

## 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/PP3236TH  
The Operator is: Whitetower Energy Limited  
The Installation is: Croydon Plant  
This Variation Notice number is: EPR/PP3236TH/V004

### **What this document is about**

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

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

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

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

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

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

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

## How this document is structured

### Glossary of terms

- 1 Our decision
- 2 How we reached our decision
- 2.1 Requesting information to demonstrate compliance with BAT Conclusions for Large Combustion Plant
- 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
- 3 The legal framework
- 4 Key issues
- 5 Decision checklist regarding relevant BAT Conclusions
- 6 Review and assessment of derogation requests made by the Operator in relation to BAT Conclusions which include an associated emission level (AEL) value
- 7 Emissions to water
- 8 Additional IED Chapter II requirements
- 9 Review and assessment of changes that are not part of the BAT Conclusions derived permit review.

## Glossary of acronyms used in this document

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

APC	Air Pollution Control
BAT	Best Available Technique(s)
BAT-AEEL	BAT Associated Energy Efficiency Level
BAT-AEL	BAT Associated Emission Level
BATc	BAT conclusion
BREF	Best available techniques reference document
CCGT	Combined Cycle Gas Turbine
CEM	Continuous emissions monitor
CHP	Combined heat and power
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DLN	Dry Low NOx burners
DLN-E	Dry Low NOx effective
EIONET	European environment information and observation network is a partnership network of the European Environment Agency
ELV	Emission limit value derived under BAT or an emission limit value set out in IED
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154)
EWC	European waste catalogue
FSA	Food Standards Agency
IC	Improvement Condition
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
LCP	Large Combustion Plant subject to Chapter III of IED
MSUL/MSDL	Minimum start up load/minimum shut-down load
NOx	Oxides of nitrogen (NO plus NO <sub>2</sub> expressed as NO <sub>2</sub> )
NPV	Net Present Value
OCGT	Open Cycle Gas Turbine
PHE	Public Health England
SAC	Special Area of Conservation
SGN	Sector guidance note
TGN	Technical guidance note
TNP	Transitional National Plan
TOC	Total Organic Carbon
WFD	Water Framework Directive (2000/60/EC)

## 1 Our decision

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

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

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

## 2 How we reached our decision

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

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

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

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

The Regulation 61 Notice response from the Operator was received on 30 October 2018.

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

Request for information sent 14 April 2020 BAT Conclusions 1, 2, 3, 6, 9, 12 to 14, 17, 42 and 44.	Response received from Operator 12 May 2020.  Submission of an amended Regulation 61 response which replaces previous submission.
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## 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.

## 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)

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.
- For gas turbines where the IED specified that limits applied over 70% load and the BAT Conclusions specified that AELs applied when dry low NO<sub>x</sub> is effective (DLN-E), we have used DLN-E as a default across all monitoring requirements for NO<sub>x</sub> and CO.

### **a. LCP Configuration**

LCP78 is a 122.9 MWth Open Cycle Gas Turbine (OCGT), burning natural gas and driving an electrical generator producing 49.9 MWe electrical output. The plant and process is designed as a mid-merit power station supplying electricity to the local distribution system.

The OCGT is limited to 1,500 hours of operation per annum, refer to section 8 of this document.

### **b. Setting permit limits**

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

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

- <1,500 hours operation

The Operator's Regulation 61 response was based on unlimited hours operation; however this is not BAT, refer to section 8 of this document.

The following tables outline the limits that have been incorporated into the permit for LCP78, where these were derived from and the reference periods at which they apply. The emission limits refer to concentrations, expressed as mass of emitted substance per volume of flue-gas under the following standard conditions:

- dry gas at a temperature of 273.15 K;
- pressure of 101.3 kPa; and
- 15% volume reference oxygen concentration in the flue gases.

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



NOx limits (mg/Nm <sup>3</sup> )							
Averaging	IED (Annex V Part 1) – Existing plant	Current permit limits	BREF (Table 24 BAT-c)	Expected permit limits	Basis	Limits apply	Monitoring
Annual	None	None	50	Note 1	NA	NA	Continuous
Monthly	50	50	None	50	IED	DLN effective to baseload	
Daily	55	50	55	50 Notes 2 & 3	Existing limit	DLN effective to baseload	
95 <sup>th</sup> %ile of hourly means	100	50	None	50 Note 2	Existing limit	DLN effective to baseload	

Note 1: Yearly average BAT AELs do not apply to existing plants operated < 1,500 hours/year.

Note 2: Existing permit limits which are tighter than the IED ELV and/or the BATAEL and are therefore retained under the principle of 'no backsliding'.

Note 3: This limit also applies to MSUL/MSDL to baseload.

CO limits (mg/Nm <sup>3</sup> )							
Averaging	IED (Annex V Part 1) – Existing plant	Current permit limits	BREF (Table 24 BAT-c)	Expected permit limits	Basis	Limits apply	Monitoring
Annual	None	None	40	Note 1	NA	NA	Continuous
Monthly	100	50	None	50 Note 2	Existing limit	DLN effective to baseload	
Daily	110	50	None	50 Notes 2 & 3	Existing limit	DLN effective to baseload	
95 <sup>th</sup> %ile of hourly means	200	50	None	50 Note 2	Existing limit	DLN effective to baseload	

Note 1: Yearly average BAT AELs do not apply to existing plants operated < 1,500 hours/year.

Note 2: Existing permit limits which are tighter than the IED ELV and/or the BAT AEL and are therefore retained under the principle of 'no backsliding'.

Note 3: This limit also applies to MSUL/MSDL to baseload.

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

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

The existing permit has a restriction on operating hours of 5,250 hours/year; however the Regulation 61 response was submitted based on unlimited operational hours. We have introduced a limit on operating hours in Open Cycle Mode for the LCP in line with our guidance 'BAT for Balancing Plant' (refer to section 8 of this document) as we do not consider this mode of operation as BAT for plant operating over 1,500 hours/year.

Footnote 1 of Table 23 of the LCP BAT Conclusions specifies that the BAT AEELs for this type of plant are not applicable as the plant will operate for <1,500 hours/year. Whilst the BAT AEELs do not apply to this plant, we have included the information provided by the Operator.

The table below sets out the BAT AEELs specified in the LCP BAT Conclusions for LCP operating >1,500 hours/year and the energy efficiency levels confirmed through the Regulation 61 notice response. Although not applicable, 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
<b>LCP78 OCGT &gt;50MWth</b>					
33 – 41.5	None	None	40.7 ± 1.1	NA	NA

We have however included a process monitoring requirement in table S3.3 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. If the plant operates for <500 hours/year we have specified that the assessment of efficiency can be based on calculation. This is because we will not require plant to fire up with the sole purpose of carrying out an assessment of efficiency.

## 5 Decision checklist regarding relevant BAT Conclusions

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

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

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

BAT Conclusion requirement topic	Permit condition(s)	Permit table(s)
Environmental Management System	1.1.1	S1.2
BAT AELs	3.1.1 and 3.5.1	S3.1a
Monitoring	2.3, 3.5 and 3.6	S1.2, S1.4, S1.5 and S3.1a
Energy efficiency	1.2 and 2.3	S3.3
Noise	2.3 and 3.4	S1.2
Other operating techniques	2.3	S1.2

