

## 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/VP3933RJ  
The Operator is: Uniper UK Limited  
The Installation is: Killingholme Power Station  
This Variation Notice number is: EPR/VP3933RJ/V006

### What this document is about

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

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

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

As well as considering the review of the operating techniques used by the Operator for the operation of the plant and activities of the installation, the consolidated variation notice takes into account and brings together in a single document all previous variations that relate to the original permit

issued. It also modernises the entire permit to reflect the conditions contained in our current generic permit template.

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

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

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
- 2.3 Summary of how we considered the responses from public consultation.
- 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.)

AEEL	Associated Energy Efficiency Level
APC	Air Pollution Control
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BAT-AEEL	BAT Associated Energy Efficiency 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
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 2010 No. 1154)
EWC	European waste catalogue
FSA	Food Standards Agency
IC	Improvement Condition
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
LCP	Large Combustion Plant subject to Chapter III of IED
MSUL/MSDL	Minimum start up load/minimum shut-down load
NOx	Oxides of nitrogen (NO plus NO <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
PC	Process Contribution
SGN	Sector guidance note
TGN	Technical guidance note
TNP	Transitional National Plan
TOC	Total Organic Carbon
WFD	Water Framework Directive (2000/60/EC)

## 1 Our decision

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

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

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

## 2 How we reached our decision

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

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

- Describes the techniques that will be implemented before 17<sup>th</sup> August 2021, which will then ensure that operations meet the revised standard, or
- Justifies why standards will not be met by 17<sup>th</sup> 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 31<sup>st</sup> October 2018.

## **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 demonstrated by the operator that an alternative limit was more appropriate.

The LCPs on site consist of four 446MWth input natural gas fired Open Cycle Gas Turbines (OCGTs) referenced LCP 108, LCP 109, LCP 110 and LCP 111.

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

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

- <500 hours non-emergency plant

The following tables outline the limits that have been incorporated into the permit.

Under Chapter III gas turbines and gas engines operating for less than 500 hours per year were considered to be emergency plant and therefore were not covered by the emission limits set out in IED Annex V. However, for the purposes of the LCP BAT review, plants operated for emergency use may only be defined as plants which operate for the sole purpose of providing power at



a site during an onsite emergency and/or during a black start and which do not provide balancing services or demand side response services. As this site runs commercially on an intermittent basis to support the Grid, it is not considered emergency plant and therefore indicative BAT applies.

We have set the indicative limit requiring validation through emission factors based on the principle that we will not require plant to fire up with the sole purpose of performing an emission measurement, as set out the UK Regulators Interpretation Document. The site has dry low NOx (DLN) in place but we have decided that the point at which DLN is effective does not need to be defined because continuous monitoring is not being carried out on site.

Emissions of nitrogen dioxide for comparison against the value included in the permit will be calculated every 2 years, whichever is sooner, based on fuel usage and emissions factors, according to the agreed protocol described in JEP Report JEP17EMG02 / UTG/18/ERG/CT/773/R 'Maintaining the Emissions Performance of Open Cycle Gas Turbines that operate for less than 500 hours per year', October 2018.

<b>Plant type</b>	Open Cycle Gas Turbine
<b>Age</b>	Permitted <b>before</b> publication of the LCP BREF <b>AND</b> operational no later than 27 November 2003
<b>Operating Hours</b>	No more than 500 hours/year, not emergency
<b>Fuel</b>	Natural gas

NOx limits (mg/Nm <sup>3</sup> ) – indicative limits in italics				
Averaging	IED (Annex V Part 1) - Existing	BREF	Expected permit limits	Basis
Annual	None	None	None	NA
Monthly	None	None	None	NA
Daily	None	<i>140</i>	<i>140</i>	BREF
95 <sup>th</sup> %ile of hr means	None	None	None	NA

CO limits (mg/Nm <sup>3</sup> )				
Averaging	IED (Annex V Part 1) - Existing	BREF	Expected permit limits	Basis
Annual	None	None	None	NA
Monthly	None	None	None	NA
Daily	None	None	None	NA
95 <sup>th</sup> %ile of hr means	None	None	None	NA

## **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.

Table 23 of the LCP BAT Conclusions specifies that the BAT-AEELs for this type of plant are not applicable to plant operating less than 1500 hours per year. We have therefore not assessed this operational aspect of the plant. 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.

