streams that are typically segregated and treated include surface run-off water, cooling water, and waste water from flue-gas treatment.
Applicability
The applicability may be restricted in the case of existing plants due to the configuration of the drainage systems.</td><td>CC</td><td>The operator has confirmed the following:

<u>LCP91</u>

The historic configuration of the drainage system prevents the segregation of wastewater discharge streams. All surface water, cooling water and FGD WWTP effluents are discharged</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>offsite via a single discharge point, W1.

LCP454

Not applicable - no process waters generated from OCGT engines</td></tr>
<tr><td>15</td><td>In order to reduce emissions to water from flue-gas treatment, BAT is to use an appropriate combination of the techniques given below, and to use secondary techniques as close as possible to the source in order to avoid dilution.
<table>
<tr><th colspan="2">Technique</th><th>Typical pollutants prevented/abated</th><th>Applicability</th></tr>
<tr><td colspan="4">Primary techniques</td></tr>
<tr><td>a.</td><td>Optimised combustion (see BAT 6) and flue-gas treatment systems (e.g. SCR/SNCR, see BAT 7)</td><td>Organic compounds, ammonia (NH_3)</td><td>Generally applicable</td></tr>
<tr><td colspan="4">Secondary techniques [29]</td></tr>
<tr><td>b.</td><td>Adsorption on activated 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>
</table></td><td>CC</td><td>The operator has confirmed the following:

LCP91

The following techniques are in place at this installation:

A – Optimised Combustion – combustion is optimised as described under BAT12.

E – Coagulation and flocculation – In each of the settlement tanks a pro-electrolyte is added in order to cause flocculation, which settles to the bottom of the tank enhancing sedimentation.

F – Crystallisation – The effluent is seeded in order encourage the formation of gypsum crystals. This helps to enhance the removal rates.</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

h.	Flotation	Suspended solids, free oil	Generally applicable
i.	Ion exchange	Metals	Generally applicable
j.	Neutralisation	Acids, alkalis	Generally applicable
k.	Oxidation	Sulphide (S^{2-}), sulphite (SO_3^{2-})	Generally applicable
l.	Precipitation	Metals and metalloids, sulphate (SO_4^{2-}), fluoride (F^-)	Generally applicable
m.	Sedimentation	Suspended solids	Generally applicable
n.	Stripping	Ammonia (NH_3)	Generally applicable

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

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

Substance/Parameter		BAT-AELs
		Daily average
Total organic carbon (TOC)		20–50 mg/l (30) (31) (32)
Chemical oxygen demand (COD)		60–150 mg/l (30) (31) (32)
Total suspended solids (TSS)		10–30 mg/l
Fluoride (F^-)		10–25 mg/l (32)
Sulphate (SO_4^{2-})		1,3–2,0 g/l (32) (33) (34) (35)
Sulphide (S^{2-}), easily released		0,1–0,2 mg/l (32)
Sulphite (SO_3^{2-})		1–20 mg/l (32)
Metals and metalloids	As	10–50 µg/l
	Cd	2–5 µg/l
	Cr	10–50 µg/l
	Cu	10–50 µg/l
	Hg	0,2–3 µg/l
	Ni	10–50 µg/l
	Pb	10–20 µg/l
	Zn	50–200 µg/l

G – Filtration – The effluent is pumped through two parallel dual-media filters.

J - Primary neutralisation is carried out in an agitated vessel, where the pH of the effluent is increase to 6.5 through the controlled addition of hydrated lime slurry.

K – Oxidation of forms part of the effluent treatment process.

L - Precipitation – precipitation of heavy metals and other ionic constituents by adjustment using hydrated lime. Two stage precipitation:
1. Hydrated lime added to raise PH to 6.2.
2. After further settlement the PH is raised to 9.2 by adding further hydrated lime (TMT can be added to further raise the pH if needed).

M - Sedimentation – solid matter removed by settlement in a primary and secondary settlement tank. Each settlement follows precipitation of heavy metals.

LCP454

Not applicable - OCGT not fitted with flue-gas treatment

<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></td></tr>
<tr><td>16</td><td>In order to reduce the quantity of waste sent for disposal from the combustion and/or gasification process and abatement techniques, BAT is to organise operations so as to maximise, in order of priority and taking into account life-cycle thinking:
(a) waste prevention, e.g. maximise the proportion of residues which arise as by-products;
(b) waste preparation for reuse, e.g. according to the specific requested quality criteria;
(c) waste recycling;
(d) other waste recovery (e.g. energy recovery),
by implementing an appropriate combination of techniques such as:
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Generation of gypsum as a by-product</td><td>Quality optimisation of the calcium-based reaction residues generated by the wet FGD so that they can be used as a substitute for mined gypsum (e.g. as raw material in the plasterboard 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>CC</td><td>The operator has confirmed the following:

<u>LCP91</u>

The following techniques are in place at this installation, which demonstrate compliance with BAT16:

A - The FGD was specifically designed to manufacture gypsum to supply local production facilities, which it has successfully done since it commenced operations.