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

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

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement
<b>General</b>			
1	<p><b>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:</b></p> <ul style="list-style-type: none"> <li>i. commitment of the management, including senior management;</li> <li>ii. definition of an environmental policy that includes the continuous improvement of the installation by the management;</li> <li>iii. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment;</li> <li>iv. implementation of procedures <ul style="list-style-type: none"> <li>(a) Structure and responsibility</li> <li>(b) Training</li> <li>(c) Communication</li> <li>(d) Employee involvement</li> <li>(e) Documentation</li> <li>(f) Efficient process control</li> <li>(g) Maintenance programmes</li> <li>(h) Emergency preparedness and response</li> <li>(i) Safeguarding compliance with environmental legislation</li> </ul> </li> <li>v. checking performance and taking corrective action, paying particular attention to: <ul style="list-style-type: none"> <li>(a) monitoring and measurement (see also the Reference Document on the General Principles of Monitoring)</li> <li>(b) corrective and preventive action</li> <li>(c) maintenance of records</li> <li>(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;</li> </ul> </li> <li>vi. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management;</li> <li>vii. following the development of cleaner technologies;</li> <li>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;</li> <li>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;</li> <li>ix. application of sectoral benchmarking on a regular basis.</li> </ul>	FC	<p>In their response to our further information request received 12 May 2020 they confirm that:</p> <p>The existing EMS is currently in compliance with all conditions of this BAT Conclusion, i through xvi.</p> <p>When fully implemented, the NAES EMS will also meet all requirements of this BAT Conclusion.</p> <p>There was a change in ownership in 2019 when the company name was changed to Whitetower Energy Limited.</p> <p>From 01 June 2020 the site operations and therefore the EMS will be provided by the new operations and maintenance (O &amp; M) provider, NAES Power Solutions Limited. NAES have an EMS that is very similar to ISO 14001 but it is not certified.</p> <p>They expect to be fully compliant with this BAT Conclusion in 2021.</p> <p>Due to the change of EMS and the expected implementation timescales we do not agree with the Operator's stated compliance of CC and have changed the status to FC. We do not consider it necessary to set an improvement condition as we will track progress via compliance.</p>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement													
	<p>Etc - see BAT Conclusions</p> <p><b>Applicability.</b> 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.</p>															
2	<p>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.</p>	CC	<p>The Operator confirmed that:</p> <p>Calculations of gas turbine efficiency were provided in the Regulation 60 data submitted 21 July 2015. (Thermal Efficiency - Measurements taken 23 June 2015).</p> <p>Specific data will be reviewed by the O &amp; M provider and Siemens. Siemens will provide engine performance data.</p> <p>O &amp; M to provide a site efficiency report as a review of historic site data and improvements.</p> <p>A process monitoring requirement has been set in table S3.3 which requires energy efficiency monitoring after an overhaul.</p> <p>We agree with the Operator's stated compliance.</p>													
3	<p><b>BAT is to monitor key process parameters relevant for emissions to air and water including those given below.</b></p> <table border="1" data-bbox="293 1002 1173 1249"> <thead> <tr> <th data-bbox="293 1002 568 1034">Stream</th> <th data-bbox="568 1002 893 1034">Parameter(s)</th> <th data-bbox="893 1002 1173 1034">Monitoring</th> </tr> </thead> <tbody> <tr> <td data-bbox="293 1034 568 1190" rowspan="3">Flue-gas</td> <td data-bbox="568 1034 893 1098">Flow</td> <td data-bbox="893 1034 1173 1098">Periodic or continuous determination</td> </tr> <tr> <td data-bbox="568 1098 893 1161">Oxygen content, temperature, and pressure</td> <td data-bbox="893 1098 1173 1161">Periodic or continuous measurement</td> </tr> <tr> <td data-bbox="568 1161 893 1190">Water vapour content <sup>(3)</sup></td> <td data-bbox="893 1161 1173 1190"></td> </tr> <tr> <td data-bbox="293 1190 568 1249">Waste water from flue-gas treatment</td> <td data-bbox="568 1190 893 1249">Flow, pH, and temperature</td> <td data-bbox="893 1190 1173 1249">Continuous measurement</td> </tr> </tbody> </table>	Stream	Parameter(s)	Monitoring	Flue-gas	Flow	Periodic or continuous determination	Oxygen content, temperature, and pressure	Periodic or continuous measurement	Water vapour content <sup>(3)</sup>		Waste water from flue-gas treatment	Flow, pH, and temperature	Continuous measurement	CC	<p>The Operator confirmed that:</p> <p>Flow, temperature and pressure are measured by instruments installed on the gas turbine air system and gas fuel system.</p> <p>Oxygen is measured on a continuous basis by the continuous emissions monitor (CEMS) analyser.</p> <p>An Mcertified CEM system is installed.</p> <p>We can confirm that the existing permit requires continuous monitoring for oxygen, temperature, pressure and water vapour.</p> <p>The site does not carry out flue-gas treatment.</p> <p>We agree with the Operator's stated compliance.</p>
Stream	Parameter(s)	Monitoring														
Flue-gas	Flow	Periodic or continuous determination														
	Oxygen content, temperature, and pressure	Periodic or continuous measurement														
	Water vapour content <sup>(3)</sup>															
Waste water from flue-gas treatment	Flow, pH, and temperature	Continuous measurement														

BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement
4	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.						CC	<p>The Operator confirmed that:</p> <p>An Mcertified CEM system is installed.</p> <p>We can confirm that the existing permit requires continuous monitoring for NOx and CO, consistent with the requirements of this BAT Conclusion.</p> <p>We agree with the Operator's stated compliance.</p>
	Substance/Parameter	Fuel/Process/Type of combustion plant	Combustion plant total rated thermal input	Standard(s) <sup>(4)</sup>	Minimum monitoring frequency <sup>(5)</sup>	Monitoring associated with		
	NH <sub>3</sub>	— When SCR and/or SNCR is used	All sizes	Generic EN standards	Continuous <sup>(6)</sup> / <sup>(7)</sup>	BAT 7		
	NO <sub>x</sub>	— 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 <sup>(6)</sup> / <sup>(8)</sup>	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		
		— Combustion plants on offshore platforms	All sizes	EN 14792	Once every year <sup>(9)</sup>	BAT 53		
	N <sub>2</sub> O	— Coal and/or lignite in circulating	All sizes	EN 21258	Once every year <sup>(10)</sup>	BAT 20 BAT 24		

BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement
		fluidised bed boilers						
		— Solid biomass and/or peat in circulating fluidised bed boilers						
	CO	<ul style="list-style-type: none"> <li>— Coal and/or lignite including waste co-incineration</li> <li>— Solid biomass and/or peat including waste co-incineration</li> <li>— HFO- and/or gas-oil-fired boilers and engines</li> <li>— Gas-oil-fired gas turbines</li> <li>— Natural-gas-fired boilers, engines, and turbines</li> <li>— Iron and steel process gases</li> <li>— Process fuels from the chemical industry</li> <li>— IGCC plants</li> </ul>	All sizes	Generic EN standards	Continuous <sup>(6)</sup> <sub>(8)</sub>	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 <sup>(9)</sup>	BAT 54		
	SO <sub>2</sub>	<ul style="list-style-type: none"> <li>— Coal and/or lignite incl waste co-incineration</li> <li>— Solid biomass and/or peat incl waste co-incineration</li> <li>— HFO- and/or gas-oil-fired boilers</li> </ul>	All sizes	Generic EN standards and EN 14791	Continuous <sup>(6)</sup> <sub>(11)</sub> <sub>(12)</sub>	BAT 21 BAT 25 BAT 29 BAT 34 BAT 39 BAT 50 BAT 57 BAT 66 BAT 67 BAT 74		

BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement
	<ul style="list-style-type: none"> <li>— HFO- and/or gas-oil-fired engines</li> <li>— Gas-oil-fired gas turbines</li> <li>— Iron and steel process gases</li> <li>— Process fuels from the chemical industry in boilers</li> <li>— IGCC plants</li> </ul>							
SO <sub>3</sub>	<ul style="list-style-type: none"> <li>— When SCR is used</li> </ul>	All sizes	No EN standard available	Once every year	—			
Gaseous chlorides, expressed as HCl	<ul style="list-style-type: none"> <li>— Coal and/or lignite</li> <li>— Process fuels from the chemical industry in boilers</li> </ul>	All sizes	EN 1911	Once every three months <sup>(6)</sup> <sup>(13)</sup> <sup>(14)</sup>	BAT 21 BAT 57			
	<ul style="list-style-type: none"> <li>— Solid biomass and/or peat</li> </ul>	All sizes	Generic EN standards	Continuous <sup>(15)</sup> <sup>(16)</sup>	BAT 25			
	<ul style="list-style-type: none"> <li>— Waste co-incineration</li> </ul>	All sizes	Generic EN standards	Continuous <sup>(6)</sup> <sup>(16)</sup>	BAT 66 BAT 67			
HF	<ul style="list-style-type: none"> <li>— Coal and/or lignite</li> <li>— Process fuels from the chemical industry in boilers</li> </ul>	All sizes	No EN standard available	Once every three months <sup>(6)</sup> <sup>(13)</sup> <sup>(14)</sup>	BAT 21 BAT 57			
	<ul style="list-style-type: none"> <li>— Solid biomass and/or peat</li> </ul>	All sizes	No EN standard available	Once every year	BAT 25			
	<ul style="list-style-type: none"> <li>— Waste co-incineration</li> </ul>	All sizes	Generic EN standards	Continuous <sup>(6)</sup> <sup>(16)</sup>	BAT 66 BAT 67			
Dust	<ul style="list-style-type: none"> <li>— Coal and/or lignite</li> <li>— Solid biomass and/or peat</li> <li>— HFO- and/or gas-oil-fired boilers</li> </ul>	All sizes	Generic EN standards and EN 13284-1 and EN 13284-2	Continuous <sup>(6)</sup> <sup>(17)</sup>	BAT 22 BAT 26 BAT 30 BAT 35 BAT 39 BAT 51 BAT 58 BAT 75			



BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement
		<ul style="list-style-type: none"> <li>— Iron and steel process gases</li> <li>— Process fuels from the chemical industry in boilers</li> <li>— IGCC plants</li> <li>— HFO- and/or gas-oil-fired engines</li> <li>— Gas-oil-fired gas turbines</li> </ul>						
		<ul style="list-style-type: none"> <li>— Waste co-incineration</li> </ul>	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)	<ul style="list-style-type: none"> <li>— Coal and/or lignite</li> <li>— Solid biomass and/or peat</li> <li>— HFO- and/or gas-oil-fired boilers and engines</li> </ul>	All sizes	EN 14385	Once every year <sub>(18)</sub>	BAT 22 BAT 26 BAT 30		
		<ul style="list-style-type: none"> <li>— Waste co-incineration</li> </ul>	< 300 MW <sub>th</sub>	EN 14385	Once every six months <sub>(13)</sub>	BAT 68 BAT 69		
			≥ 300 MW <sub>th</sub>	EN 14385	Once every three months <sub>(19)</sub> <sub>(13)</sub>			
		<ul style="list-style-type: none"> <li>— IGCC plants</li> </ul>	≥ 100 MW <sub>th</sub>	EN 14385	Once every year <sub>(18)</sub>	BAT 75		
	Hg	<ul style="list-style-type: none"> <li>— Coal and/or lignite including waste co-incineration</li> </ul>	< 300 MW <sub>th</sub>	EN 13211	Once every three months <sub>(13)</sub> <sub>(20)</sub>	BAT 23		
			≥ 300 MW <sub>th</sub>	Generic EN standards and EN 14884	Continuous <sub>(16)</sub> <sub>(21)</sub>			
		<ul style="list-style-type: none"> <li>— Solid biomass and/or peat</li> </ul>	All sizes	EN 13211	Once every year <sub>(22)</sub>	BAT 27		
		<ul style="list-style-type: none"> <li>— Waste co-incineration with solid biomass and/or peat</li> </ul>	All sizes	EN 13211	Once every three months <sub>(13)</sub>	BAT 70		
		<ul style="list-style-type: none"> <li>— IGCC plants</li> </ul>	≥ 100 MW <sub>th</sub>	EN 13211	Once every year <sub>(23)</sub>	BAT 75		



BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement																														
	<table border="1"> <tr> <td colspan="2">Sulphide, easily released (S<sup>2-</sup>)</td> <td>No EN standard available</td> <td></td> </tr> <tr> <td colspan="2">Sulphite (SO<sub>3</sub><sup>2-</sup>)</td> <td>EN ISO 10304-3</td> <td></td> </tr> <tr> <td rowspan="7">Metals and metalloids</td> <td>As</td> <td rowspan="6">Various EN standards available (e.g. EN ISO 11885 or EN ISO 17294-2)</td> <td></td> </tr> <tr> <td>Cd</td> </tr> <tr> <td>Cr</td> </tr> <tr> <td>Cu</td> </tr> <tr> <td>Ni</td> </tr> <tr> <td>Pb</td> </tr> <tr> <td>Zn</td> </tr> <tr> <td></td> <td>Hg</td> <td>Various EN standards available (e.g. EN ISO 12846 or EN ISO 17852)</td> <td></td> </tr> <tr> <td colspan="2">Chloride (Cl<sup>-</sup>)</td> <td>Various EN standards available (e.g. EN ISO 10304-1 or EN ISO 15682)</td> <td>—</td> </tr> <tr> <td colspan="2">Total nitrogen</td> <td>EN 12260</td> <td>—</td> </tr> </table>	Sulphide, easily released (S <sup>2-</sup> )		No EN standard available		Sulphite (SO <sub>3</sub> <sup>2-</sup> )		EN ISO 10304-3		Metals and metalloids	As	Various EN standards available (e.g. EN ISO 11885 or EN ISO 17294-2)		Cd	Cr	Cu	Ni	Pb	Zn		Hg	Various EN standards available (e.g. EN ISO 12846 or EN ISO 17852)		Chloride (Cl <sup>-</sup> )		Various EN standards available (e.g. EN ISO 10304-1 or EN ISO 15682)	—	Total nitrogen		EN 12260	—		
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6	<p>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.</p> <table border="1"> <thead> <tr> <th>Technique</th> <th>Description</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>a. 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. Maintenance of the combustion system</td> <td>Regular planned maintenance according to suppliers' recommendations</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Fuel blending and mixing	Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type	Generally applicable	b. Maintenance of the combustion system	Regular planned maintenance according to suppliers' recommendations	CC	<p>The Operator confirmed that:</p> <p>a) Fuel blending - not applicable</p> <p>b) Maintenance of combustion system - maintenance of the gas turbine is undertaken to maintain environmental performance. This includes camera inspections and combustion tuning, with improvements carried out through a service agreement.</p> <p>c) Advance control system – the gas turbine is controlled with an engine management system which is maintained through a service agreement.</p> <p>d) Good design of combustion equipment – the gas turbine is fitted with a three stage DLN combustion system to provide combustion stability and emissions performance.</p>																						
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BAT C No.	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement
	c . .	Advanced control system	See description in Section 8.1	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system	e) Fuel choice – the gas turbine can only operate on natural gas.  We agree with the Operator's stated compliance.
d . .	Good design of the combustion equipment	Good design of furnace, combustion chambers, burners and associated devices	Generally applicable to new combustion plants		
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		
7	<p>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<sub>x</sub> emissions, BAT is to optimise the design and/or operation of SCR and/or SNCR (e.g. optimised reagent to NO<sub>x</sub> ratio, homogeneous reagent distribution and optimum size of the reagent drops).</p> <p><b>BAT-associated emission levels</b></p> <p>The BAT-associated emission level (BAT-AEL) for emissions of NH<sub>3</sub> to air from the use of SCR and/or SNCR is &lt; 3–10 mg/Nm<sup>3</sup> 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<sup>3</sup>.</p>			NA	<p>The Operator confirmed that this BAT Conclusion is not applicable to the installation, despite stating that they are currently compliant.</p> <p>We have set the status to NA instead of CC.</p> <p>We agree this BAT Conclusion is not applicable to the activities carried out at the installation, as there is no SCR or SNCR on site.</p>
8	<p>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.</p>			CC	<p>The Operator confirmed that:</p> <p>Gas turbine servicing and engine tuning is undertaken.</p>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement									
			<p>No abatement systems are installed. Engines run at full load capacity, therefore most efficient running. They do not run at reduced load.</p> <p>We agree with the Operator's stated compliance.</p>									
9	<p>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):</p> <p>(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;</p> <p>(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);</p> <p>(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)).</p> <p><b>Description</b> 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.</p> <table border="1" data-bbox="293 1102 1173 1390"> <thead> <tr> <th data-bbox="293 1102 591 1137">Fuel(s)</th> <th data-bbox="591 1102 1173 1137">Substances/Parameters subject to characterisation</th> </tr> </thead> <tbody> <tr> <td data-bbox="293 1137 591 1342" rowspan="4">Biomass/peat</td> <td data-bbox="591 1137 1173 1173">— LHV</td> </tr> <tr> <td data-bbox="591 1173 1173 1224">— moisture</td> </tr> <tr> <td data-bbox="591 1224 1173 1259">— Ash</td> </tr> <tr> <td data-bbox="591 1259 1173 1342">— C, Cl, F, N, S, K, Na — Metals and metalloids (As, Cd, Cr, Cu, Hg, Pb, Zn)</td> </tr> <tr> <td data-bbox="293 1342 591 1390">Coal/lignite</td> <td data-bbox="591 1342 1173 1390">— LHV</td> </tr> </tbody> </table>	Fuel(s)	Substances/Parameters subject to characterisation	Biomass/peat	— LHV	— moisture	— Ash	— C, Cl, F, N, S, K, Na — Metals and metalloids (As, Cd, Cr, Cu, Hg, Pb, Zn)	Coal/lignite	— LHV	CC	<p>The Operator confirmed that:</p> <p>All fuel gas is supplied through the national gas networks. National inventory data is used for quality measurement.</p> <p>We consider that for plants which burn natural gas from the National Grid as a fuel that it is not necessary for the Operator to replicate the testing carried out by the National Grid.</p> <p>There are no alternative fuels used.</p> <p>We agree with the Operator's stated compliance.</p>
Fuel(s)	Substances/Parameters subject to characterisation											
Biomass/peat	— LHV											
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Coal/lignite	— LHV											

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Waste <sup>[28]</sup>	<ul style="list-style-type: none"> <li>— LHV</li> <li>— Moisture</li> <li>— Volatiles, ash, Br, C, Cl, F, H, N, O, S</li> <li>— Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Ti, V, Zn)</li> </ul>																				
10	<p>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:</p> <ul style="list-style-type: none"> <li>— 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),</li> </ul>	CC	<p>The Operator confirmed that:</p> <p>The gas turbine is operated to keep start-up times to a minimum. Engine testing is kept to minimum durations.</p> <p>The energy supply contracts are for peaking operations, which reduces operational hours.</p>																		

