

## 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/UP3538LW/V006  
The Operator is:                         National Grid Gas Plc  
The Installation is:                       Wisbech Compressor Station  
This Variation Notice number is:   EPR/UP3538LW/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.

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
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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
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- 4.2 The energy efficiency levels associated with the Best Available Techniques Conclusions
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- 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
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- 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
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
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 30/11/18.

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.

## **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)
- The review and assessment of the availability of BAT for gas turbines operating <500 hours per year

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

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

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

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

The LCP on site consists of LCP243 which is an OCGT gas turbine compression unit which has a thermal input of 59.7MWth. The unit burns natural gas only.

There is a second OCGT gas turbine compression which is not an LCP as it has a thermal input of 45MWth.

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 emergency only plant

LCP0243 is a gas turbine operated for Mechanical Drive, which is limited to less than 500 hours per year, therefore there are no applicable BAT-AELs.



## **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 sets out the BAT-AEELs for the combustion of natural gas. A footnote to the table specifies that the BAT-AEELs are not applicable to plant operating <1500 hours per year. The energy efficiency level of the plant is therefore not considered further in relation to this BAT Conclusion. We have however included a process monitoring requirement in table S3.3 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. For <500 hour plant 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.

## **4.3 The review and assessment of BAT for gas turbines operating <500 hours per year**

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

The JEP document states that plants operated for emergency use will have very low running hours, comprising testing of critical systems and operation during site emergencies only. As such, emissions will be limited and abatement techniques are unlikely to be cost-effective.

We agree that the techniques reported under BAT conclusion 42 are not applicable to LCP243.

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

## 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	N/A	N/A
Monitoring	2.3, 3.5 and 3.6	S1.2, S1.4
Energy efficiency	1.2 and 2.3	S3.3
Noise	3.4 and 2.3	S2.1
Other operating techniques	2.3	S1.2

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

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

BAT Concn. Number	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
<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	National Grid operates an ISO14001 certified EMS.

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 has explained that equipment is not fitted to allow for the determination of the net mechanical efficiency of the plant.</p> <p>The original equipment manufacturer has calculated the mechanical efficiency based upon internal product data.</p> <p>The net mechanical efficiency of the unit LCP243 is 32.3%.</p> <p>A process monitoring requirement has been set in table S3.3 which requires energy efficiency monitoring after an overhaul.</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="322 1082 1496 1257"> <thead> <tr> <th data-bbox="322 1082 689 1118">Stream</th> <th data-bbox="689 1082 1122 1118">Parameter(s)</th> <th data-bbox="1122 1082 1496 1118">Monitoring</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 1118 689 1222" rowspan="3">Flue-gas</td> <td data-bbox="689 1118 1122 1155">Flow</td> <td data-bbox="1122 1118 1496 1155">Periodic or continuous determination</td> </tr> <tr> <td data-bbox="689 1155 1122 1192">Oxygen content, temperature, and pressure</td> <td data-bbox="1122 1155 1496 1192" rowspan="2">Periodic or continuous measurement</td> </tr> <tr> <td data-bbox="689 1192 1122 1222">Water vapour content (%)</td> </tr> <tr> <td data-bbox="322 1222 689 1257">Waste water from flue-gas treatment</td> <td data-bbox="689 1222 1122 1257">Flow, pH, and temperature</td> <td data-bbox="1122 1222 1496 1257">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 (%)	Waste water from flue-gas treatment	Flow, pH, and temperature	Continuous measurement	CC	<p>Flow - Fuel gas usage is measured and flue-gas flow is determined by stoichiometric calculations.</p> <p>Oxygen content, temperature and pressure - NOx, carbon monoxide (CO) and Oxygen (O<sub>2</sub>) concentration content is measured via periodic measurements, conducted by UKAS ISO17025 laboratory to EN standards. Emissions measurements taken in</p>
Stream	Parameter(s)	Monitoring													
Flue-gas	Flow	Periodic or continuous determination													
	Oxygen content, temperature, and pressure	Periodic or continuous measurement													
	Water vapour content (%)														
Waste water from flue-gas treatment	Flow, pH, and temperature	Continuous measurement													