B - For coal ash materials we operate a quality management system to produce pulverised fuel ash (PFA) and furnace bottom ash (FBA) in compliance with the quality protocol (QP). Biomass ash is utilised in the construction industry but as a waste, a report was provided to the EA providing evidence and making the case for it’s waste status to be ended.

C - The site is permitted to combust ashes to recover the energy where suitable as per the BRef 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><u>LCP454</u>

There are no by-products identified by BAT 16 associated with the combustion process at Drax Power Station. Other wastes arising from site activities are dealt with according the waste hierarchy.</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>
<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</td><td>The applicability may be restricted by lack of space</td></tr>
</table></td><td>CC</td><td>The operator has confirmed the following:

<u>LCP91 and LCP454</u>

A - The installation has a Noise Management Plan in place which details the operational measures that are in place to minimise noise. Areas identified as having noise potential where specific operational measures are in place are:
-Main turbine Hall
-Flue Gas Desulphurisation Plant
-Ancillary Equipment – Compressors, Pumphouses and Pumps
-Materials Handling
-Mobile Plant and Equipment
-Jetty where unloading of Talloil takes place.
-Cooling water intake point
- Biomass Processing areas</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></td><td></td><td>— enclosure of noisy equipment
— soundproofing of buildings</td><td></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 –
-The main turbine hall is fitted with Acoustic enclosures around equipment that emits noise above acceptable levels. The enclosures are constructed using acoustic panelling.
-Drain and vent valves used during boiler pressure raising are fitted with silencers to attenuate the noise.
-In the biomass processing area the hammer mill is used in conjunction with a noise barrier. In addition a mobile barrier of straw bales stacked 5m high is used.</td></tr>
<tr><td colspan="4">Combustion of solid fuels only</td></tr>
<tr><td>18</td><td>In order to improve the general environmental performance of the combustion of coal and/or lignite, and in addition to BAT 6, BAT is to use the technique given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Integrated combustion process ensuring high boiler efficiency and including primary techniques for NO_X reduction (e.g. air staging, fuel staging, low-NO_Xburners (LNB) and/or flue-gas recirculation)</td><td>Combustion processes such as pulverised combustion, fluidised bed combustion or moving grate firing allow this integration</td><td>Generally applicable</td></tr>
</table>
</td><td>CC</td><td>The operator has confirmed the following:
An integrated combustion process is in place at the installation. High boiler efficiency is achieved through effective combustion control. The combustion process is tuned based upon the fuel used with live systems monitoring the combustion process.

A variety of primary techniques for the reduction of NO_x are in place at the installation.</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>Low NO_x Burners – Boiler units 1-5 are fitted with Hitachi ultralow NO_x, which will be optimised in order to achieve compliance with the BAT-AELS. If necessary a further low NO_x burner will be installed onto unit 6 to achieve compliance.
Air Staging – All boiler units are fitted with Boosted Over Fire Air (BOFA) systems which is used in conjunction with combustion control to support NO_x control through staging combustion air to reduce the production of thermal NO_x.</td></tr>
<tr><td>19</td><td>In order to increase the energy efficiency of the combustion of coal and/or lignite, BAT is to use an appropriate combination of the techniques given in BAT 12 and below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Dry bottom ash handling</td><td>Dry hot bottom ash falls from the furnace onto a mechanical conveyor system and, after redirection to the furnace for reburning, is cooled down by ambient air. Useful energy is recovered from both the ash reburning and ash cooling</td><td>There may be technical restrictions that prevent retrofitting to existing combustion units</td></tr>
</table>
BAT-associated energy efficiency levels (BAT-AEELs) for coal and/or lignite combustion
<table>
<tr><th rowspan="3">Type of combustion unit</th><th colspan="3">BAT-AEELs [36] [37]</th></tr>
<tr><th colspan="2">Net electrical efficiency (%) [38]</th><th>Net total fuel utilisation (%) [38] [39] [40]</th></tr>
<tr><th>New unit [41] [42]</th><th>Existing unit [41] [43]</th><th>New or existing unit</th></tr>
<tr><td>Coal-fired, ≥ 1 000 MW_{th}</td><td>45 – 46</td><td>33,5 – 44</td><td>75 – 97</td></tr>
<tr><td>Lignite-fired, ≥ 1 000 MW_{th}</td><td>42 – 44 [44]</td><td>33,5 – 42,5</td><td>75 – 97</td></tr>
<tr><td>Coal-fired, < 1 000 MW_{th}</td><td>36,5 – 41,5 [45]</td><td>32,5 – 41,5</td><td>75 – 97</td></tr>
</table></td><td></td><td>The operator has confirmed the following:

The site is permitted to combust ashes to recover the energy where suitable as per the BRef decision document.

