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/XP3839XV
The Operator is: SembCorp Utilities (UK) Limited
The Installation is: Wilton No.2 Gas Turbine
This Variation Notice number is: EPR/XP3839XV/V005

What this document is about

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

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

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

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

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

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

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

How this document is structured

Glossary of acronyms used in this document

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

APC	Air Pollution Control
BAT	Best Available Technique(s)
BAT-AEEL	BAT Associated Energy Efficiency Level
BAT-AEL	BAT Associated Emission Level
BATc	BAT conclusion
BREF	Best available techniques reference document
CCGT	Combined Cycle Gas Turbine
CEM	Continuous emissions monitor
CHP	Combined heat and power
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DLN	Dry Low NOx burners
DLN-E	Dry Low NOx effective
EIONET	European environment information and observation network is a partnership network of the European Environment Agency
ELV	Emission limit value derived under BAT or an emission limit value set out in IED
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154)
EWC	European waste catalogue
FSA	Food Standards Agency
IC	Improvement Condition
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
LCP	Large Combustion Plant subject to Chapter III of IED
MSUL/MSDL	Minimum start up load/minimum shut-down load
NOx	Oxides of nitrogen (NO plus NO2 expressed as NO2)
NPV	Net Present Value
OCGT	Open Cycle Gas Turbine
PHE	Public Health England
SAC	Special Area of Conservation
SGN	Sector guidance note
TGN	Technical guidance note
TNP	Transitional National Plan
TOC	Total Organic Carbon
WFD	Water Framework Directive (2000/60/EC)

1 Our decision

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

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

The consolidated variation notice contains many conditions taken from our standard Environmental Permit template including the relevant Annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations (EPR) (England and Wales) 2016 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 EPR 2016 (a Regulation 61 Notice) on 01 May 2018 requiring the Operator to provide information to demonstrate how the operation of their installation currently meets, or will subsequently meet, the revised standards described in the LCP BAT Conclusions document. The Notice also required that where the revised standards are not currently met, the Operator should provide information that:

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

Where the Operator proposed that they were not intending to meet a BAT standard that also included a BAT Associated Emission Level (BAT AEL) described in the BAT Conclusions document, the Regulation 61 Notice requested that the Operator make a formal request for derogation from compliance with that AEL (as provisioned by Article 15(4) of the 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.

We did not receive any such request from the Operator.

The Regulation 61 notice response from the Operator was received on 19 March 2019.

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

Request for information sent 23 January 2020. BAT Conclusions 1, 2, 5, 10, 12, 16, 40, 42 and 44	Response received 13 March 2020.
BAT Conclusions 40 and 44	Response received 01 April 2020
LCP thermal inputs	Response received 04 May 2020

2.2 Review of our own information in respect to the capability of the installation to meet revised standards included in the BAT Conclusions document

Based on our records and previous regulatory activities with the facility we have no reason to consider that the Operator will not be able to comply with the conditions that we include in the permit.

In relation to BAT Conclusions 2, 9 and 40 we agree with the Operator in respect to their current stated capability as recorded in their Regulation 61 Notice response that improvements are required.

We have therefore included improvement conditions in the consolidated variation notice, which requires them to upgrade their operational techniques so that the requirements of these BAT Conclusions are delivered by 17 August 2021. This is discussed in more detail in the Key issues section and in the decision checklist regarding relevant BAT Conclusions.

3 The legal framework

The consolidated variation notice will be issued under Regulation 20 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

- an *installation* as described by the IED;
- subject to aspects of other relevant legislation which also have to be addressed.

We consider that the consolidated variation notice will ensure that the operation of the installation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

We explain how we have addressed specific statutory requirements more fully in the rest of this document.

4 The key issues

The key issues arising during this permit review are:

- Emissions to air and the emission limits applied to the plant.
- The energy efficiency levels associated with the Best Available Techniques (BAT-AEELs).

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

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

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

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

- For gas turbines where the IED specified that limits applied over 70% load and the BAT Conclusions specified that AELs applied when dry low NOx is effective (DLN-E), we have used DLN-E as a default across all monitoring requirements for NOx and CO.

a) LCP 320 configuration

This is a natural gas-fired combined heat and power (CHP) plant located within the Wilton International site. The **133.1 MWth** Wilton No.2 gas turbine incorporates a Combined Cycle Gas Turbine (CCGT) and a single pressure heat recovery steam generator (HRSG) which is capable of 162 tonnes/hour of IP steam at 18 barg and 300 °C or 100 tonnes/hour of HP steam at 96 barg and 320 °C.

The turbine runs on natural gas and vents through a 50m high single stack, at emission point A6. The plant does not operate in open cycle i.e. open cycle gas turbine (OCGT).

b) Emission limits

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

The emission limit values (ELVs) and AELs are based on an unlimited hours operating regime.