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement										
	<ul style="list-style-type: none"> <li>— set-up and implementation of a specific preventive maintenance plan for these relevant systems,</li> <li>— review and recording of emissions caused by OTNOC and associated circumstances and implementation of corrective actions if necessary,</li> <li>— periodic assessment of the overall emissions during OTNOC (e.g. frequency of events, duration, emissions quantification/estimation) and implementation of corrective actions if necessary.</li> </ul>		<p>The engine is shut-down for investigation in the event of abnormal emissions.</p> <p>We agree with the Operator's stated compliance.</p>										
11	<p>BAT is to appropriately monitor emissions to air and/or to water during OTNOC.</p> <p><b>Description</b></p> <p>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.</p>	CC	<p>The Operator confirmed that:</p> <p>The plant is not operated when the CEMS is out of service. There is no alternative method of analysis available.</p> <p>We agree with the Operator's stated compliance.</p>										
12	<p>In order to increase the energy efficiency of combustion, gasification and/or IGCC units operated <math>\geq 1\,500</math> h/yr, BAT is to use an appropriate combination of the techniques given below.</p> <table border="1" data-bbox="293 903 1173 1385"> <thead> <tr> <th data-bbox="293 903 495 938">Technique</th> <th data-bbox="495 903 846 938">Description</th> <th data-bbox="846 903 1173 938">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="293 938 495 1070">a. Combustion optimisation</td> <td data-bbox="495 938 846 1070">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 data-bbox="846 938 1173 1070" rowspan="3">Generally applicable</td> </tr> <tr> <td data-bbox="293 1070 495 1257">b. Optimisation of the working medium conditions</td> <td data-bbox="495 1070 846 1257">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<sub>x</sub> emissions or the characteristics of energy demanded</td> </tr> <tr> <td data-bbox="293 1257 495 1385">c. Optimisation of the steam cycle</td> <td data-bbox="495 1257 846 1385">Operate with lower turbine exhaust pressure by utilisation of the lowest possible temperature of the condenser cooling water, within the design conditions</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Combustion optimisation	See description in Section 8.2. Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues	Generally applicable	b. Optimisation of the working medium conditions	Operate at the highest possible pressure and temperature of the working medium gas or steam, within the constraints associated with, for example, the control of NO <sub>x</sub> emissions or the characteristics of energy demanded	c. Optimisation of the steam cycle	Operate with lower turbine exhaust pressure by utilisation of the lowest possible temperature of the condenser cooling water, within the design conditions	CC	<p>The Operator confirmed that:</p> <p>a) Combustion optimisation - gas turbine performance is monitored by the O &amp; M provider who recommend any actions to maintain / improve performance.</p> <p>b) Optimisation of working medium conditions – the gas turbine engine is controlled with an engine management system which is maintained through a service agreement.</p> <p>d) Minimisation of energy consumption - routine checks of the fuel usage are carried out to compare historic data to measure gas turbine performance technically and commercially.</p> <p>p) Minimisation of heat loss - gas fuel pipe-work is insulated after the gas heater.</p> <p>q) Advanced materials – the gas turbine is engineered from aero derivative based technology and uses the same materials and technologies.</p>
Technique	Description	Applicability											
a. Combustion optimisation	See description in Section 8.2. Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues	Generally applicable											
b. Optimisation of the working medium conditions	Operate at the highest possible pressure and temperature of the working medium gas or steam, within the constraints associated with, for example, the control of NO <sub>x</sub> emissions or the characteristics of energy demanded												
c. Optimisation of the steam cycle	Operate with lower turbine exhaust pressure by utilisation of the lowest possible temperature of the condenser cooling water, within the design conditions												

BAT C No.	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement
	d.	Minimisation of energy consumption	Minimising the internal energy consumption (e.g. greater efficiency of the feed-water pump)		<p>The site operates in open cycle mode only and is not capable of CCGT/ CHP operations so some techniques do not apply.</p> <p>NA: c, e, f, g to o, r and s</p> <p>We agree with the Operator's stated compliance.</p>
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 <sub>x</sub> 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 <sub>x</sub> 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: <ul style="list-style-type: none"> <li>— flue-gas</li> <li>— grate cooling</li> <li>— circulating fluidised bed</li> </ul>	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		



BAT C No.	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement
	k.	Flue-gas condenser	See description in Section 8.2.	Generally applicable to CHP units provided there is enough demand for low-temperature heat	
	l.	Heat accumulation	Heat accumulation storage in CHP mode	Only applicable to CHP plants. The applicability may be limited in the case of low heat load demand	
	m.	Wet stack	See description in Section 8.2.	Generally applicable to new and existing units fitted with wet FGD	
	n.	Cooling tower discharge	The release of emissions to air through a cooling tower and not via a dedicated stack	Only applicable to units fitted with wet FGD where reheating of the flue-gas is necessary before release, and where the unit cooling system is a cooling tower	
	o.	Fuel pre-drying	The reduction of fuel moisture content before combustion to improve combustion conditions	Applicable to the combustion of biomass and/or peat within the constraints associated with spontaneous combustion risks (e.g. the moisture content of peat is kept above 40 % throughout the delivery chain). The retrofit of existing plants may be restricted by the extra calorific value that can be obtained from the drying operation and by the limited retrofit possibilities offered by some boiler designs or plant configurations	
	p.	Minimisation of heat losses	Minimising residual heat losses, e.g. those that occur via the slag or those that can be reduced by insulating radiating sources	Only applicable to solid-fuel-fired combustion units and to gasification/IGCC units	
	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	

BAT C No.	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement												
	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 $\geq 600 \text{ MW}_{th}$ operated $> 4\,000 \text{ h/yr}$ . Not applicable when the purpose of the unit is to produce low steam temperatures and/or pressures in process industries. Not applicable to gas turbines and engines generating steam in CHP mode. For units combusting biomass, the applicability may be constrained by high-temperature corrosion in the case of certain biomasses													
13	In order to reduce water usage and the volume of contaminated waste water discharged, BAT is to use one or both of the techniques given below.			CC	<p>The Operator confirmed that:</p> <p>The contents of plant blind sumps are removed on alarm and tankered off site as required for recycling. The volume collected annually is approximately eight tonnes/year.</p> <p>We agree with the Operator's stated compliance.</p>												
	<table border="1"> <thead> <tr> <th data-bbox="277 938 331 978">Technique</th> <th data-bbox="331 938 450 978"></th> <th data-bbox="450 938 853 978">Description</th> <th data-bbox="853 938 1189 978">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="277 978 331 1158">a</td> <td data-bbox="331 978 450 1158">Water recycling</td> <td data-bbox="450 978 853 1158">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 data-bbox="853 978 1189 1158">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 data-bbox="277 1158 331 1318">b</td> <td data-bbox="331 1158 450 1318">Dry bottom ash handling</td> <td data-bbox="450 1158 853 1318">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 data-bbox="853 1158 1189 1318">Only applicable to plants combusting solid fuels. There may be technical restrictions that prevent retrofitting to existing combustion plants</td> </tr> </tbody> </table>			Technique		Description	Applicability	a	Water recycling	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	Not applicable to waste water from cooling systems when water treatment chemicals and/or high concentrations of salts from seawater are present	b	Dry bottom ash handling	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.	Only applicable to plants combusting solid fuels. There may be technical restrictions that prevent retrofitting to existing combustion plants		
Technique		Description	Applicability														
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BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement																								
14	<p>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.</p> <p><b>Description</b> Waste water streams that are typically segregated and treated include surface run-off water, cooling water, and waste water from flue-gas treatment.</p> <p><b>Applicability</b> The applicability may be restricted in the case of existing plants due to the configuration of the drainage systems.</p>	CC	<p>The Operator confirmed that:</p> <p>The contents of foul water sumps are removed on alarm and tankered off site as required for processing &amp; recycling. The volume collected annually is approximately 15 tonnes/year.</p> <p>We note that uncontaminated surface water is discharged at emission point W1, via interceptors to a soak-away.</p> <p>We agree with the Operator's stated compliance.</p>																								
15	<p>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.</p> <table border="1" data-bbox="293 703 1173 1313"> <thead> <tr> <th data-bbox="293 703 591 767">Technique</th> <th data-bbox="591 703 824 767">Typical pollutants prevented/abated</th> <th data-bbox="824 703 1173 767">Applicability</th> </tr> </thead> <tbody> <tr> <td colspan="3" data-bbox="293 767 1173 799" style="text-align: center;"><b>Primary techniques</b></td> </tr> <tr> <td data-bbox="293 799 591 911">a. Optimised combustion (see BAT 6) and flue-gas treatment systems (e.g. SCR/SNCR, see BAT 7)</td> <td data-bbox="591 799 824 911">Organic compounds, ammonia (NH<sub>3</sub>)</td> <td data-bbox="824 799 1173 911">Generally applicable</td> </tr> <tr> <td colspan="3" data-bbox="293 911 1173 943" style="text-align: center;"><b>Secondary techniques <sup>(29)</sup></b></td> </tr> <tr> <td data-bbox="293 943 591 1007">b. Adsorption on activated carbon</td> <td data-bbox="591 943 824 1007">Organic compounds, mercury (Hg)</td> <td data-bbox="824 943 1173 1007">Generally applicable</td> </tr> <tr> <td data-bbox="293 1007 591 1190">c. Aerobic biological treatment</td> <td data-bbox="591 1007 824 1190">Biodegradable organic compounds, ammonium (NH<sub>4</sub><sup>+</sup>)</td> <td data-bbox="824 1007 1173 1190">Generally applicable for the treatment of organic compounds. Aerobic biological treatment of ammonium (NH<sub>4</sub><sup>+</sup>) may not be applicable in the case of high chloride concentrations (i.e. around 10 g/l)</td> </tr> <tr> <td data-bbox="293 1190 591 1254">d. Anoxic/anaerobic biological treatment</td> <td data-bbox="591 1190 824 1254">Mercury (Hg), nitrate (NO<sub>3</sub><sup>-</sup>), nitrite (NO<sub>2</sub><sup>-</sup>)</td> <td data-bbox="824 1190 1173 1254">Generally applicable</td> </tr> <tr> <td data-bbox="293 1254 591 1313">e. Coagulation and flocculation</td> <td data-bbox="591 1254 824 1313">Suspended solids</td> <td data-bbox="824 1254 1173 1313">Generally applicable</td> </tr> </tbody> </table>	Technique	Typical pollutants prevented/abated	Applicability	<b>Primary techniques</b>			a. Optimised combustion (see BAT 6) and flue-gas treatment systems (e.g. SCR/SNCR, see BAT 7)	Organic compounds, ammonia (NH <sub>3</sub> )	Generally applicable	<b>Secondary techniques <sup>(29)</sup></b>			b. Adsorption on activated carbon	Organic compounds, mercury (Hg)	Generally applicable	c. Aerobic biological treatment	Biodegradable organic compounds, ammonium (NH <sub>4</sub> <sup>+</sup> )	Generally applicable for the treatment of organic compounds. Aerobic biological treatment of ammonium (NH <sub>4</sub> <sup>+</sup> ) may not be applicable in the case of high chloride concentrations (i.e. around 10 g/l)	d. Anoxic/anaerobic biological treatment	Mercury (Hg), nitrate (NO <sub>3</sub> <sup>-</sup> ), nitrite (NO <sub>2</sub> <sup>-</sup> )	Generally applicable	e. Coagulation and flocculation	Suspended solids	Generally applicable	NA	<p>The Operator confirmed that this BAT Conclusion is not applicable to the installation, despite stating that they are currently compliant.</p> <p>We have set the status to NA instead of CC.</p> <p>We agree this BAT Conclusion is not applicable to the activities carried out at the installation, as no flue gas treatment undertaken on site.</p>
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BAT C No.	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement
	f.	Crystallisation	Metals and metalloids, sulphate (SO <sub>4</sub> <sup>2-</sup> ), fluoride (F <sup>-</sup> )	Generally applicable	
	g.	Filtration (e.g. sand filtration, microfiltration, ultrafiltration)	Suspended solids, metals	Generally applicable	
	h.	Flotation	Suspended solids, free oil	Generally applicable	
	i.	Ion exchange	Metals	Generally applicable	
	j.	Neutralisation	Acids, alkalis	Generally applicable	
	k.	Oxidation	Sulphide (S <sup>2-</sup> ), sulphite (SO <sub>3</sub> <sup>2-</sup> )	Generally applicable	
	l.	Precipitation	Metals and metalloids, sulphate (SO <sub>4</sub> <sup>2-</sup> ), fluoride (F <sup>-</sup> )	Generally applicable	
	m.	Sedimentation	Suspended solids	Generally applicable	
	n.	Stripping	Ammonia (NH <sub>3</sub> )	Generally applicable	
	The BAT-AELs refer to direct discharges to a receiving water body at the point where the emission leaves the installation.				
	<b>BAT-AELs for direct discharges to a receiving water body from flue-gas treatment</b>				
	<b>Substance/Parameter</b>		<b>BAT-AELs</b>		
			<b>Daily average</b>		
	Total organic carbon (TOC)		20–50 mg/l <sup>(30)</sup> <sup>(31)</sup> <sup>(32)</sup>		
	Chemical oxygen demand (COD)		60–150 mg/l <sup>(30)</sup> <sup>(31)</sup> <sup>(32)</sup>		
	Total suspended solids (TSS)		10–30 mg/l		
	Fluoride (F <sup>-</sup> )		10–25 mg/l <sup>(32)</sup>		
	Sulphate (SO <sub>4</sub> <sup>2-</sup> )		1,3–2,0 g/l <sup>(32)</sup> <sup>(33)</sup> <sup>(34)</sup> <sup>(35)</sup>		
	Sulphide (S <sup>2-</sup> ), easily released		0,1–0,2 mg/l <sup>(32)</sup>		
	Sulphite (SO <sub>3</sub> <sup>2-</sup> )		1–20 mg/l <sup>(32)</sup>		
	Metals and metalloids	As	10–50 µg/l		
		Cd	2–5 µg/l		