## 5 Decision checklist regarding relevant BAT Conclusions

BAT Conclusions for large combustion plant, were published by the European Commission on 17<sup>th</sup> 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	S3.1a
Energy efficiency	1.2 and 2.3	S3.3
Noise	3.4 and 2.3	S1.2
Other operating techniques	1.2	S1.2

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

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

BAT Concn. Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
<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> <p>Etc - see BAT Conclusions</p>	CC	The Operator confirmed that there is an EMS certified to ISO 14001 in place that the certification is consistent with the requirements of BAT 1.

BAT Concn. Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<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 the energy efficiency of the plant is 33%.</p> <p>Information submitted with previous variation application EPR/ZP3839QF/V005 confirmed that performance tests were carried out by E.ON New Build and Technology on the Killingholme Power Station Module 2 in January 2012 following major overhaul and return to service in November 2011. The aim of the tests was to determine the thermal performance of the Module and each GT. The results of the tests were:</p> <ul style="list-style-type: none"> <li>• GT21 gross corrected performance: 32.9% efficiency (LHV).</li> <li>• GT22 gross corrected performance: 33.3% efficiency (LHV).</li> </ul> <p>The site previously operated in combined cycle mode but the GTs were reconfigured for OCGT operation through a previous variation.</p> <p>A process monitoring requirement has been set in table S3.3 which requires energy efficiency monitoring after an overhaul.</p>

BAT Concn. Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement													
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="322 440 1402 687"> <thead> <tr> <th data-bbox="322 440 658 472">Stream</th> <th data-bbox="658 440 1057 472">Parameter(s)</th> <th data-bbox="1057 440 1402 472">Monitoring</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 472 658 628" rowspan="3">Flue-gas</td> <td data-bbox="658 472 1057 533">Flow</td> <td data-bbox="1057 472 1402 533">Periodic or continuous determination</td> </tr> <tr> <td data-bbox="658 533 1057 593">Oxygen content, temperature, and pressure</td> <td data-bbox="1057 533 1402 593">Periodic or continuous measurement</td> </tr> <tr> <td data-bbox="658 593 1057 628">Water vapour content <sup>(2)</sup></td> <td data-bbox="1057 593 1402 628"></td> </tr> <tr> <td data-bbox="322 628 658 687">Waste water from flue-gas treatment</td> <td data-bbox="658 628 1057 687">Flow, pH, and temperature</td> <td data-bbox="1057 628 1402 687">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>(2)</sup>		Waste water from flue-gas treatment	Flow, pH, and temperature	Continuous measurement	NA	<p>We do not require monitoring for these parameters where no periodic or continuous monitoring is specified in the permit.</p> <p>No flue gas treatment is undertaken on site.</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>(2)</sup>															
Waste water from flue-gas treatment	Flow, pH, and temperature	Continuous measurement														
4	<p>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.</p> <table border="1" data-bbox="322 788 1402 1390"> <thead> <tr> <th data-bbox="322 788 465 906">Substance/Parameter</th> <th data-bbox="465 788 757 906">Fuel/Process/Type of combustion plant</th> <th data-bbox="757 788 900 906">Combustion plant total rated thermal input</th> <th data-bbox="900 788 1061 906">Standard(s) <sup>(4)</sup></th> <th data-bbox="1061 788 1263 906">Minimum monitoring frequency <sup>(5)</sup></th> <th data-bbox="1263 788 1402 906">Monitoring associated with</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 906 465 1390">NO<sub>x</sub></td> <td data-bbox="465 906 757 1390"> <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> </ul> </td> <td data-bbox="757 906 900 1390">All sizes</td> <td data-bbox="900 906 1061 1390">Generic EN standards</td> <td data-bbox="1061 906 1263 1390">Continuous <sup>(6)</sup> <sup>(8)</sup></td> <td data-bbox="1263 906 1402 1390">           BAT 20            BAT 24            BAT 28            BAT 32            BAT 37            BAT 41            BAT 42            BAT 43            BAT 47            BAT 48            BAT 56            BAT 64            BAT 65            BAT 73         </td> </tr> </tbody> </table>	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	NO <sub>x</sub>	<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> </ul>	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	CC	<p>OCGTs operating for &lt;500 hours are subject to indicative daily BAT-ELVs only. The monitoring frequencies described in BAT 4 do not apply where plant operation would be for the sole purpose of performing or emission measurement.</p> <p>We have specified monitoring against the indicative AEL through emission factors in table S3.1a.</p> <p>Concentrations of NO<sub>x</sub>, CO and SO<sub>2</sub> are calculated every 2 years based on fuel usage and emissions factors, according to the agreed protocol described in JEP Report JEP17EMG02 / UTG/18/ERG/CT/773/R 'Maintaining the Emissions Performance of Open Cycle Gas Turbines that operate for less than 500 hours per year', October 2018.</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											
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BAT Concn. Number	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
		<ul style="list-style-type: none"> <li>— IGCC plants</li> <li>— Combustion plants on offshore platforms</li> </ul>	All sizes	EN 14792	Once every year <sup>(9)</sup>	BAT 53		There is no SCR/SNCR on site and therefore no requirement to monitor ammonia or SO <sub>3</sub> .
N <sub>2</sub> O		<ul style="list-style-type: none"> <li>— Coal and/or lignite in circulating fluidised bed boilers</li> <li>— Solid biomass and/or peat in circulating fluidised bed boilers</li> </ul>	All sizes	EN 21258	Once every year <sup>(10)</sup>	BAT 20 BAT 24		
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> <sup>(8)</sup>	BAT 20 BAT 24 BAT 28 BAT 33 BAT 38 BAT 44 BAT 49 BAT 56 BAT 64 BAT 65 BAT 73		
		<ul style="list-style-type: none"> <li>— Combustion plants on offshore platforms</li> </ul>	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> </ul>	All sizes	Generic EN standards and EN 14791	Continuous <sup>(6)</sup> <sup>(11)</sup> <sup>(12)</sup>	BAT 21 BAT 25 BAT 29 BAT 34 BAT 39 BAT 50		