The energy efficiency of the plant is 41%, which is within the 33.5 – 44% range, which is applicable to this installation.</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>Lignite-fired, < 1 000 MW_{th}</td><td>36,5 – 40 (46)</td><td>31,5 – 39,5</td><td>75 – 97</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>20</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 coal and/or lignite, 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>See description in Section 8.3.
Generally used in combination with other techniques</td><td>Generally applicable</td></tr>
<tr><td>b.</td><td>Combination of other primary techniques for NO_X reduction (e.g. air staging, fuel staging, flue-gas recirculation, low-NO_X burners (LNB))</td><td>See description in Section 8.3 for each single technique. The choice and performance of (an) appropriate (combination of) primary techniques may be influenced by the boiler design</td><td></td></tr>
<tr><td>c.</td><td>Selective non-catalytic reduction (SNCR)</td><td>See description in Section 8.3.
Can be applied with ‘slip’ SCR</td><td>The applicability may be limited in the case of boilers with a high cross-sectional area preventing homogeneous mixing of NH_3 and NO_X.
The applicability may be limited in the case of combustion plants operated < 1 500 h/yr with highly variable boiler loads</td></tr>
<tr><td>d.</td><td>Selective catalytic reduction (SCR)</td><td>See description in Section 8.3</td><td>Not applicable to combustion plants of < 300 MW_{th} operated < 500 h/yr.
Not generally applicable to combustion plants of < 100 MW_{th}.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr and for existing</td></tr>
</table>
</td><td>FC</td><td>The operator has confirmed the following:

A - High boiler efficiency is achieved through effective combustion control. The combustion process is tuned based upon the fuel used with live systems monitoring the combustion process.

B - A variety of primary techniques for the reduction of NO_x are in place at the installation. Low NO_x Burners –If necessary then a further low NO_x burner will be installed onto unit 6 to achieve compliance.
Air Staging – All boiler units are fitted with Boosted Over Fire Air (BOFA) systems which is used in conjunction with combustion control to support NO_x control through staging combustion air to reduce the production of thermal NO_x.

C – Selective Non-Catalytic Reduction (SNCR) – Not used for the coal units
As boiler unit 5 will be operated for <1500 hours it will be operating with highly variable load profiles which will limit the applicability of</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

			combustion plants of ≥ 300 MW_{th} operated < 500 h/yr
e.	Combined techniques for NO_X and SO_X reduction	See description in Section 8.3	Applicable on a case-by-case basis, depending on the fuel characteristics and combustion process

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

Combustion plant total rated thermal input (MW_{th})	BAT-AELs (mg/Nm^3)			
	Yearly average		Daily average or average over the sampling period	
	New plant	Existing plant (47)	New plant	Existing plant (48) (49)
< 100	100–150	100–270	155–200	165–330
100–300	50–100	100–180	80–130	155–210
≥ 300, FBC boiler combusting coal and/or lignite and lignite-fired PC boiler	50 – 85	< 85 – 150 (50) (51)	80 – 125	140 – 165 (52)
≥ 300, coal-fired PC boiler	65 – 85	65 – 150	80 – 125	< 85 – 165 (53)

As an indication, the yearly average CO emission levels for existing combustion plants operated ≥ 1 500 h/yr or for new combustion plants will generally be as follows:

Combustion plant total rated thermal input (MW_{th})	CO indicative emission level (mg/Nm^3)
< 300	< 30–140
≥ 300, FBC boiler combusting coal and/or lignite and lignite-fired PC boiler	< 30–100 (54)
≥ 300, coal-fired PC boiler	< 5–100 (54)

the use of the SNCR that is fitted. Therefore, it will be operated without SNCR and will necessitate footnote 2 in table 3 to be applied resulting in BAT-AEL of 340mg/Nm^3.

It is not the intention to fit SNCR to boiler unit 6 due to the life expectancy of coal in the UK.

In addition to the techniques considered above, it should also be noted that fuel choice is an important parameter. Testing and optimisation of fuels is undertaken to identify suitable fuels and operating conditions to support compliance both from NO_x and other emissions species and their interactions.

The combination of the techniques identified will enable NO_x compliance with the higher end of the relevant BAT-AEL range.

The yearly average NOx limit and indicative CO BAT AEL do not apply as the plant is operated <1,500 hours/year.

We have set limits as set out in Section 4.1 of this document.

<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>We agree with the Operator's stated compliance.</td></tr>
<tr><td>21</td><td>In order to prevent or reduce SO_X, HCl and HF emissions to air from the combustion of coal and/or lignite, 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>See description in Section 8.4</td><td rowspan="5">Generally applicable</td></tr>
<tr><td>b.</td><td>Duct sorbent injection (DSI)</td><td>See description in Section 8.4. The technique can be used for HCl/HF removal when no specific FGD end-of-pipe technique is implemented</td></tr>
<tr><td>c.</td><td>Spray dry absorber (SDA)</td><td rowspan="2">See description in Section 8.4</td></tr>
<tr><td>d.</td><td>Circulating fluidised bed (CFB) dry scrubber</td></tr>
<tr><td>e.</td><td>Wet scrubbing</td><td>See description in Section 8.4. The techniques can be used for HCl/HF removal when no specific FGD end-of-pipe technique is implemented</td></tr>
<tr><td>f.</td><td>Wet flue-gas desulphurisation (wet FGD)</td><td rowspan="3">See description in Section 8.4</td><td rowspan="2">Not applicable to combustion plants operated < 500 h/yr.
There may be technical and economic restrictions for applying the technique to combustion plants of < 300 MW_{th}, and for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</td></tr>
<tr><td>g.</td><td>Seawater FGD</td></tr>
<tr><td>h.</td><td>Combined techniques for NO_X and SO_X reduction</td><td>Applicable on a case-by-case basis, depending on the fuel characteristics and combustion process</td></tr>
</table></td><td>FC</td><td>The operator has confirmed the following:

The combination of techniques used and applicable at the installation are (f) wet flue-gas desulphurisation (wet FGD) and (j) fuel choice. Generally, the other techniques are not applicable where a wet FGD is in place.