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>this way are not affected by changes in temperature and pressure and these parameters are not required for correction to reference conditions. We are satisfied with the Operators justification of why temperature and pressure are not measured.</p> <p>Water vapour content - Flue gas is dried prior to measurement for periodic monitoring.</p> <p>Waste water from flue-gas treatment - no waste water is generated from flue-gas treatment.</p>																		
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="320 954 1494 1385"> <thead> <tr> <th data-bbox="320 954 477 1074">Substance/Parameter</th> <th data-bbox="477 954 790 1074">Fuel/Process/Type of combustion plant</th> <th data-bbox="790 954 947 1074">Combustion plant total rated thermal input</th> <th data-bbox="947 954 1126 1074">Standard(s)<sup>(4)</sup></th> <th data-bbox="1126 954 1350 1074">Minimum monitoring frequency<sup>(5)</sup></th> <th data-bbox="1350 954 1494 1074">Monitoring associated with</th> </tr> </thead> <tbody> <tr> <td data-bbox="320 1074 477 1137">NH<sub>3</sub></td> <td data-bbox="477 1074 790 1137">— When SCR and/or SNCR is used</td> <td data-bbox="790 1074 947 1137">All sizes</td> <td data-bbox="947 1074 1126 1137">Generic EN standards</td> <td data-bbox="1126 1074 1350 1137">Continuous<sup>(6)</sup><sup>(7)</sup></td> <td data-bbox="1350 1074 1494 1137">BAT 7</td> </tr> <tr> <td data-bbox="320 1137 477 1385">NO<sub>x</sub></td> <td data-bbox="477 1137 790 1385">           — 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         </td> <td data-bbox="790 1137 947 1385">All sizes</td> <td data-bbox="947 1137 1126 1385">Generic EN standards</td> <td data-bbox="1126 1137 1350 1385">Continuous<sup>(6)</sup><sup>(8)</sup></td> <td data-bbox="1350 1137 1494 1385">           BAT 20            BAT 24            BAT 28            BAT 32            BAT 37            BAT 41            BAT 42            BAT 43            BAT 47            BAT 48            BAT 56         </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	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	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	CC	<p>The operator has confirmed that NO<sub>x</sub> and CO are monitored on a continuous basis. Foot note 5 applies which allows for the use of a Predictive Emissions Monitoring System (PEMS). This is in place at the installation.</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																
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BAT Concn. Numbe r	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>— 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>				BAT 64 BAT 65 BAT 73		
		<ul style="list-style-type: none"> <li>— Combustion plants on offshore platforms</li> </ul>	All sizes	EN 14792	Once every year <sup>(9)</sup>	BAT 53		
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		

BAT Concn. Numbe r	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
	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> <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>	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 57 BAT 66 BAT 67 BAT 74		
	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> </ul>	All sizes	Generic EN standards and	Continuous <sup>(6)</sup> <sup>(17)</sup>	BAT 22 BAT 26		

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>— 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>		EN 13284-1 and EN 13284-2		BAT 30 BAT 35 BAT 39 BAT 51 BAT 58 BAT 75	
		— Waste co-incineration	All sizes	Generic EN standards and EN 13284-2	Continuous	BAT 68 BAT 69	
	Metals and metalloids except mercury (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Ti, 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 <sup>(18)</sup>	BAT 22 BAT 26 BAT 30	
		— Waste co-incineration	< 300 MW <sub>th</sub>	EN 14385	Once every six months <sup>(13)</sup>	BAT 68 BAT 69	
			≥ 300 MW <sub>th</sub>	EN 14385	Once every three months <sup>(19)</sup> <sup>(13)</sup>		
		— IGCC plants	≥ 100 MW <sub>th</sub>	EN 14385	Once every year <sup>(18)</sup>	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 <sup>(13)</sup> <sup>(20)</sup>	BAT 23	
			≥ 300 MW <sub>th</sub>	Generic EN standards and EN 14884	Continuous <sup>(16)</sup> <sup>(21)</sup>		
		— Solid biomass and/or peat	All sizes	EN 13211	Once every year <sup>(22)</sup>	BAT 27	
		— Waste co-incineration with solid biomass and/or peat	All sizes	EN 13211	Once every three months <sup>(13)</sup>	BAT 70	
		— IGCC plants	≥ 100 MW <sub>th</sub>	EN 13211	Once every year <sup>(23)</sup>	BAT 75	