BAT Concn. Number	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
		<ul style="list-style-type: none"> <li>— HFO- and/or gas-oil-fired boilers</li> <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>				BAT 57 BAT 66 BAT 67 BAT 74		
	SO <sub>3</sub>	— When SCR is used	All sizes	No EN standard available	Once every year	—		
	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> <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>	All sizes	Generic EN standards and EN 13284-1 and EN 13284-2	Continuous <sup>(6)</sup> (17)	BAT 22 BAT 26 BAT 30 BAT 35 BAT 39 BAT 51 BAT 58 BAT 75		
5	BAT is to monitor emissions to water from flue-gas treatment with at least the frequency given in BAT Conclusion 5 and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.						NA	The site does not carry out flue-gas treatment.



BAT Concn. Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																	
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" data-bbox="331 475 1395 1153"> <thead> <tr> <th data-bbox="331 475 539 507">Technique</th> <th data-bbox="539 475 943 507">Description</th> <th data-bbox="943 475 1395 507">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="331 507 539 619">a. Fuel blending and mixing</td> <td data-bbox="539 507 943 619">Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type</td> <td data-bbox="943 507 1395 619" rowspan="2">Generally applicable</td> </tr> <tr> <td data-bbox="331 619 539 699">b. Maintenance of the combustion system</td> <td data-bbox="539 619 943 699">Regular planned maintenance according to suppliers' recommendations</td> </tr> <tr> <td data-bbox="331 699 539 810">c. Advanced control system</td> <td data-bbox="539 699 943 810">See description in Section 8.1</td> <td data-bbox="943 699 1395 810">The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system</td> </tr> <tr> <td data-bbox="331 810 539 890">d. Good design of the combustion equipment</td> <td data-bbox="539 810 943 890">Good design of furnace, combustion chambers, burners and associated devices</td> <td data-bbox="943 810 1395 890">Generally applicable to new combustion plants</td> </tr> <tr> <td data-bbox="331 890 539 1153">e. Fuel choice</td> <td data-bbox="539 890 943 1153">Select or switch totally or partially to another fuel(s) with a better environmental profile (e.g. with low sulphur and/or mercury content) amongst the available fuels, including in start-up situations or when back-up fuels are used</td> <td data-bbox="943 890 1395 1153">Applicable within the constraints associated with the availability of suitable types of fuel with a better environmental profile as a whole, which may be impacted by the energy policy of the Member State, or by the integrated site's fuel balance in the case of combustion of industrial process fuels. For existing combustion plants, the type of fuel chosen may be limited by the configuration and the design of the plant</td> </tr> </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	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	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	CC	<p>The station uses a combination of techniques B and C. The station completes regular maintenance as suggested by the original equipment manufacturer (OEM). It also has an advanced control system controlled and monitored through the distributed control system (DCS).</p> <p>The gas turbine runs on natural gas which is low sulphur in line with technique e.</p>
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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>	NA	<p>The site has no SCR/SNCR</p>																	