The coal units (5 and 6) are installed with wet FGD with downstream gas heaters. The wet FDG is used in conjunction with fuel sulphur control.

We have set limits as set out in Section 4.1 of this document.

We agree with the Operator's stated compliance.</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

i.	Replacement or removal of the gas-gas heater located downstream of the wet FGD	Replacement of the gas-gas heater downstream of the wet FGD by a multi-pipe heat extractor, or removal and discharge of the flue-gas via a cooling tower or a wet stack	Only applicable when the heat exchanger needs to be changed or replaced in combustion plants fitted with wet FGD and a downstream gas-gas heater
j.	Fuel choice	See description in Section 8.4. Use of fuel with low sulphur (e.g. down to 0,1 wt-%, dry basis), chlorine or fluorine content	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. The applicability may be limited due to design constraints in the case of combustion plants combusting highly specific indigenous fuels

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

Combustion plant total rated thermal input (MW_{th})	BAT-AELs (mg/Nm^3)			
	Yearly average		Daily average	Daily average or average over the sampling period
	New plant	Existing plant ([55])	New plant	Existing plant ([56])
< 100	150–200	150–360	170–220	170–400
100–300	80–150	95–200	135–200	135–220 ([57])
≥ 300, PC boiler	10–75	10–130 ([58])	25–110	25–165 ([59])
≥ 300, Fluidised bed boiler ([60])	20–75	20–180	25–110	50–220

For a combustion plant with a total rated thermal input of more than 300 MW, which is specifically designed to fire indigenous lignite fuels and which can demonstrate that it cannot achieve the BAT-AELs mentioned in Table 4 for techno-economic reasons, the daily average BAT-AELs set out in Table 4 do not apply, and the upper end of the yearly average BAT-AEL range is as follows:

(i) for a new FGD system: RCG × 0,01 with a maximum of 200 mg/Nm^3;

(ii) for an existing FGD system: RCG × 0,03 with a maximum of 320 mg/Nm^3;

<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>
in which RCG represents the concentration of SO_2 in the raw flue-gas as a yearly average (under the standard conditions given under General considerations) at the inlet of the SO_X abatement system, expressed at a reference oxygen content of 6 vol- % O_2.
(iii) If boiler sorbent injection is applied as part of the FGD system, the RCG may be adjusted by taking into account the SO_2 reduction efficiency of this technique (η_{BSI}), as follows: RCG (adjusted) = RCG (measured)/(1-η_{BSI}).
BAT-associated emission levels (BAT-AELs) for HCl and HF emissions to air from the combustion of coal and/or lignite
<table>
<tr><th rowspan="3">Pollutant</th><th rowspan="3">Combustion plant total rated thermal input (MW_{th})</th><th colspan="2">BAT-AELs (mg/Nm^3)</th></tr>
<tr><th colspan="2">Yearly average or average of samples obtained during one year</th></tr>
<tr><th>New plant</th><th>Existing plant (61)</th></tr>
<tr><td rowspan="2">HCl</td><td>< 100</td><td>1–6</td><td>2–10 (62)</td></tr>
<tr><td>≥ 100</td><td>1–3</td><td>1–5 (62) (63)</td></tr>
<tr><td rowspan="2">HF</td><td>< 100</td><td>< 1–3</td><td>< 1–6 (64)</td></tr>
<tr><td>≥ 100</td><td>< 1–2</td><td>< 1–3 (64</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>22</td><td>
In order to reduce dust and particulate-bound metal emissions to air from the combustion of coal and/or lignite, 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="3">Generally applicable</td></tr>
<tr><td>b.</td><td>Bag filter</td></tr>
<tr><td>c.</td><td>Boiler sorbent injection (in-furnace or in-bed)</td><td rowspan="3">See descriptions in Section 8.5.
The techniques are mainly used for SO_X, HCl and/or HF control</td></tr>
<tr><td>d.</td><td>Dry or semi-dry FGD system</td><td></td></tr>
<tr><td>e.</td><td>Wet flue-gas desulphurisation (wet FGD)</td><td>See applicability in BAT 21</td></tr>
</table>
BAT-associated emission levels (BAT-AELs) for dust emissions to air from the combustion of coal and/or lignite
</td><td>FC</td><td>The operator has confirmed the following:

The combination of techniques used and applicable at the installation are (a) electrostatic precipitator and (e) wet FGD. Generally, the other techniques are not applicable where (a) and (e) are present.