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement												
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Zn	50–200 µg/l														
16	<p>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:</p> <p>(a) waste prevention, e.g. maximise the proportion of residues which arise as by-products;</p> <p>(b) waste preparation for reuse, e.g. according to the specific requested quality criteria;</p> <p>(c) waste recycling;</p> <p>(d) other waste recovery (e.g. energy recovery),</p> <p>by implementing an appropriate combination of techniques such as:</p> <table border="1"> <thead> <tr> <th data-bbox="293 884 327 916">Technique</th> <th data-bbox="327 884 869 916">Description</th> <th data-bbox="869 884 1173 916">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="293 916 327 1123">a</td> <td data-bbox="327 916 869 1123">Generation of gypsum as a by-product</td> <td data-bbox="869 916 1173 1123">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> </tr> <tr> <td data-bbox="293 1123 327 1331">b</td> <td data-bbox="327 1123 869 1331">Recycling or recovery of residues in the construction sector</td> <td data-bbox="869 1123 1173 1331">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> </tr> <tr> <td data-bbox="293 1331 327 1390">c</td> <td data-bbox="327 1331 869 1390">Energy recovery by</td> <td data-bbox="869 1331 1173 1390">The residual energy content of carbon-rich ash and sludges</td> </tr> </tbody> </table>	Technique	Description	Applicability	a	Generation of gypsum as a by-product	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	b	Recycling or recovery of residues in the construction sector	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)	c	Energy recovery by	The residual energy content of carbon-rich ash and sludges	CC	<p>The Operator confirmed that:</p> <p>Disposal of waste where possible is via recycling processes with contractors. Volumes of waste are very low due to activity levels on site.</p> <p>We agree with the Operator's stated compliance.</p>
Technique	Description	Applicability													
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BAT C No.	Summary of BAT Conclusion requirement				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement
		using waste in the fuel mix	generated by the combustion of coal, lignite, heavy fuel oil, peat or biomass can be recovered for example by mixing with the fuel	fuel mix and are technically able to feed the fuels into the combustion chamber		
	d	Preparation of spent catalyst for reuse	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	The applicability may be limited by the mechanical condition of the catalyst and the required performance with respect to controlling NO <sub>x</sub> and NH <sub>3</sub> emissions		

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement																		
17	<p>In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below.</p> <table border="1" data-bbox="293 384 1173 1267"> <thead> <tr> <th data-bbox="293 384 495 416">Technique</th> <th data-bbox="495 384 875 416">Description</th> <th data-bbox="875 384 1173 416">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="293 416 495 762">a. Operational measures</td> <td data-bbox="495 416 875 762">           These include:           <ul style="list-style-type: none"> <li>— improved inspection and maintenance of equipment</li> <li>— closing of doors and windows of enclosed areas, if possible</li> <li>— equipment operated by experienced staff</li> <li>— avoidance of noisy activities at night, if possible</li> <li>— provisions for noise control during maintenance activities</li> </ul> </td> <td data-bbox="875 416 1173 762">Generally applicable</td> </tr> <tr> <td data-bbox="293 762 495 842">b. Low-noise equipment</td> <td data-bbox="495 762 875 842">This potentially includes compressors, pumps and disks</td> <td data-bbox="875 762 1173 842">Generally applicable when the equipment is new or replaced</td> </tr> <tr> <td data-bbox="293 842 495 978">c. Noise attenuation</td> <td data-bbox="495 842 875 978">Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings</td> <td data-bbox="875 842 1173 978">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 data-bbox="293 978 495 1161">d. Noise-control equipment</td> <td data-bbox="495 978 875 1161">           This includes:           <ul style="list-style-type: none"> <li>— noise-reducers</li> <li>— equipment insulation</li> <li>— enclosure of noisy equipment</li> <li>— soundproofing of buildings</li> </ul> </td> <td data-bbox="875 978 1173 1161">The applicability may be restricted by lack of space</td> </tr> <tr> <td data-bbox="293 1161 495 1267">e. Appropriate location of equipment and buildings</td> <td data-bbox="495 1161 875 1267">Noise levels can be reduced by increasing the distance between the emitter and the receiver and by using buildings as noise screens</td> <td data-bbox="875 1161 1173 1267">Generally applicable to new plant</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Operational measures	These include: <ul style="list-style-type: none"> <li>— improved inspection and maintenance of equipment</li> <li>— closing of doors and windows of enclosed areas, if possible</li> <li>— equipment operated by experienced staff</li> <li>— avoidance of noisy activities at night, if possible</li> <li>— provisions for noise control during maintenance activities</li> </ul>	Generally applicable	b. Low-noise equipment	This potentially includes compressors, pumps and disks	Generally applicable when the equipment is new or replaced	c. Noise attenuation	Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings	Generally applicable to new plants. In the case of existing plants, the insertion of obstacles may be restricted by lack of space	d. Noise-control equipment	This includes: <ul style="list-style-type: none"> <li>— noise-reducers</li> <li>— equipment insulation</li> <li>— enclosure of noisy equipment</li> <li>— soundproofing of buildings</li> </ul>	The applicability may be restricted by lack of space	e. Appropriate location of equipment and buildings	Noise levels can be reduced by increasing the distance between the emitter and the receiver and by using buildings as noise screens	Generally applicable to new plant	CC	<p>The Operator confirmed that:</p> <p>Maintaining site noise prevention devices / sound proofing. Low levels of operating hours during the year. Regular maintenance of plant.</p> <p>The plant is as design and operated remotely with no new plant items requiring new noise assessments.</p> <p>O&amp;M to plan in a noise survey to check against historic levels.</p> <p>a) Plant is only operated with existing enclosures and doors are closed;  b) Gas compressors are housed in sound enclosures;  c) All enclosures are maintained to design;  d) All auxiliary equipment that could cause noise issues are housed in enclosures;  e) Not applicable.</p> <p>We are satisfied that the necessary controls are in place. We have already removed the site specific noise conditions, refer to section 8 below.</p> <p>We agree with the Operator's stated compliance.</p>
Technique	Description	Applicability																			
a. Operational measures	These include: <ul style="list-style-type: none"> <li>— improved inspection and maintenance of equipment</li> <li>— closing of doors and windows of enclosed areas, if possible</li> <li>— equipment operated by experienced staff</li> <li>— avoidance of noisy activities at night, if possible</li> <li>— provisions for noise control during maintenance activities</li> </ul>	Generally applicable																			
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<p><b>BAT Conclusions 18 to 23 for the combustion of coal and/or lignite (solid fuels only)</b>  <b>BAT Conclusions 24 to 27 for the combustion of solid biomass and/or peat (solid fuels only)</b>  <b>BAT Conclusions 28 to 30 for the combustion of HFO and/or gas-oil in boilers (liquid fuels only)</b></p>																					