BAT Concn. Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement						
8	In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.	NA	The gas turbines are not fitted with emissions abatement						
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> <ul style="list-style-type: none"> <li>(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;</li> <li>(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);</li> <li>(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)).</li> </ul> <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="322 963 1402 1083"> <thead> <tr> <th data-bbox="322 963 685 1002">Fuel(s)</th> <th data-bbox="685 963 1402 1002">Substances/Parameters subject to characterisation</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 1002 685 1040">Natural gas</td> <td data-bbox="685 1002 1402 1040">— LHV</td> </tr> <tr> <td data-bbox="322 1040 685 1083"></td> <td data-bbox="685 1040 1402 1083">— CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>3</sub>, C<sub>4</sub>+, CO<sub>2</sub>, N<sub>2</sub>, Wobbe index</td> </tr> </tbody> </table>	Fuel(s)	Substances/Parameters subject to characterisation	Natural gas	— LHV		— CH <sub>4</sub> , C <sub>2</sub> H <sub>6</sub> , C <sub>3</sub> , C <sub>4</sub> +, CO <sub>2</sub> , N <sub>2</sub> , Wobbe index	CC	<p>Fuel gas is supplied via the National Grid.</p> <p>We consider that for gases 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. However, the operator has confirmed the following: The fuel gas supplied to the site has been assessed in accordance with technique (i) and is continuously monitored in accordance with technique (ii) Measurement of LHV, CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>3</sub>, C<sub>4</sub>+, CO<sub>2</sub> and Wobbe index is carried out continuously using an online gas chromatograph which carries out calculations in accordance with ISO6976. The gas chromatograph is calibrated annually in accordance with ISO17025. The data supplied from the gas monitoring system is used to assess the performance of the plant in accordance with technique (iii).</p>
Fuel(s)	Substances/Parameters subject to characterisation								
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10	In order to reduce emissions to air and/or to water during other than normal operating conditions (OTNOC), BAT is to set up and implement a management plan as part of the environmental management system (see BAT 1), commensurate with the relevance of potential pollutant releases, that includes the following elements:	CC	The existing site EMS incorporates the key aspects of BAT 10. The site operates a risk based review with the EMS which includes a review of potential impacts of OTNOC.						

BAT Concn. Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<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> <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 power station was purpose designed to minimise environmental impact throughout during operational / non operational conditions. e.g. primary, secondary and tertiary containment measures to prevent emissions to soil or water from incidents.</p> <p>Start up and shut down times are minimised as much as possible to reduce emissions and inefficient use of fuel. Control systems are designed to ensure if the plant is operating in low load then emission limits are still met. Gas turbine starts are optimised based on plant condition to minimise emissions during start-up.</p> <p>The power station is maintained in accordance with a full and active preventative maintenance program operated via computer software. All plant components are included within the site specific preventative maintenance programmes. The frequency of maintenance is dependent on component duty and manufacturers requirements. This programme is supported by a risk assessment to identify environmentally critical plant (ECP), and emergency procedures for plant failure.</p>