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
	TVOC	<ul style="list-style-type: none"> <li>— HFO- and/or gas-oil-fired engines</li> <li>— Process fuels from chemical industry in boilers</li> </ul>	All sizes	EN 12619	Once every six months <sup>(13)</sup>	BAT 33 BAT 59		
		<ul style="list-style-type: none"> <li>— Waste co-incineration with coal, lignite, solid biomass and/or peat</li> </ul>	All sizes	Generic EN standards	Continuous	BAT 71		
	Formaldehyde	<ul style="list-style-type: none"> <li>— Natural-gas in spark-ignited lean-burn gas and dual fuel engines</li> </ul>	All sizes	No EN standard available	Once every year	BAT 45		
	CH <sub>4</sub>	<ul style="list-style-type: none"> <li>— Natural-gas-fired engines</li> </ul>	All sizes	EN ISO 25139	Once every year <sup>(24)</sup>	BAT 45		
	PCDD/F	<ul style="list-style-type: none"> <li>— Process fuels from chemical industry in boilers</li> <li>— Waste co-incineration</li> </ul>	All sizes	EN 1948-1, EN 1948-2, EN 1948-3	Once every six months <sup>(13)</sup> <sup>(25)</sup>	BAT 59 BAT 71		
5	<p>BAT is to monitor emissions to water from flue-gas treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p>						NA	The plant does not have flue-gas treatment installed.
	<b>Substance/Parameter</b>		<b>Standard(s)</b>		<b>Minimum monitoring frequency</b>	<b>Monitoring associated with</b>		
	Total organic carbon (TOC) <sup>(26)</sup>		EN 1484		Once every month	BAT 15		
	Chemical oxygen demand (COD) <sup>(26)</sup>		No EN standard available					
	Total suspended solids (TSS)		EN 872					
	Fluoride (F <sup>-</sup> )		EN ISO 10304-1					
	Sulphate (SO <sub>4</sub> <sup>2-</sup> )		EN ISO 10304-1					
	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						

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																						
		Cd	Various EN standards available (e.g. EN ISO 11885 or EN ISO 17294-2)																									
		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		—																							
6	In order to improve the general environmental performance of combustion plants and to reduce emissions to air of CO and unburnt substances, BAT is to ensure optimised combustion and to use an appropriate combination of the techniques given below.				CC	<p>The operator has confirmed that the following measures are in place:</p> <p>b. Maintenance of the combustion system – A preventative maintenance management system is in place which is certified to both PAS55 and ISO 55001. The maintenance system identifies all site plant and equipment, frequency of maintenance, requirements for maintenance as set by the manufacturer, British and international standards used and details of any incidents and failures.</p> <p>d. Good design of the combustion equipment – All the units are generally more than 20 years old</p>																						
	<table border="1"> <thead> <tr> <th data-bbox="331 868 369 895">Technique</th> <th data-bbox="376 868 555 895">Description</th> <th data-bbox="562 868 1491 895">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="331 900 369 927">a.</td> <td data-bbox="376 900 555 986">Fuel blending and mixing</td> <td data-bbox="562 900 1491 986">Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type</td> <td data-bbox="1003 900 1491 986" rowspan="2">Generally applicable</td> </tr> <tr> <td data-bbox="331 991 369 1018">b.</td> <td data-bbox="376 991 555 1066">Maintenance of the combustion system</td> <td data-bbox="562 991 1491 1066">Regular planned maintenance according to suppliers' recommendations</td> </tr> <tr> <td data-bbox="331 1070 369 1098">c.</td> <td data-bbox="376 1070 555 1157">Advanced control system</td> <td data-bbox="562 1070 1491 1157">See description in Section 8.1</td> <td data-bbox="1003 1070 1491 1157">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 1161 369 1189">d.</td> <td data-bbox="376 1161 555 1236">Good design of the combustion equipment</td> <td data-bbox="562 1161 1491 1236">Good design of furnace, combustion chambers, burners and associated devices</td> <td data-bbox="1003 1161 1491 1236">Generally applicable to new combustion plants</td> </tr> <tr> <td data-bbox="331 1241 369 1268">e.</td> <td data-bbox="376 1241 555 1348">Fuel choice</td> <td data-bbox="562 1241 1491 1348">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,</td> <td data-bbox="1003 1241 1491 1348">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</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,	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
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		including in start-up situations or when back-up fuels are used	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	The operator has confirmed that neither SCR or SNCR are not installed at this installation.				
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 operator has confirmed that no abatement equipment is installed at this installation.				
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></p>	CC	<p>Natural Gas is the only fuel burnt in the LCPs. This is provided by the National Gas Transmission System. As such it is provided to the site at the UK standard for Natural Gas.</p> <p>This gas has to meet a nationally agreed specification for all the parameters listed. 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>				