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<b>BAT Conclusions 31 to 35 for the combustion of HFO and/or gas-oil in engines (liquid fuels only)</b> <b>BAT Conclusions 36 to 39 for the combustion of gas oil in gas turbines (liquid fuels only)</b> <b>These BAT Conclusions are not applicable to the activities carried out at the installation.</b>																																										
<b>Combustion of gaseous fuels</b>																																										
40	<p>In order to increase the energy efficiency of natural gas combustion, BAT is to use an appropriate combination of the techniques given in BAT 12 and below.</p> <table border="1" data-bbox="293 528 1173 874"> <thead> <tr> <th data-bbox="293 528 434 592">Technique</th> <th data-bbox="434 528 607 592">Description</th> <th data-bbox="607 528 1173 592">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="293 592 434 874">a</td> <td data-bbox="434 592 607 874">Combined cycle See description in Section 8.2</td> <td data-bbox="607 592 1173 874">Generally applicable to new gas turbines and engines except when operated &lt; 1 500 h/yr. Applicable to existing gas turbines and engines within the constraints associated with the steam cycle design and the space availability. Not applicable to existing gas turbines and engines operated &lt; 1 500 h/yr. Not applicable to mechanical drive gas turbines operated in discontinuous mode with extended load variations and frequent start-ups and shutdowns. 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Applicable to existing gas turbines and engines within the constraints associated with the steam cycle design and the space availability. Not applicable to existing gas turbines and engines operated < 1 500 h/yr. Not applicable to mechanical drive gas turbines operated in discontinuous mode with extended load variations and frequent start-ups and shutdowns. Not applicable to boilers	Type of combustion unit	BAT-AEELs <sup>(136)</sup> <sup>(137)</sup>					Net electrical efficiency (%)		Net total fuel utilisation (%) <sup>(138)</sup> <sup>(139)</sup>	Net mechanical energy efficiency (%) <sup>(139)</sup> <sup>(140)</sup>		New unit	Existing unit	New unit	Existing unit	Gas engine	39,5–44 <sup>(141)</sup>	35–44 <sup>(141)</sup>	56–85 <sup>(141)</sup>	No BAT-AEEL.		Gas-fired boiler	39–42,5	38–40	78–95	No BAT-AEEL.		Open cycle gas turbine, ≥ 50 MWth	36–41,5	33–41,5	No BAT-AEEL	36,5–41	33,5–41	CC	<p>The installation uses techniques a, b, d, p and q given in BAT Conclusion 12. See above for further details.</p> <p>The plant only operates as an OCGT, during the permit review, we have introduced a limit on operating hours in line with our guidance 'BAT for Balancing Plant' (refer to section 8 of this document) as we do not consider this mode of operation as BAT for plant operating over 1,500 hours/year.</p> <p>Footnote 1 of Table 23 of the LCP BAT Conclusions specifies that the BAT AEELs for this type of plant are not applicable as the plant will operate for &lt;1,500 hours/year. Whilst the BAT AEELs do not apply to this plant, the Operator provided details of the plant efficiency calculations, see below.</p> <p>The Operator confirmed that:</p> <p>Thermal efficiency measurements taken 23 June 2015</p> <p>Thermal Efficiency = 40.7 ± 1.1%</p> <p>The efficiency is at the higher end of the BAT AEEL range of 33 to 41.5%.</p> <p>Also refer to section 4.2 of this document.</p> <p>We agree with the Operator's stated compliance.</p>
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BAT C No.	Summary of BAT Conclusion requirement					Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement																								
	CCGT, 50–600 MW <sub>th</sub>	53–58,5	46–54	No BAT-AEEL	No BAT-AEEL																										
	CCGT, ≥ 600 MW <sub>th</sub>	57–60,5	50–60	No BAT-AEEL	No BAT-AEEL																										
	CHP CCGT, 50–600 MW <sub>th</sub>	53–58,5	46–54	65–95	No BAT-AEEL																										
	CHP CCGT, ≥ 600 MW <sub>th</sub>	57–60,5	50–60	65–95	No BAT-AEEL	NA	<p>The Operator confirmed that this BAT Conclusion is not applicable to the installation, despite stating that they are currently compliant.</p> <p>We have set the status to NA instead of CC.</p> <p>We agree this BAT Conclusion is not applicable to the activities carried out at the installation.</p>																								
41	In order to prevent or reduce NO <sub>x</sub> emissions to air from the combustion of natural gas in boilers, BAT is to use one or a combination of the techniques given below.					NA	<p>The Operator confirmed that this BAT Conclusion is not applicable to the installation, despite stating that they are currently compliant.</p> <p>We have set the status to NA instead of CC.</p> <p>We agree this BAT Conclusion is not applicable to the activities carried out at the installation.</p>																								
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42	In order to prevent or reduce NO <sub>x</sub> emissions to air from the combustion of natural gas in gas turbines, BAT is to use one or a combination of the techniques given below.			CC	<p>The Operator confirmed that:</p> <p>a) Advanced control system – the gas turbine is controlled with an engine management system which is maintained through a service agreement.</p> <p>c) Dry low-NO<sub>x</sub> burners – the gas turbine has a DLN combustion system.</p> <p>d) Low-load design concept – the gas turbine is not capable at operations at low load.</p> <p>NA: b, e and f</p> <p>Dry low NO<sub>x</sub> load point:</p> <p>i. The output load @ 35MWe or ii. This output load @70% Thermal</p> <p>Applicable NO<sub>x</sub> AELs - table 24 of this BAT Conclusion.</p> <p>Yearly average BAT AELs do not apply to existing plants operated &lt; 1,500 hours/year.</p> <p>Daily Average 25 - 55 mg/Nm<sup>3</sup></p> <p>Refer to section 4.1 of this document for the setting of limits.</p>																		
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		f. Selective catalytic reduction (SCR)	<p>combined-cycle gas turbine (CCGT) combustion plants</p> <p>Not applicable in the case of combustion plants operated &lt; 500 h/yr. Not generally applicable to existing combustion plants of &lt; 100 MW<sub>th</sub>. Retrofitting existing combustion plants may be constrained by the availability of sufficient space. There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</p>		We agree with the Operator's stated compliance.															
43	In order to prevent or reduce NO <sub>x</sub> emissions to air from the combustion of natural gas in engines, BAT is to use one or a combination of the techniques given below.			NA	<p>The Operator confirmed that this BAT Conclusion is not applicable to the installation, despite stating that they are currently compliant.</p> <p>We have set the status to NA instead of CC.</p> <p>We agree this BAT Conclusion is not applicable to the activities carried out at the installation.</p>															
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			There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr		