Historically the site used sulphur trioxide injection. However, this approach has not been used for some time. It is being considered whether this equipment may need</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 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 (65)</th><th>New plant</th><th>Existing plant (66)</th></tr>
<tr><td>< 100</td><td>2–5</td><td>2–18</td><td>4–16</td><td>4–22 (67)</td></tr>
<tr><td>100–300</td><td>2–5</td><td>2–14</td><td>3–15</td><td>4–22 (68)</td></tr>
<tr><td>300–1 000</td><td>2–5</td><td>2–10 (69)</td><td>3–10</td><td>3–11 (70)</td></tr>
<tr><td>≥ 1 000</td><td>2–5</td><td>2–8</td><td>3–10</td><td>3–11 (71)</td></tr>
</table>
</td><td></td><td>to be renewed and brought into an operational state in order to achieve compliance.

We have set limits as set out in Section 4.1 of this document.

We agree with the Operator's stated compliance.</td></tr>
<tr><td>23</td><td>In order to prevent or reduce mercury emissions to air from the combustion of coal and/or lignite, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td colspan="4">Co-benefit from techniques primarily used to reduce emissions of other pollutants</td></tr>
<tr><td>a.</td><td>Electrostatic precipitator (ESP)</td><td>See description in Section 8.5.
Higher mercury removal efficiency is achieved at flue-gas temperatures below 130 °C.
The technique is mainly used for dust control</td><td rowspan="3">Generally applicable</td></tr>
<tr><td>b.</td><td>Bag filter</td><td>See description in Section 8.5.
The technique is mainly used for dust control</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></tr>
<tr><td>d.</td><td>Wet flue-gas desulphurisation (wet FGD)</td><td>See applicability in BAT 21</td></tr>
<tr><td>e.</td><td>Selective catalytic reduction (SCR)</td><td>See description in Section 8.3.
Only used in combination with other techniques to enhance or reduce the</td><td>See applicability in BAT 20</td></tr>
</table>
</td><td>FC</td><td>The operator has confirmed the following:

The combination of techniques used and applicable at the installation, which provide a co-benefit in respect of mercury emissions, are:

(a) Electrostatic precipitators – YES
(b) Bag filters – NO
(c) Dry or semi-dry FGD system – NO
(d) Wet flue-gas desulphurisation (wet FGD) – YES
(e) Selective catalytic reduction (SCR) – NO

Specific techniques used and applicable to reduce mercury emissions 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

		mercury oxidation before capture in a subsequent FGD or dedusting system. The technique is mainly used for NO_X control	

Specific techniques to reduce mercury emissions

f.	Carbon sorbent (e.g. activated carbon or halogenated activated carbon) injection in the flue-gas	See description in Section 8.5. Generally used in combination with an ESP/bag filter. The use of this technique may require additional treatment steps to further segregate the mercury-containing carbon fraction prior to further reuse of the fly ash	Generally applicable
g.	Use of halogenated additives in the fuel or injected in the furnace	See description in Section 8.5	Generally applicable in the case of a low halogen content in the fuel
h.	Fuel pretreatment	Fuel washing, blending and mixing in order to limit/reduce the mercury content or improve mercury capture by pollution control equipment	Applicability is subject to a previous survey for characterising the fuel and for estimating the potential effectiveness of the technique
i.	Fuel choice	See description in Section 8.5	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 mercury emissions to air from the combustion of coal and lignite

Combustion plant total rated thermal input (MW_{th})	BAT-AELs ($\mu g/Nm^3$)	
	Yearly average or average of samples obtained during one year	
	New plant	Existing plant ([72])

(f) Carbon sorbent injection in the flue-gas – NO
(g) Use of halogenated additives in the fuel or injected in the furnace – NO
(h) Fuel pre-treatment – NO
(i) Fuel choice – YES

The combination of existing co-benefit techniques identified, as well as the specific technique of fuel choice, will enable the operator to meet the BAT-AELs.

We have set limits as set out in Section 4.1 of this document.

We agree with the Operator's stated compliance.

<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></th><th>coal</th><th>lignite</th><th>coal</th><th>lignite</th></tr>
<tr><td>< 300</td><td>< 1–3</td><td>< 1–5</td><td>< 1–9</td><td>< 1–10</td></tr>
<tr><td>≥ 300</td><td>< 1–2</td><td>< 1–4</td><td>< 1–4</td><td>< 1–7</td></tr>
</table>
</td><td></td><td></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>CC</td><td>The operator has confirmed the following:

The energy efficiency of the plant is 41%, which is greater than the 28 – 38% range, which is applicable to this installation.</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.</td><td>Not applicable to combustion plants operated < 500 h/yr.</td></tr>
</table>
</td><td>FC</td><td>The operator has confirmed the following:

A - High boiler efficiency is achieved through effective combustion control. The combustion process is tuned based upon the fuel used with live systems monitoring the combustion process.