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			<p>In the event of an accident or environmental incident, the operator has stated they would review the emissions, cause etc. as part of the incident investigation process and ensure any relevant corrective and / or preventive action is implemented.</p> <p>We agree that this is adequate for this site to meet the BAT Conclusion.</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>	NA	<p>Monitoring of emissions to air is not applicable to OCGTs operating for &lt;500 hours which are subject to indicative daily BAT-AELs only. The requirements described in BAT 11 should not apply where plant operation would be for the sole purpose of performing emissions measurement.</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 in BAT 12.</p>	NA	<p>Not applicable - Only applicable to plant &gt;1500 hours per year.</p>									
13	<p>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.</p> <table border="1" data-bbox="320 1074 1400 1374"> <thead> <tr> <th data-bbox="320 1074 510 1110">Technique</th> <th data-bbox="510 1074 1005 1110">Description</th> <th data-bbox="1005 1074 1400 1110">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="320 1110 510 1241">a. Water recycling</td> <td data-bbox="510 1110 1005 1241">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="1005 1110 1400 1241">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="320 1241 510 1374">b. Dry bottom ash handling</td> <td data-bbox="510 1241 1005 1374">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="1005 1241 1400 1374">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	CC	<p>OCGT so very minimal volumes of water used in process, if any.</p>
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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	OCGT so very minimal volumes of water used in process, if any. Surface water run off and process water are not mixed. Surface water only is emitted via emission point W1.												
15	In order to reduce emissions to water from flue-gas treatment, BAT is to use an appropriate combination of the techniques given in BAT 15, and to use secondary techniques as close as possible to the source in order to avoid dilution.	NA	No flue-gas treatment carried out.												
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> <ul style="list-style-type: none"> <li>(a) waste prevention, e.g. maximise the proportion of residues which arise as by-products;</li> <li>(b) waste preparation for reuse, e.g. according to the specific requested quality criteria;</li> <li>(c) waste recycling;</li> <li>(d) other waste recovery (e.g. energy recovery),</li> </ul> <p>by implementing an appropriate combination of techniques such as:</p> <table border="1" data-bbox="322 1023 1402 1374"> <thead> <tr> <th data-bbox="322 1023 360 1054"></th> <th data-bbox="360 1023 555 1054">Technique</th> <th data-bbox="555 1023 1021 1054">Description</th> <th data-bbox="1021 1023 1402 1054">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 1054 360 1241">a.</td> <td data-bbox="360 1054 555 1241">Generation of gypsum as a by-product</td> <td data-bbox="555 1054 1021 1241">Quality optimisation of the calcium-based reaction residues generated by the wet FGD so that they can be used as a substitute for mined gypsum (e.g. as raw material in the plasterboard industry). The quality of limestone used in the wet FGD influences the purity of the gypsum produced</td> <td data-bbox="1021 1054 1402 1241">Generally applicable within the constraints associated with the required gypsum quality, the health requirements associated to each specific use, and by the market conditions</td> </tr> <tr> <td data-bbox="322 1241 360 1374">b.</td> <td data-bbox="360 1241 555 1374">Recycling or recovery of residues in the construction sector</td> <td data-bbox="555 1241 1021 1374">Recycling or recovery of residues (e.g. from semi-dry desulphurisation processes, fly ash, bottom ash) as a construction material (e.g. in road building, to replace sand in concrete production, or in the cement industry)</td> <td data-bbox="1021 1241 1402 1374">Generally applicable within the constraints associated with the required material quality (e.g. physical properties, content of harmful substances) associated to each</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	Generally applicable within the constraints associated with the required gypsum quality, the health requirements associated to each specific use, and by the market conditions	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)	Generally applicable within the constraints associated with the required material quality (e.g. physical properties, content of harmful substances) associated to each	CC	There are no by-products identified by BAT 16 associated with the combustion process at Killingholme Power Station. Other wastes arising from site activities are dealt with according the waste hierarchy.
	Technique	Description	Applicability												
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				<p>specific use, and by the market conditions</p> <p>c. Energy recovery by using waste in the fuel mix The residual energy content of carbon-rich ash and sludges generated by the combustion of coal, lignite, heavy fuel oil, peat or biomass can be recovered for example by mixing with the fuel</p> <p>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</p>																
17	In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below.			CC	<p>Site uses a combination of all the techniques laid out in BAT 17.</p> <p>A: operations are undertaken by trained staff e.g. the closing of doors to noisy activities including signage where necessary.</p> <p>B: any new purchased equipment is purchased based on noise attributes</p> <p>C: buildings and walls surround the louder equipment providing attenuation.</p> <p>D: the turbine is enclosed in a noise dampening case and the buildings are soundproofed.</p> <p>E: The site is in the vicinity of other industrial processes on an industrial estate.</p>															
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		<ul style="list-style-type: none"> <li>— equipment insulation</li> <li>— enclosure of noisy equipment</li> <li>— soundproofing of buildings</li> </ul>																																																	
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>				CC	<p>BAT 12 is not applicable to plant which operates less than 1500 hours per year.</p>																																													
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BAT Concn. Number	Summary of BAT Conclusion requirement					Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	CCGT, $\geq 600 \text{ MW}_{th}$	57–60,5	50–60	No BAT-AEEL	No BAT-AEEL		
	CHP CCGT, 50–600 $\text{MW}_{th}$	53–58,5	46–54	65–95	No BAT-AEEL		
	CHP CCGT, $\geq 600 \text{ MW}_{th}$	57–60,5	50–60	65–95	No BAT-AEEL		
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 in BAT 41.					NA	Not applicable to gas turbines.
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 site uses a combination of the techniques listed in BAT 42, such as techniques A and C which are applicable to the combustion of natural gas.</p> <p>A: It has an advanced control system which measures multiple metrics.</p> <p>C: Dry low-NO<sub>x</sub> burners are used to reduce NO<sub>x</sub> emissions further. This is initiated as part of the start-up routine and is engaged at around 50MW. Effective Dry Low-NO<sub>x</sub> is established at 50 MW and is only switched off once the station is in shut-down.</p> <p>Concentrations of NO<sub>x</sub> is calculated every 2 years based on fuel usage.</p>
<b>Technique</b>		<b>Description</b>			<b>Applicability</b>		
a.	Advanced control system	See description in Section 8.3. This technique is often used in combination with other techniques or may be used alone for combustion plants operated < 500 h/yr			The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system		
b.	Water/steam addition	See description in Section 8.3			The applicability may be limited due to water availability		
c.	Dry low-NO <sub>x</sub> burners (DLN)				The applicability may be limited in the case of turbines where a retrofit package is not available or when water/steam addition systems are installed		
d.	Low-load design concept	Adaptation of the process control and related equipment to maintain good combustion efficiency when the demand in energy varies, e.g. by improving the inlet airflow control capability or by splitting the combustion process into decoupled combustion stages			The applicability may be limited by the gas turbine design		
e.	Low-NO <sub>x</sub> burners (LNB)	See description in Section 8.3			Generally applicable to supplementary firing for heat recovery steam generators (HRSGs) in the case of combined-cycle gas turbine (CCGT) combustion plants		