44	<p>In order to prevent or reduce CO emissions to air from the combustion of natural gas, BAT is to ensure optimised combustion and/or to use oxidation catalysts.  <b>Description - See descriptions in Section 8.3.</b>  <b>BAT-associated emission levels (BAT-AELs) for NO<sub>x</sub> emissions to air from the combustion of natural gas in gas turbines</b></p> <table border="1" data-bbox="293 341 1173 512"> <thead> <tr> <th rowspan="2">Type of combustion plant</th> <th rowspan="2">Combustion plant total rated thermal input (MW<sub>th</sub>)</th> <th colspan="2">BAT-AELs (mg/Nm<sup>3</sup>) <sup>(142)</sup> <sup>(143)</sup></th> </tr> <tr> <th>Yearly average <sup>(144)</sup> <sup>(145)</sup></th> <th>Daily average or average over the sampling period</th> </tr> </thead> <tbody> <tr> <td colspan="4" style="text-align: center;"><b>Open-cycle gas turbines (OCGTs) <sup>(146)</sup> <sup>(147)</sup></b></td> </tr> <tr> <td>New OCGT</td> <td>≥ 50</td> <td>15–35</td> <td>25–50</td> </tr> <tr> <td>Existing OCGT (excluding turbines for mechanical drive applications) — All but plants operated &lt; 500 h/yr</td> <td>≥ 50</td> <td>15–50</td> <td>25–55 <sup>(148)</sup></td> </tr> <tr> <td colspan="4" style="text-align: center;"><b>Combined-cycle gas turbines (CCGTs) <sup>(146)</sup> <sup>(149)</sup></b></td> </tr> <tr> <td>New CCGT</td> <td>≥ 50</td> <td>10–30</td> <td>15–40</td> </tr> <tr> <td>Existing CCGT with a net total fuel utilisation of &lt; 75 %</td> <td>≥ 600</td> <td>10–40</td> <td>18–50</td> </tr> <tr> <td>Existing CCGT with a net total fuel utilisation of ≥ 75 %</td> <td>≥ 600</td> <td>10–50</td> <td>18–55 <sup>(150)</sup></td> </tr> <tr> <td>Existing CCGT with a net total fuel utilisation of &lt; 75 %</td> <td>50–600</td> <td>10–45</td> <td>35–55</td> </tr> <tr> <td>Existing CCGT with a net total fuel utilisation of ≥ 75 %</td> <td>50–600</td> <td>25–50 <sup>(151)</sup></td> <td>35–55 <sup>(152)</sup></td> </tr> <tr> <td colspan="4" style="text-align: center;"><b>Open- and combined-cycle gas turbines</b></td> </tr> <tr> <td>Gas turbine put into operation no later than 27 November 2003, or existing gas turbine for emergency use and operated &lt; 500 h/yr</td> <td>≥ 50</td> <td>No BAT-AEL</td> <td>60–140 <sup>(153)</sup> <sup>(154)</sup></td> </tr> <tr> <td>Existing gas turbine for mechanical drive applications — All but plants operated &lt; 500 h/yr</td> <td>≥ 50</td> <td>15–50 <sup>(155)</sup></td> <td>25–55 <sup>(156)</sup></td> </tr> </tbody> </table> <p>As an indication, the yearly average CO emission levels for each type of existing combustion plant operated ≥ 1 500 h/yr and for each type of new combustion plant will generally be as follows:</p>	Type of combustion plant	Combustion plant total rated thermal input (MW <sub>th</sub> )	BAT-AELs (mg/Nm <sup>3</sup> ) <sup>(142)</sup> <sup>(143)</sup>		Yearly average <sup>(144)</sup> <sup>(145)</sup>	Daily average or average over the sampling period	<b>Open-cycle gas turbines (OCGTs) <sup>(146)</sup> <sup>(147)</sup></b>				New OCGT	≥ 50	15–35	25–50	Existing OCGT (excluding turbines for mechanical drive applications) — All but plants operated < 500 h/yr	≥ 50	15–50	25–55 <sup>(148)</sup>	<b>Combined-cycle gas turbines (CCGTs) <sup>(146)</sup> <sup>(149)</sup></b>				New CCGT	≥ 50	10–30	15–40	Existing CCGT with a net total fuel utilisation of < 75 %	≥ 600	10–40	18–50	Existing CCGT with a net total fuel utilisation of ≥ 75 %	≥ 600	10–50	18–55 <sup>(150)</sup>	Existing CCGT with a net total fuel utilisation of < 75 %	50–600	10–45	35–55	Existing CCGT with a net total fuel utilisation of ≥ 75 %	50–600	25–50 <sup>(151)</sup>	35–55 <sup>(152)</sup>	<b>Open- and combined-cycle gas turbines</b>				Gas turbine put into operation no later than 27 November 2003, or existing gas turbine for emergency use and operated < 500 h/yr	≥ 50	No BAT-AEL	60–140 <sup>(153)</sup> <sup>(154)</sup>	Existing gas turbine for mechanical drive applications — All but plants operated < 500 h/yr	≥ 50	15–50 <sup>(155)</sup>	25–55 <sup>(156)</sup>	CC	<p>The Operator confirmed that:</p> <p>Historic engine CO emissions are below ELVs as required in the permit. This is a characteristic of this type of gas turbine.</p> <p>They confirm that they would be compliant with a CO ELV of 40 mg/Nm<sup>3</sup>. However, as we have introduced a restriction on operating hours for the OCGT to &lt;1,500 hours per year, the yearly BAT AEL for NO<sub>x</sub> and the yearly indicative emission limit for CO are not applicable.</p> <p>The existing permit already sets monthly, daily and hourly average emission limits for CO and NO<sub>x</sub>. Under the principal of “no backsliding”, the current emission limits will be retained unless tighter limits are set by the BREF. Refer to section 4.1 of this document for the setting of limits.</p> <p>We agree with the Operator’s stated compliance.</p>
Type of combustion plant	Combustion plant total rated thermal input (MW <sub>th</sub> )			BAT-AELs (mg/Nm <sup>3</sup> ) <sup>(142)</sup> <sup>(143)</sup>																																																					
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- New OCGT of  $\geq 50 \text{ MW}_{\text{th}}$ :  $< 5\text{--}40 \text{ mg/Nm}^3$ . For plants with a net electrical efficiency (EE) greater than 39 %, a correction factor may be applied to the higher end of this range, corresponding to [higher end]  $\times$  EE/39, where EE is the net electrical energy efficiency or net mechanical energy efficiency of the plant determined at ISO baseload conditions.
- Existing OCGT of  $\geq 50 \text{ MW}_{\text{th}}$  (excluding turbines for mechanical drive applications):  $< 5\text{--}40 \text{ mg/Nm}^3$ . The higher end of this range will generally be  $80 \text{ mg/Nm}^3$  in the case of existing plants that cannot be fitted with dry techniques for  $\text{NO}_x$  reduction, or  $50 \text{ mg/Nm}^3$  for plants that operate at low load.
- New CCGT of  $\geq 50 \text{ MW}_{\text{th}}$ :  $< 5\text{--}30 \text{ mg/Nm}^3$ . For plants with a net electrical efficiency (EE) greater than 55 %, a correction factor may be applied to the higher end of the range, corresponding to [higher end]  $\times$  EE/55, where EE is the net electrical energy efficiency of the plant determined at ISO baseload conditions.
- Existing CCGT of  $\geq 50 \text{ MW}_{\text{th}}$ :  $< 5\text{--}30 \text{ mg/Nm}^3$ . The higher end of this range will generally be  $50 \text{ mg/Nm}^3$  for plants that operate at low load.
- Existing gas turbines of  $\geq 50 \text{ MW}_{\text{th}}$  for mechanical drive applications:  $< 5\text{--}40 \text{ mg/Nm}^3$ . The higher end of the range will generally be  $50 \text{ mg/Nm}^3$  when plants operate at low load.

In the case of a gas turbine equipped with DLN burners, these indicative levels correspond to when the DLN operation is effective.

**BAT-associated emission levels (BAT-AELs) for  $\text{NO}_x$  emissions to air from the combustion of natural gas in boilers and engines**

Type of combustion plant	BAT-AELs ( $\text{mg/Nm}^3$ )			
	Yearly average <sup>(157)</sup>		Daily average or average over the sampling period	
	New plant	Existing plant <sup>(158)</sup>	New plant	Existing plant <sup>(159)</sup>
Boiler	10–60	50–100	30–85	85–110
Engine <sup>(160)</sup>	20–75	20–100	55–85	55–110 <sup>(161)</sup>

As an indication, the yearly average CO emission levels will generally be:

- $< 5\text{--}40 \text{ mg/Nm}^3$  for existing boilers operated  $\geq 1\,500 \text{ h/yr}$ ,
- $< 5\text{--}15 \text{ mg/Nm}^3$  for new boilers,
- $30\text{--}100 \text{ mg/Nm}^3$  for existing engines operated  $\geq 1\,500 \text{ h/yr}$  and for new engines.

45	In order to reduce non-methane volatile organic compounds (NMVOC) and methane ( $\text{CH}_4$ ) emissions to air from the combustion of natural gas in spark-ignited lean-burn	NA	The Operator confirmed that this BAT Conclusion is not applicable to the installation, despite stating that they are currently compliant.
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BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the Operator to demonstrate compliance with the BAT Conclusion requirement																		
	<p>gas engines, BAT is to ensure optimised combustion and/or to use oxidation catalysts.</p> <p><b>Description</b></p> <p>See descriptions in Section 8.3. Oxidation catalysts are not effective at reducing the emissions of saturated hydrocarbons containing less than four carbon atoms.</p> <p><b>BAT-associated emission levels (BAT-AELs) for formaldehyde and CH<sub>4</sub> emissions to air from the combustion of natural gas in a spark-ignited lean-burn gas engine</b></p> <table border="1" data-bbox="293 552 1173 775"> <thead> <tr> <th rowspan="3">Combustion plant total rated thermal input (MW<sub>th</sub>)</th> <th colspan="3">BAT-AELs (mg/Nm<sup>3</sup>)</th> </tr> <tr> <th>Formaldehyde</th> <th colspan="2">CH<sub>4</sub></th> </tr> <tr> <th colspan="3">Average over the sampling period</th> </tr> <tr> <th></th> <th>New or existing plant</th> <th>New plant</th> <th>Existing plant</th> </tr> </thead> <tbody> <tr> <td>≥ 50</td> <td>5–15 <sup>(162)</sup></td> <td>215–500 <sup>(163)</sup></td> <td>215–560 <sup>(162)</sup> <sup>(163)</sup></td> </tr> </tbody> </table>	Combustion plant total rated thermal input (MW <sub>th</sub> )	BAT-AELs (mg/Nm <sup>3</sup> )			Formaldehyde	CH <sub>4</sub>		Average over the sampling period				New or existing plant	New plant	Existing plant	≥ 50	5–15 <sup>(162)</sup>	215–500 <sup>(163)</sup>	215–560 <sup>(162)</sup> <sup>(163)</sup>		<p>We have set the status to NA instead of CC.</p> <p>We agree this BAT Conclusion is not applicable to the activities carried out at the installation.</p>
Combustion plant total rated thermal input (MW <sub>th</sub> )	BAT-AELs (mg/Nm <sup>3</sup> )																				
	Formaldehyde		CH <sub>4</sub>																		
	Average over the sampling period																				
	New or existing plant	New plant	Existing plant																		
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<p><b>BAT Conclusions 46 to 51 for iron and steel process gases.</b></p> <p><b>BAT Conclusions 52 to 54 for offshore platforms.</b></p> <p><b>BAT Conclusions 55 to 59 for chemical process gases.</b></p> <p><b>BAT Conclusions 60 to 71 for co-incineration.</b></p> <p><b>BAT Conclusions 72 to 75 for gasification.</b></p> <p><b>These BAT Conclusions are not applicable to the activities carried out at the installation.</b></p>																					

## **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 authorises the discharge of surface water at emission point W1.