BAT Concn. Numbe r	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>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="320 469 1494 1374"> <thead> <tr> <th data-bbox="320 469 712 501">Fuel(s)</th> <th data-bbox="712 469 1494 501">Substances/Parameters subject to characterisation</th> </tr> </thead> <tbody> <tr> <td data-bbox="320 501 712 707">Biomass/peat</td> <td data-bbox="712 501 1494 707"> — LHV  — moisture  — Ash  — C, Cl, F, N, S, K, Na  — Metals and metalloids (As, Cd, Cr, Cu, Hg, Pb, Zn) </td> </tr> <tr> <td data-bbox="320 707 712 920">Coal/lignite</td> <td data-bbox="712 707 1494 920"> — LHV  — Moisture  — Volatiles, ash, fixed carbon, C, H, N, O, S  — Br, Cl, F  — Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn) </td> </tr> <tr> <td data-bbox="320 920 712 1003">HFO</td> <td data-bbox="712 920 1494 1003"> — Ash  — C, S, N, Ni, V </td> </tr> <tr> <td data-bbox="320 1003 712 1086">Gas oil</td> <td data-bbox="712 1003 1494 1086"> — Ash  — N, C, S </td> </tr> <tr> <td data-bbox="320 1086 712 1169">Natural gas</td> <td data-bbox="712 1086 1494 1169"> — 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 </td> </tr> <tr> <td data-bbox="320 1169 712 1252">Process fuels from the chemical industry<sup>[27]</sup></td> <td data-bbox="712 1169 1494 1252"> — Br, C, Cl, F, H, N, O, S  — Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn) </td> </tr> <tr> <td data-bbox="320 1252 712 1335">Iron and steel process gases</td> <td data-bbox="712 1252 1494 1335"> — LHV, CH<sub>4</sub> (for COG), C<sub>x</sub>H<sub>y</sub> (for COG), CO<sub>2</sub>, H<sub>2</sub>, N<sub>2</sub>, total sulphur, dust, Wobbe index </td> </tr> <tr> <td data-bbox="320 1335 712 1374">Waste<sup>[28]</sup></td> <td data-bbox="712 1335 1494 1374"> — 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 — Moisture — Volatiles, ash, fixed carbon, C, H, N, O, S — Br, Cl, F — Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)	HFO	— Ash — C, S, N, Ni, V	Gas oil	— Ash — N, C, S	Natural gas	— LHV — CH <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	Process fuels from the chemical industry <sup>[27]</sup>	— Br, C, Cl, F, H, N, O, S — Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)	Iron and steel process gases	— LHV, CH <sub>4</sub> (for COG), C <sub>x</sub> H <sub>y</sub> (for COG), CO <sub>2</sub> , H <sub>2</sub> , N <sub>2</sub> , total sulphur, dust, Wobbe index	Waste <sup>[28]</sup>	— LHV		
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 — Moisture — Volatiles, ash, fixed carbon, C, H, N, O, S — Br, Cl, F — Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)																				
HFO	— Ash — C, S, N, Ni, V																				
Gas oil	— Ash — N, C, S																				
Natural gas	— LHV — CH <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																				
Process fuels from the chemical industry <sup>[27]</sup>	— Br, C, Cl, F, H, N, O, S — Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)																				
Iron and steel process gases	— LHV, CH <sub>4</sub> (for COG), C <sub>x</sub> H <sub>y</sub> (for COG), CO <sub>2</sub> , H <sub>2</sub> , N <sub>2</sub> , total sulphur, dust, Wobbe index																				
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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> <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>	CC	The LCPs control systems monitor critical gas turbine running parameters and shut down in case of malfunction and OTNOC.									
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	The LCPs control systems monitor critical gas turbine running parameters and shut down in case of malfunction and OTNOC.									
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="322 1134 1496 1361"> <thead> <tr> <th data-bbox="322 1134 577 1169">Technique</th> <th data-bbox="577 1134 1057 1169">Description</th> <th data-bbox="1057 1134 1496 1169">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 1169 367 1278">a.</td> <td data-bbox="367 1169 577 1278">Combustion optimisation</td> <td data-bbox="577 1169 1057 1278">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> </tr> <tr> <td data-bbox="322 1278 367 1361">b.</td> <td data-bbox="367 1278 577 1361">Optimisation of the working medium conditions</td> <td data-bbox="577 1278 1057 1361">Operate at the highest possible pressure and temperature of the working medium gas or steam, within the constraints associated with, for</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	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	CC	<p>BATc 12 is not applicable to plant which operates less than 1500 hours per year. However, the operator has confirmed that the following measures are in place:</p> <p>a. Combustion optimisation – Singular annular combustors with gas fuel</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										
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										