BAT Concn. Number	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																														
	f. Selective catalytic reduction (SCR)		Not applicable in the case of combustion plants operated < 500 h/yr. Not generally applicable to existing combustion plants of < 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																																
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 in BAT 43.			NA	Not applicable to gas turbines.																														
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.</p> <p><b>Description - See descriptions in Section 8.3.</b></p> <p><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="322 919 1402 1342"> <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> </tbody> </table>			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	CC	<p>The Regulation 61 response specified that this BAT Conclusion is not relevant to the operation as it is &lt;500 hours. However, we do not agree with this conclusion.</p> <p>BAT 6 outlines methods for optimisation of combustion which we consider will reduce CO emissions.</p> <p>The air quality report submitted with the previous variation confirmed that the emissions of CO are in line with those set with Chapter III for gas turbines operating over 500 hours. There are no applicable indicative BAT AELs for CO for plant operating for less than 1500 hours per annum.</p> <p>The NO<sub>2</sub> indicative AEL of 140mg/m<sup>3</sup> specified in the permit.</p>
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BAT Concn. Number	Summary of BAT Conclusion requirement				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement	
	Existing CCGT with a net total fuel utilisation of $\geq 75\%$	$\geq 600$	10–50	18–55 <sup>(150)</sup>		We consider there is adequate information contained in the Regulation 61 response to show that the site demonstrates current compliance with the BAT Conclusion.	
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 $\geq 75\%$	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	$\geq 50$	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	$\geq 50$	15–50 <sup>(155)</sup>	25–55 <sup>(156)</sup>				
<p>As an indication, the yearly average CO emission levels for each type of existing combustion plant operated <math>\geq 1\,500</math> h/yr and for each type of new combustion plant will generally be as follows:</p> <ul style="list-style-type: none"> <li>— New OCGT of <math>\geq 50</math> MW<sub>th</sub>: <math>&lt; 5\text{--}40</math> mg/Nm<sup>3</sup>. 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] <math>\times</math> EE/39, where EE is the net electrical energy efficiency or net mechanical energy efficiency of the plant determined at ISO baseload conditions.</li> <li>— Existing OCGT of <math>\geq 50</math> MW<sub>th</sub> (excluding turbines for mechanical drive applications): <math>&lt; 5\text{--}40</math> mg/Nm<sup>3</sup>. The higher end of this range will generally be 80 mg/Nm<sup>3</sup> in the case of existing plants that cannot be fitted with dry techniques for NO<sub>x</sub> reduction, or 50 mg/Nm<sup>3</sup> for plants that operate at low load.</li> <li>— New CCGT of <math>\geq 50</math> MW<sub>th</sub>: <math>&lt; 5\text{--}30</math> mg/Nm<sup>3</sup>. 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] <math>\times</math> EE/55, where EE is the net electrical energy efficiency of the plant determined at ISO baseload conditions.</li> <li>— Existing CCGT of <math>\geq 50</math> MW<sub>th</sub>: <math>&lt; 5\text{--}30</math> mg/Nm<sup>3</sup>. The higher end of this range will generally be 50 mg/Nm<sup>3</sup> for plants that operate at low load.</li> <li>— Existing gas turbines of <math>\geq 50</math> MW<sub>th</sub> for mechanical drive applications: <math>&lt; 5\text{--}40</math> mg/Nm<sup>3</sup>. The higher end of the range will generally be 50 mg/Nm<sup>3</sup> when plants operate at low load.</li> </ul> <p>In the case of a gas turbine equipped with DLN burners, these indicative levels correspond to when the DLN operation is effective.</p> <p><b>BAT-associated emission levels (BAT-AELs) for NO<sub>x</sub> emissions to air from the combustion of natural gas in boilers and engines</b></p>							
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BAT Concn. Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																			
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Type of combustion plant	Yearly average <sup>(157)</sup>		Daily average or average over the sampling period																			
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Boiler	10–60	50–100	30–85	85–110																		
Engine <sup>(160)</sup>	20–75	20–100	55–85	55–110 <sup>(161)</sup>																		
45	In order to reduce non-methane volatile organic compounds (NMVOC) and methane (CH <sub>4</sub> ) emissions to air from the combustion of natural gas in spark-ignited lean-burn gas engines, BAT is to ensure optimised combustion and/or to use oxidation catalysts.	NA	Not applicable to gas turbines.																			
54	In order to prevent or reduce CO emissions to air from the combustion of gaseous and/or liquid fuels in gas turbines on offshore platforms, BAT is to use one or a combination of the techniques given in BAT Conclusion 54.	NA	Only applicable to turbines on offshore platforms.																			