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

## 8 Additional IED Chapter II requirements:

Permit condition/table	Justification
<p>Existing permit condition 2.3.2 replaced and 4.2.2 amended</p> <p>S1.1 and S4.3 amended</p>	<p>Existing permit condition 2.3.2: <i>'Gas shall be burnt in the turbine for a maximum of 5,250 hours in any 12 month period beginning 1st January and ending 31st December'</i>.</p> <p>We have introduced a limit on operating hours in Open Cycle Mode for the LCP in line with our guidance 'BAT for Balancing Plant' (see below) as we do not consider this mode of operation as BAT for plant operating over 1,500 hours.</p> <p>We have amended the reporting requirements in the permit. We have added in a reporting requirement for operating hours to be reported over a five year rolling average to demonstrate compliance with the less than 1,500 hour operational limit.</p> <p>The OCGTs previously operated with a 5,250 hours restriction. However, we are not satisfied that there is sufficient evidence available to demonstrate that OCGTs represent best available techniques (BAT) for plants operating for more than 1,500 hours per year. Therefore, we have specified 1,500 hours as a limit on operational hours in the permit.</p> <p>Article 11 of the Industrial Emissions Directive 2010/75/EU states that BAT are applied. BAT requires the use of the most effective and advanced techniques to prevent or minimise emissions and impacts on the environment.</p> <p>Relevant guidance that we have drawn on, for BAT, includes the Department of Energy and Climate Change <i>'Developing best available techniques (BAT) for combustion plants operating in the balancing market'</i> and Chapter III of IED and the BAT conclusions all of which specifically identify two categories of combustion plant operating in the balancing market as peaking plant: those that operate less than 500 hours and those that operate from 500 hours up to 1,500 hours. Within these documents no other categories of operational regimes are recognised other than base load operation.</p> <p>Furthermore, draft Environment Agency guidance <i>'BAT guidance for &gt;50 MWth gas and liquid fuel combustion</i></p>

	<p><i>plant exporting electricity under commercial arrangements for &lt;1,500 hours per annum'</i> consolidates our position on the above and stipulates that combustion plants operating in a single cycle, will be limited to 1,500 hours per annum on a rolling average.</p> <p>OCGTs operating as peaking plant are classed as fast start, lower efficiency and would generally have higher emissions of oxides of nitrogen (NOx) per megawatt hour of energy produced than would be expected for natural gas fired base load plant. Therefore, OCGTs are better suited to fast reserve running for short periods of time in comparison to base load plants which are more appropriate for steady state running operations.</p> <p>The use of fast start closed circuit gas turbines (CCGT) aero derivative, gas turbine combined heat and power (GT-CHP) or a large gas engine with combined heat and power would be considered to be a more favourable alternative, in terms of energy efficiency, than the proposal presented in this Regulation 61 response.</p> <p>The National Emissions Ceiling Directive (NECD) sets national targets for reductions in pollutants including NOx. Restrictions on plants with higher NOx intensity directly contributes to achieving the NECD targets.</p> <p>For this reason the variation restricts the hours of operation of the plant to no more than 1,500 hours per engine per year as a rolling average over a 5 year period and with operation of the turbine in any individual year limited to a maximum of 2,250 hours.</p>
2.3.8 and IC6 in table S1.3	<p>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 LCP which could be called depending on the circumstances.</p> <p>A risk assessment will be carried out by Energy UK/Joint Environmental Programme on behalf of LCP 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 a 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 2.3.8. This condition allows</p>

	the hourly ELVs for plants operating under a black start instruction to be discounted for the purpose of reporting. We would also require there to be a procedure in place for minimisation of emissions in the case of a black start event and for reporting in the event of a black start. This modelling and the procedures have not been agreed in advance of the issue of the permit review and therefore a condition linking back to an improvement condition has been included in the permit.
Existing 3.4.1, 3.4.2, 3.5.1 (b), 5.1, 5.2 and existing table S3.3 are deleted and permit condition 3.4.1 is added from permit template  Table S4.1 amended	Noise monitoring is no longer required. This was agreed with the Operator and recorded on the Compliance Assessment Report (CAR) ref: PP3236TH_0290045.
Table S1.3 amended	To remove completed improvement conditions IC1 to IC5.
Table S4.1 amended	Emissions to water reporting period changed from every 3 months to every 6 months consistent with the monitoring frequency of twice per year in table S3.2 of the permit.
Table S4.4 amended	To remove form performance1 which is no longer required.
Schedule 6 Interpretation	Added definition for “baseload”.
	Added definition for “daily average”.
	Added definition for “Black Start”
	Deleted definition for “mid-merit” which applies to plants operating between 1,500 and 4,000 hours/year. This variation limits operation to 1,500 hours/year, see above.
Installation name	Changed from Croydon Energy to Croydon Plant

## 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
<b>Receipt of application</b>	
Confidential information	A claim for commercial or industrial confidentiality has not been made.
Identifying confidential information	<p>We have not identified information provided as part of the application that we consider to be confidential.</p> <p>The decision was taken in accordance with our guidance on confidentiality.</p>
<b>The site</b>	
Biodiversity, heritage, landscape and nature conservation	<p>The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat.</p> <p>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.</p> <p>We have not consulted Natural England on the application. The decision was taken in accordance with our guidance.</p>
<b>Operating techniques</b>	
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.

<b>Aspect considered</b>	<b>Decision</b>
	<p>The permit conditions ensure compliance with the relevant BREF, BAT Conclusions. The ELVs deliver compliance with the BAT AELs.</p> <p>We have introduced a limit on operating hours in Open Cycle Mode for the LCP in line with our guidance 'BAT for Balancing Plant' as we do not consider this mode of operation as BAT for plant operating over 1,500 hours. See section 8 for further information.</p>
<b>Permit conditions</b>	
Updating permit conditions during consolidation	We have updated permit conditions to those in the current generic permit template as part of permit consolidation. The conditions will provide at least the same level of protection as those in the previous permit and in some cases will provide a higher level of protection to those in the previous permit.
Changes to the permit conditions due to an Environment Agency initiated variation	We have varied the permit as stated in the variation notice.
Improvement programme	<p>Based on the information on the application, we consider that we need to impose an improvement condition for black start operations. See Section 8 of this document for further information.</p> <p>We have also removed the completed improvement conditions from the permit.</p>
Emission limits	<p>We have decided that emission limits should be set for the parameters listed in the permit.</p> <p>These are described in the relevant BAT Conclusions in Sections 4.1 and 5 of this document.</p> <p>It is considered that the ELVs described above will ensure that significant pollution of the environment is</p>

<b>Aspect considered</b>	<b>Decision</b>
	prevented and a high level of protection for the environment is secured.
Monitoring	<p>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.</p> <p>These are described in the relevant BAT Conclusions in Section 5 of this document.</p> <p>Table S3.3 Process monitoring requirements was amended to include the requirement to monitor energy efficiency after overhauls on site in line with BAT Conclusion 2.</p> <p>Based on the information in the Regulation 61 response we are satisfied that the Operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.</p>
Reporting	<p>We have specified reporting in the permit for the following parameters:</p> <ul style="list-style-type: none"> <li>• Nitrogen dioxide</li> <li>• Carbon monoxide</li> <li>• Sulphur dioxide</li> </ul> <p>These are described in the relevant BAT Conclusions in section 5 of this document.</p> <p>We have added a reporting requirement for operating hours to be reported over a 5 year rolling average to demonstrate compliance with the less than 1,500 hours/year operational limit.</p>
<b>Operator competence</b>	
Management system	There is no known reason to consider that the Operator will not have the management system to enable them to comply with the permit conditions.
<b>Growth Duty</b>	

<b>Aspect considered</b>	<b>Decision</b>
<p>Section 108 Deregulation Act 2015 – Growth duty</p>	<p>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.</p> <p>Paragraph 1.3 of the guidance says:</p> <p>“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.”</p> <p>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.</p> <p>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.</p>