BAT Concn. Numbe r	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
			example, the control of NO <sub>x</sub> emissions or the characteristics of energy demanded			b. Working medium optimisation – Operation of compressor units are aimed to be at optimum efficiency within the constraints of the system and supply/demand gas patterns, all medium used is pre-defined in the Gas Safety management Regulations (GSMR).
	c.	Optimisation of the steam cycle	Operate with lower turbine exhaust pressure by utilisation of the lowest possible temperature of the condenser cooling water, within the design conditions			
	d.	Minimisation of energy consumption	Minimising the internal energy consumption (e.g. greater efficiency of the feed-water pump)			
	e.	Preheating of combustion air	Reuse of part of the heat recovered from the combustion flue-gas to preheat the air used in combustion	Generally applicable within the constraints related to the need to control NO <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		d. Minimisation of energy consumption – Gas turbine, Power Turbine and Gas Compressor are sized and optimised for the duty required.
	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		f. Fuel pre-heating – preheating using a water bath heater.
	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 Concn. Numbe r	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		
	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	Only applicable to new units of $\geq 600 \text{ MW}_{\text{th}}$ operated $> 4\,000 \text{ h/yr.}$		

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									
			in the case of supercritical conditions, and above 250 – 300 bar and temperatures above 580 – 600 °C in the case of ultra-supercritical conditions	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.			NA	Water is not used in the process of gas turbine driven mechanical drive gas compression in operation at the installation.									
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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	<p>Water is not used in the process and there is no direct water based effluent from the operation of the gas turbines on site.</p> <p>A small amount of water (20 to 50 litres) is used with detergent to complete a "wash" of the gas turbine, to clean out combustion and airborne debris from the engine internals. This is done on a monitored condition basis, the more hours the unit is running, the</p>									



BAT Concn. Numbe r	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>greater the frequency of washing required. All of the water used to complete washing is contaminated, thus is collected, segregated and disposed of as hazardous waste.</p> <p>There are no discharges to sewer from the installation. Domestic discharges from the facilities in the control building are directed to a bio-disc for treatment. The contents of the bio-disc are pumped out, by a third-party contractor, on a regular basis.</p> <p>As no process effluent is discharged from emission point W1, only limited primary treatment is required prior to discharge. All surface water and treated water from the bio-disc passes through the installation's main interceptor to remove any residual oil collected from site run-off, prior to being discharged to W1.</p> <p>A programme of visual inspection of the discharge, for oil and grease, is in place to ensure efficiency of the oil interceptor.</p>
15	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.	NA	The plant does not have flue-gas treatment installed.