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

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

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

*(a) the geographical location or the local environmental conditions of the installation concerned; or*

*(b) the technical characteristics of the installation concerned.*

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

## **7. Emissions to Water**

The consolidated permit incorporates the existing surface water discharge to controlled waters identified as W1 on site plan in schedule 7: emission to the Humber Estuary.

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

## **8 Additional IED Chapter II requirements:**

The BAT for balancing plant guidance (Working draft, 2018) sets out additional restrictions on hours for <1500 hour non-emergency plant which are low efficiency. Table 1 of the guidance sets out categories for LCP peaking plant. The LCP falls into category B because it's NO<sub>x</sub> emissions are below 500mg/m<sup>3</sup> and its efficiency at 33% is above that set out in table 2 of the guidance. Table 1 therefore confirms that there are no additional restrictions applied to the hours of operation.

## 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	We have not identified information provided as part of the application that we consider to be confidential.
<b>The site</b>	
Extent of the site of the facility	The operator has provided a plan which we consider is satisfactory, showing the extent of the site of the facility. The plan is included in the permit.
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	<p>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.</p> <p>The permit conditions ensure compliance with the relevant BREF, BAT Conclusions. The ELVs deliver compliance with the BAT-AELs.</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

Aspect considered	Decision
	those in the previous permit and in some cases will provide a higher level of protection to those in the previous permit.
Changes to the permit conditions due to an Environment Agency initiated variation	We have varied the permit as stated in the variation notice.
Improvement programme	Based on the information on the application, we do not consider that we need to impose an improvement programme.  Improvement conditions IC1 – IC12 have been confirmed complete and removed through variation EPR/VP3933RJ/V006.
Emission limits	We have decided that emission limits should be set for the parameters listed in the permit.  These are described in the relevant BAT Conclusions in Section 5 of this document.  It is considered that the ELVs/equivalent parameters or technical measures described above will ensure that significant pollution of the environment is prevented and a high level of protection for the environment is secured.
Monitoring	We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified.  These are described in the relevant BAT Conclusions in Section 5 of this document.  Table S3.3 Process monitoring requirements was amended to include the requirement to monitor energy efficiency after overhauls on site in line with BAT2.
Reporting	We have specified reporting in the permit for the following parameters:  <ul style="list-style-type: none"> <li>• Nitrogen dioxide</li> </ul> These are described in the relevant BAT Conclusions in Section 5 of this document.
<b>Operator competence</b>	
Management system	There is no known reason to consider that the operator will not have the management system to enable it to comply with the permit conditions.
<b>Growth Duty</b>	



Aspect considered	Decision
<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>