B - A variety of primary techniques for the reduction of NO_x are in place at the installation. Low NO_x Burners – Boiler units 1-5 are fitted with Hitachi ultralow NO_x, which will be optimised in order to achieve compliance with the BAT-AELS.
Air Staging – All boiler units are fitted with Boosted Over Fire Air (BOFA) systems which is used in</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

		The use of high-alkali fuels (e.g. straw) may require the SCR to be installed downstream of the dust abatement system	There may be economic restrictions for retrofitting existing combustion plants of < 300 MW_{th}. Not generally applicable to existing combustion plants of < 100 MW_{th}

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

Combustion plant total rated thermal input (MW_{th})	BAT-AELs (mg/Nm^3)			
	Yearly average		Daily average or average over the sampling period	
	New plant	Existing plant ([79])	New plant	Existing plant ([80])
50–100	70–150 ([81])	70–225 ([82])	120–200 ([83])	120–275 ([84])
100–300	50–140	50–180	100–200	100–220
≥ 300	40–140	40–150 ([85])	65–150	95–165 ([86])

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}.

conjunction with combustion control to support NO_x control through staging combustion air to reduce the production of thermal NO_x.

C – Selective Non-Catalytic Reduction (SNCR) is fitted to boiler units 1-5. This will be optimised to ensure compliance with the BAT-AELs by 17 August 2021.
In addition to the techniques considered above, it should also be noted that fuel choice is an important parameter. Testing and optimisation of fuels is undertaken to identify suitable fuels and operating conditions to support compliance both from NO_x and other emissions species and their interactions.

The combination of the techniques identified will enable NO_x compliance with the higher end of the relevant BAT-AEL range.

We have set limits as set out in Section 4.1 of this document.

We agree with the Operator's stated compliance.

<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>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="8">See descriptions in Section 8.4</td><td rowspan="6">Generally applicable</td></tr>
<tr><td>b.</td><td>Duct sorbent injection (DSI)</td></tr>
<tr><td>c.</td><td>Spray dry absorber (SDA)</td></tr>
<tr><td>d.</td><td>Circulating fluidised bed (CFB) dry scrubber</td></tr>
<tr><td>e.</td><td>Wet scrubbing</td></tr>
<tr><td>f.</td><td>Flue-gas condenser</td></tr>
<tr><td>g.</td><td>Wet flue-gas desulphurisation (wet FGD)</td><td>Not applicable to combustion plants operated < 500 h/yr. There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</td></tr>
<tr><td>h.</td><td>Fuel choice</td><td>Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td></tr>
</table>
BAT-associated emission levels (BAT-AELs) for SO_2 emissions to air from the combustion of solid biomass and/or peat
<table>
<tr><th rowspan="3">Combustion plant total rated thermal input (MW_{th})</th><th colspan="4">BAT-AELs for SO_2 (mg/Nm^3)</th></tr>
<tr><th colspan="2">Yearly average</th><th colspan="2">Daily average or average over the sampling period</th></tr>
<tr><th>New plant</th><th>Existing plant ([87])</th><th>New plant</th><th>Existing plant ([88])</th></tr>
<tr><td>< 100</td><td>15–70</td><td>15–100</td><td>30–175</td><td>30–215</td></tr>
<tr><td>100–300</td><td>< 10–50</td><td>< 10–70 ([89])</td><td>< 20–85</td><td>< 20–175 ([90])</td></tr>
</table>
</td><td>FC</td><td>The operator has confirmed the following:

Technique h) is in place at the installation. The biomass units (1-4) use low sulphur fuel. As a result they do not require FGD as is the case with the coal units.

We have set limits as set out in Section 4.1 of this document.

We agree with the Operator's stated compliance.</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

≥ 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
100–300	1–5	1–9	1–12	1–12	< 1	< 1
≥ 300	1–5	1–5	1–12	1–12	< 1	< 1

26	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.			FC

	Technique	Description	Applicability
a.	Electrostatic precipitator (ESP)	See description in Section 8.5	Generally applicable
b.	Bag filter		
c.	Dry or semi-dry FGD system	See descriptions in Section 8.5 The techniques are mainly used for SO_X, HCl and/or HF control	
d.	Wet flue-gas desulphurisation (wet FGD)		See applicability in BAT 25
e.	Fuel choice	See description in Section 8.5	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

The operator has confirmed the following:

Technique a) is used to ensure compliance with the BAT-AEL on the biomass units.

We have set limits as set out in Section 4.1 of this document.

We agree with the Operator's stated compliance.

<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 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></td><td></td></tr>
<tr><td>27</td><td>
In order to prevent or reduce mercury emissions to air from the combustion of solid biomass and/or peat, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td colspan="4">Specific techniques to reduce mercury emissions</td></tr>
<tr><td>a.</td><td>Carbon sorbent (e.g. activated carbon or halogenated activated carbon) injection in the flue-gas</td><td rowspan="3">See descriptions in Section 8.5</td><td>Generally applicable</td></tr>
<tr><td>b.</td><td>Use of halogenated additives in the fuel or injected in the furnace</td><td>Generally applicable in the case of a low halogen content in the fuel</td></tr>
<tr><td>c.</td><td>Fuel choice</td><td>Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td></tr>
<tr><td colspan="4">Co-benefit from techniques primarily used to reduce emissions of other pollutants</td></tr>
<tr><td>d.</td><td>Electrostatic precipitator (ESP)</td><td rowspan="2">See descriptions in Section 8.5.
The techniques are mainly used for dust control</td><td rowspan="2">Generally applicable</td></tr>
<tr><td>e.</td><td>Bag filter</td></tr>
</table>
</td><td>FC</td><td>
The operator has confirmed the following:

The combination of techniques used and applicable at the installation, which provide a co-benefit in respect of mercury emissions, are:

(a) Electrostatic precipitators – YES
(b) Bag filters – NO
(c) Dry or semi-dry FGD system – NO
(d) Wet flue-gas desulphurisation (wet FGD) – No
(e) Selective catalytic reduction (SCR) – NO

Specific techniques used and applicable to reduce mercury emissions 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
	f. Dry or semi-dry FGD system — See descriptions in Section 8.5. The techniques are mainly used for SO_X, HCl and/or HF control — g. Wet flue-gas desulphurisation (wet FGD) — See applicability in BAT 25 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.		(f) Carbon sorbent injection in the flue-gas – NO (g) Use of halogenated additives in the fuel or injected in the furnace – NO (h) Fuel pre-treatment – NO (i) Fuel choice – YES The combination of existing co-benefit techniques identified, as well as the specific technique of fuel choice, will enable the operator to meet the BAT-AELs. We have set limits as set out in Section 4.1 of this document. We agree with the Operator's stated compliance.
Combustion of liquid fuels			
Table 13, BAT28 – BAT35 – Not Applicable			
36	In order to increase the energy efficiency of gas oil combustion in gas turbines, BAT is to use an appropriate combination of the techniques given in BAT 12 and below. a. Combined cycle — See description in Section 8.2 — Generally applicable to new units operated ≥ 1 500 h/yr. Applicable to existing units within the constraints associated with the steam cycle design and the space availability. Not applicable to existing units operated < 1 500 h/yr **BAT-associated energy efficiency levels (BAT-AEELs) for gas-oil-fired gas turbines** **Type of combustion unit** — **BAT-AEELs [132] Net electrical efficiency (%) [133]**	CC	The existing open cycle gas turbines operate for less than 500 hours per year. The use of combined cycle is therefore not applicable as BAT for energy efficiency. These BAT AEELs do not apply to units operated <1500h/yr. The Olympus variant installed at Drax is the B rated unit with a

<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></th><th>New unit</th><th>Existing unit</th></tr>
<tr><td>Gas-oil-fired open-cycle gas turbine</td><td>> 33</td><td>25–35,7</td></tr>
<tr><td>Gas-oil-fired combined cycle gas turbine</td><td>> 40</td><td>33–44</td></tr>
</table>
</td><td></td><td>thermal efficiency in the range of 25.2 to 26.2%. The name plate efficiency of Olympus B rated engines is 26.2% (JEP report UTG/18/ERG/773/R).</td></tr>
<tr><td>37</td><td>In order to prevent or reduce NO_X emissions to air from the combustion of gas oil in gas turbines, 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>Water/steam addition</td><td rowspan="3">See description in Section 8.3</td><td>The applicability may be limited due to water availability</td></tr>
<tr><td>b.</td><td>Low-NO_X burners (LNB)</td><td>Only applicable to turbine models for which low-NO_X burners are available on the market</td></tr>
<tr><td>c.</td><td>Selective catalytic reduction (SCR)</td><td>Not applicable to combustion plants operated < 500 h/yr.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr.
Retrofitting existing combustion plants may be constrained by the availability of sufficient space</td></tr>
</table>
</td><td>CC</td><td>The reasoning why techniques a and b are not applicable is discussed in the key issues section.

Selective catalytic reduction (SCR) is not applicable to plant operated <500 hours.

An indicative ELV has been included in all permit for <500 hours plant based upon what the plant can achieve. The operator has stated in their Reg61 notice that the NO_x emissions from the turbines are 225mg/Nm^3, which are within the indicative BAT-AEL range (140mg/Nm^3 - 250mg/Nm^3) for oil firing on duel fuel combustors. Therefore, an indicative ELV of 250mg/Nm3 has been included in the permit.</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>38</td><td>In order to prevent or reduce CO emissions to air from the combustion of gas oil in gas turbines, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Combustion optimisation</td><td rowspan="2">See description in Section 8.3</td><td>Generally applicable</td></tr>
<tr><td>b.</td><td>Oxidation catalysts</td><td>Not applicable to combustion plants operated < 500 h/yr. Retrofitting existing combustion plants may be constrained by the availability of sufficient space</td></tr>
</table>
As an indication, the emission level for NO_X emissions to air from the combustion of gas oil in dual fuel gas turbines for emergency use operated < 500 h/yr will generally be 145–250 mg/Nm^3 as a daily average or average over the sampling period.</td><td>CC</td><td>The combustion process is optimised as described under BAT 6.