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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"> <thead> <tr> <th data-bbox="322 1262 573 1294">Technique</th> <th data-bbox="573 1262 1081 1294">Description</th> <th data-bbox="1081 1262 1491 1294">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 1294 573 1382">a. Generation of gypsum as a by-product</td> <td data-bbox="573 1294 1081 1382">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</td> <td data-bbox="1081 1294 1491 1382">Generally applicable within the constraints associated with the required gypsum quality, the health requirements</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	Generally applicable within the constraints associated with the required gypsum quality, the health requirements	NA	There is no waste generated from combustion process and no abatement systems in operation at the installation.																																						
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			raw material in the plasterboard industry). The quality of limestone used in the wet FGD influences the purity of the gypsum produced	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 specific use, and by the market conditions														
	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	Generally applicable where plants can accept waste in the 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														
17	In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below.			CC	The operator has confirmed that the following measures are in place:  a. Operational measures – The equipment is operated by experienced staff. Preventative maintenance regime is in place.  b. Low noise equipment – It is a corporate policy requirement for low noise equipment to be fitted.  d. Noise control equipment – The following plant has noise control equipment in place.													
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			Appropriate obstacles include protection walls, embankments and buildings	of obstacles may be restricted by lack of space	-Gas turbine intake and exhaust systems – situated in an acoustically insulated building. -Compressors – situated in an acoustically insulated building. -Compressor suction and discharge pipework – the pipework is burred with acoustic lagging fitted. -Recycle valves/pipework – located in pits which helps to minimise the noise. -Fuel gas skids – pipework acoustically lagged. -Gas turbine starter – In acoustic enclosure with silencer. -Depressurisation valves and vents – the valves are acoustically boxed in or buried.						
d.	Noise-control equipment	This includes: — noise-reducers — equipment insulation — enclosure of noisy equipment — soundproofing of buildings	The applicability may be restricted by lack of space								
e.	Appropriate location of equipment and buildings	Noise levels can be reduced by increasing the distance between the emitter and the receiver and by using buildings as noise screens	Generally applicable to new plant								
<b>Combustion of gaseous fuels</b>											
40	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.			NA	BATc 12 is not applicable to plant which operates less than 1500 hours per year.  Combined cycle is not applicable to plant which operates <1500 hours per year.  Table 23 of the LCP BAT Conclusions sets out the BAT-AEELs for the combustion of natural gas. A footnote to the table specifies that the BAT-AEELs are not applicable to plant operating						
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	f. Selective non-catalytic reduction (SNCR)		Not applicable to combustion plants operated < 500 h/yr with highly variable boiler loads. The applicability may be limited in the case of combustion plants operated between 500 h/yr and 1 500 h/yr with highly variable boiler loads																			
	g. Selective catalytic reduction (SCR)		Not applicable to combustion plants operated < 500 h/yr. Not generally applicable to combustion plants of < 100 MW <sub>th</sub> . There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr																			
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>We consider that the techniques described by this BAT conclusion are not applicable to LCP243 because:</p> <ul style="list-style-type: none"> <li>- It operates less than 500 hours per year;</li> <li>- There are currently no NO<sub>x</sub> emission reduction options available;</li> <li>- Selective catalytic reduction (SCR) is not applicable to combustion plants operated less than 500 hour year.</li> </ul> <p>In making this assessment, we have considered the reference technical information available within the Joint Environmental Programme (JEP) report UTG/18/PMP/774/R. Further details are discussed in the key issues section.</p>																	
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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	The plant is a gas compression unit. It is not a gas engine and so this BAT conclusion is not applicable.													
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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"> <thead> <tr> <th data-bbox="322 1342 786 1383">Type of combustion plant</th> <th data-bbox="786 1342 1496 1383">BAT-AELs (mg/Nm<sup>3</sup>) <sup>(142)</sup> <sup>(143)</sup></th> </tr> </thead> <tbody> <tr> <td data-bbox="322 1383 786 1383"></td> <td data-bbox="786 1383 1496 1383"></td> </tr> </tbody> </table>			Type of combustion plant	BAT-AELs (mg/Nm <sup>3</sup> ) <sup>(142)</sup> <sup>(143)</sup>			CC	<p>The BAT-AELs are not applicable.</p> <p>For NO<sub>x</sub> there are no compliance limits for open cycle gas turbines for mechanical drive plant operating &lt;500 hours.</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
		Combustion plant total rated thermal input (MW <sub>th</sub> )	Yearly average <sup>(144)</sup> <sup>(145)</sup>	Daily average or average over the sampling period		For CO there are no compliance limits for gas turbines operating <1500 hours.
<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>			
<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> <ul style="list-style-type: none"> <li>— New OCGT of ≥ 50 MW<sub>th</sub>: &lt; 5–40 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] × EE/39, where EE is the net electrical energy efficiency or net mechanical energy efficiency of the plant determined at ISO baseload conditions.</li> </ul>						