Oxidation catalysts are not applicable for plant operated <500 hr/yr.</td></tr>
<tr><td>39</td><td>In order to prevent or reduce SO_X and dust emissions to air from the combustion of gas oil in gas turbines, BAT is to use the technique given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Fuel choice</td><td>See description in Section 8.4</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 for SO_2 and dust emissions to air from the combustion of gas oil in gas turbines, including dual fuel gas turbines
<table>
<tr><th rowspan="3">Type of combustion plant</th><th colspan="4">BAT-AELs (mg/Nm^3)</th></tr>
<tr><th colspan="2">SO_2</th><th colspan="2">Dust</th></tr>
<tr><th>Yearly average (134)</th><th>Daily average or average over the sampling period (135)</th><th>Yearly average (134)</th><th>Daily average or average over the sampling period (135)</th></tr>
<tr><td>New and existing plants</td><td>35–60</td><td>50–66</td><td>2–5</td><td>2–10</td></tr>
</table></td><td></td><td>The indicative BAT AEL for sulphur is 66 mg/Nm^3 as a daily average over the sampling period. The sulphur content of the fired Gas Oil is regulated to ≤ 0.1% by mass, equivalent to 55 mg/m3 SO2 in the flue gas (JEP report UTG/18/ERG/773/R). Therefore this ensures that emissions are less than the indicative BAT AEL.

The applicable indicative AEL for dust is 10 mg/Nm^3 as a daily average or average over the sampling period. Dust emission levels are quantified in JEP report UTG/18/ERG/773/R and the levels are less than the indicative BAT AEL.

Indicative ELVs for both sulphur (66mg/Nm^3) and dust (10 mg/Nm^3) have been added to the</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
			permit in table S3.1 through the review.

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 the one current discharge to controlled waters identified as W1 into the River Ouse.

7.1 BAT Conclusion 5 and 15

Discharge point W2 is for effluent arising from the Flue Gas Desulphurisation Plant Waste Water Treatment Plant (FGD WWTP), this ultimately discharge to the River Ouse via point W1.

The relevant waste water BAT-AELs and monitoring for flue gas treatment plant are specified in BAT5 and under table 1. We have set ELVs and monitoring in accordance with these requirements.

The BAT-AELs for the FGD WWTP are for direct discharges to the receiving water body. However, at the point of discharge this will include cooling water and river slit. As a result the operator has chosen to test the effluent from the FGD WWTP effluent against the BAT-AELs separately at W2. Therefore, the limits in the permit have been set based on monitoring undertaken at W2.

The exception to this is Total Nitrogen. Although there is no BAT-AEL for this parameter monitoring is required as detailed under BAT 5. The existing permit monitors Total nitrogen at W1 and includes a limit, which has been carried over into this permit. This exceeds the requirements of the BAT conclusions and is therefore, is considered acceptable.

For Sulphide and Sulphite there are current no agreed monitoring standards available. Note 4 has been included in table S3.2a stating that the standard will be agreed in writing with the Environment Agency. The same approach has been taken for those substances where the operator has not specified a monitoring method in their Reg61 response.

As per BAT Conclusion 5 and this BAT Conclusion, either the BAT AEL for TOC or COD applies. TOC is the Operator's preferred option.

We have set monitoring requirements specified under BAT 4 and limits as required under BAT 15 have been included in the permit in table S3.2a

The current emissions of all parameters are below the BAT-AELs except for cadmium. It is anticipated that further optimisation of the process will ensure compliance by 17th August 2021.

7.2 Water Framework Directive

In addition to the review of compliance against the relevant BAT Conclusions for emissions to water, this permit review also provides an opportunity to consider whether the discharge to surface water will maintain River Quality Objectives (RQOs) in the receiving watercourse to ensure the water quality objectives under the WFD will be met.

This permit review sets new limits for a range of parameters at the Flue gas desulphurisation plant, as described above. In addition, emissions will reduce once the coal fired units (5 and 6) on LCP 91 are limited to <1,500 hours/year from 01 July 2020. We therefore anticipate the emissions of pollutants to water from the site to decrease. However, there is still the potential that additional measures are needed to ensure that the RQOs are met for the River Ouse and the operator has not provided sufficient information for this assessment to be made.

Improvement Conditions IC48D and IC49D have been added to Table S1.3 Improvement Programme Requirements to address this.

8 Additional IED Chapter II requirements:

Black start operation
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 2.3.9. This conditions allows the hourly ELVs for plants operating under

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	
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. 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	We have varied the permit as stated in the variation notice.

Aspect considered	Decision
Environment Agency initiated variation	
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 compliance with the relevant BAT Conclusions. This is described in the relevant sections of this document.
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 4.1 and 5 of this document. It is considered that the ELVs described above will ensure that significant pollution of the environment is prevented and a high level of protection for the environment is secured.
Monitoring	We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified. These are described in the relevant BAT Conclusions in Section 5 of this document. Table S3.5 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 • Carbon monoxide • Sulphur Dioxide • Hydrogen Chloride • Hydrogen Fluoride • Dust • Mercury • Ammonia These are described in the relevant BAT Conclusions in Section 5 of this document.

Aspect considered	Decision
Operator competence	
Management system	There is no known reason to consider that the operator will not have the management system to enable it to comply with the permit conditions.
Growth Duty	
Section 108 Deregulation Act 2015 – Growth duty	We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit. Paragraph 1.3 of the guidance says: "The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation." We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections. We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.