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>— Existing OCGT of <math>\geq 50 \text{ MW}_{\text{th}}</math> (excluding turbines for mechanical drive applications): <math>&lt; 5\text{--}40 \text{ mg/Nm}^3</math>. The higher end of this range will generally be <math>80 \text{ mg/Nm}^3</math> in the case of existing plants that cannot be fitted with dry techniques for <math>\text{NO}_x</math> reduction, or <math>50 \text{ mg/Nm}^3</math> for plants that operate at low load.</p> <p>— New CCGT of <math>\geq 50 \text{ MW}_{\text{th}}</math>: <math>&lt; 5\text{--}30 \text{ mg/Nm}^3</math>. 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 \text{EE}/55</math>, where EE is the net electrical energy efficiency of the plant determined at ISO baseload conditions.</p> <p>— Existing CCGT of <math>\geq 50 \text{ MW}_{\text{th}}</math>: <math>&lt; 5\text{--}30 \text{ mg/Nm}^3</math>. The higher end of this range will generally be <math>50 \text{ mg/Nm}^3</math> for plants that operate at low load.</p> <p>— Existing gas turbines of <math>\geq 50 \text{ MW}_{\text{th}}</math> for mechanical drive applications: <math>&lt; 5\text{--}40 \text{ mg/Nm}^3</math>. The higher end of the range will generally be <math>50 \text{ mg/Nm}^3</math> when plants operate at low load.</p> <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 <math>\text{NO}_x</math> emissions to air from the combustion of natural gas in boilers and engines</b></p> <table border="1" data-bbox="322 791 1494 1015"> <thead> <tr> <th rowspan="3">Type of combustion plant</th> <th colspan="4">BAT-AELs (<math>\text{mg/Nm}^3</math>)</th> </tr> <tr> <th colspan="2">Yearly average <sup>(157)</sup></th> <th colspan="2">Daily average or average over the sampling period</th> </tr> <tr> <th>New plant</th> <th>Existing plant <sup>(158)</sup></th> <th>New plant</th> <th>Existing plant <sup>(159)</sup></th> </tr> </thead> <tbody> <tr> <td>Boiler</td> <td>10–60</td> <td>50–100</td> <td>30–85</td> <td>85–110</td> </tr> <tr> <td>Engine <sup>(160)</sup></td> <td>20–75</td> <td>20–100</td> <td>55–85</td> <td>55–110 <sup>(161)</sup></td> </tr> </tbody> </table> <p>As an indication, the yearly average CO emission levels will generally be:</p> <ul style="list-style-type: none"> <li>— <math>&lt; 5\text{--}40 \text{ mg/Nm}^3</math> for existing boilers operated <math>\geq 1\,500 \text{ h/yr}</math>,</li> <li>— <math>&lt; 5\text{--}15 \text{ mg/Nm}^3</math> for new boilers,</li> <li>— <math>30\text{--}100 \text{ mg/Nm}^3</math> for existing engines operated <math>\geq 1\,500 \text{ h/yr}</math> and for new engines.</li> </ul>	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>		
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## **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 Notice response, the operator has not requested a derogation from compliance with the AEL values.

## **7. Emissions to Water**

The consolidated permit incorporates the current discharge to controlled waters identified as W1.

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:**

There are no additional IED Chapter II requirements addressed through the permit review.

## 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>	
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.</p>
<b>Permit conditions</b>	
Use of conditions other than those from the template	We have retained condition 2.3.5 relating to the annual Network Review. This is a condition of the permits for all National Grid Gas compressor stations.
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.

Aspect considered	Decision
Changes to the permit conditions due to an Environment Agency initiated variation	We have varied the permit as stated in the variation notice.
Emission limits	LCP 243 is a gas turbine operated for Mechanical Drive, which is limited to less than 500 hours per year, therefore there are no applicable BAT-AELs. We have not set any additional or revised emission limits for LCP243 as part of this review.
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 BAT2.</p> <p>Based on the information in the application we are satisfied that the operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.</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 it to comply with the permit conditions.
<b>Growth Duty</b>	
Section 108 Deregulation Act 2015 – Growth duty	<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>

<b>Aspect considered</b>	<b>Decision</b>
	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.