The following tables outline the limits that have been incorporated into the permit for LCP 320, where these were derived from and the reference periods at which they apply. The emission limits refer to concentrations, expressed as mass of emitted substance per volume of flue-gas under the following standard conditions:

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

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

NOx limits – BAT Conclusion 44

NOx limits (mg/Nm^3) – corrected to 15% oxygen						
Averaging	**IED (Annex V Part 1) – Existing plant**	**BREF (BAT C 44, Table 24)**	**Permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**45** (50-600 MW$_{th}$, <75%) 1	**45**	BREF	DLN-E	Continuous
Monthly	**50**	**None**	**50**	IED	DLN-E	
Daily	**55**	**55** (50-600 MW$_{th}$, <75%) 1	**55**	BREF	DLN-E	
95th %ile of hourly means	**100**	**None**	**100**	IED	DLN-E	
1 – The Operator confirmed that the lower limits for existing CCGT with a net total fuel utilisation of <75% are achievable (telecon 30 April 2020).						

The Operator confirmed that DLN operation is effective for the gas turbine at 26 MW, which corresponds to 62% load (telecon 30 April 2020).

They also confirmed that this is also the point of MSUL/MSDL. Refer to section 8 of this document.

A formal submission will be required in accordance with existing permit improvement condition IC9.

We have also set a daily limit applicable from MSUL/MSDL to baseload, consistent with the daily limit when DLN is effective. The Operator will be required to submit a formal submission in accordance with existing permit improvement condition IC10.

Tables S1.5, S1.6, S3.1 and S3.1a of the permit have been updated to reflect these requirements.

CO limits – BAT Conclusion 44

CO indicative emission levels are a yearly average of 30 mg/Nm^3. For plants operating at low load, the higher end of this range will be 50 mg/Nm^3.

The Operator has proposed a yearly average limit of 30 mg/Nm^3 (telecon 30 April 2020), with the existing IED Annex V ELVs remaining unchanged.

The applicable indicative BAT AELs are set out in the table below. We have also added the limits which will be in the varied permit and confirmed the basis for their inclusion.

CO (indicative) limits (mg/Nm^3) – corrected to 15% oxygen							
Averaging	**IED (Annex V Part 1) – Existing plant**	**Actual existing permit limits**	**BREF (BAT C 44, Table 24)**	**Permit limits**	**Basis**	**Limits apply**	**Monitoring**
Annual	**None**	**None**	**30**	**30**	BREF	DLN-E	Continuous
Monthly	**100**	**100**	**None**	**100**	IED	DLN-E	
Daily	**110**	**100**	**None**	**100**	IED	DLN-E	
95th %ile of hr means	**200**	**200**	**None**	**200**	IED	DLN-E	

We have also set a daily limit applicable from MSUL/MSDL to baseload, consistent with the daily limit when DLN is effective. The Operator will be required to submit a formal submission in accordance with existing permit improvement condition IC10.

Tables S1.5, S1.6, S3.1 and S3.1a of the permit have been updated to reflect these requirements.

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.

We have 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.

The table below sets out the BAT AEELs specified in the LCP BAT Conclusions for the LCP on the site and the energy efficiency levels confirmed through the additional information received 01 April 2020.

We are not fully satisfied that performance testing has been carried out in accordance with BAT Conclusion 2 and have set an improvement condition to address this. The Operator has committed to carrying out a performance test after the next major overhaul which is anticipated to take place in 2020. The improvement condition secures this commitment.

BAT AEELs (%) Note 1			Plant efficiency (%)		
Net electrical efficiency	**Net total fuel utilisation Note 2**	**Net mechanical efficiency**	**Net electrical efficiency**	**Net total fuel utilisation**	**Net mechanical efficiency**
CHP CCGT, 50–600 MWth **LCP 320 CHP CCGT 133.1 MWth**					
46 - 54	**65-95**	**None**	**Note 1**	**81.4**	**NA**
Note 1: In the case of CHP units, only one of the two BAT-AEELs 'Net electrical efficiency' or 'Net total fuel utilisation' applies, depending on the CHP unit design (i.e. either more oriented towards electricity generation or heat generation. The Operator confirmed that 'Net total fuel utilisation' applies. Note 2: Net total fuel utilisation BAT AEELs may not be achievable if the potential heat demand is too low.					

4.3 Fuel characterisation

BAT 9 requires the Operator to carry out fuel characterisation.

For the natural gas from Egdon resources, we have therefore included an improvement condition in the consolidated variation notice requiring the Operator to submit a plan outlining how this will be carried out for approval prior to the implementation date for the BAT Conclusions.

5 Decision checklist regarding relevant BAT Conclusions

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

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

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

BAT Conclusion requirement topic	Permit condition(s)	Permit table(s)
Environmental Management System	1.1.1	S1.2
BAT AELs	3.1.1 and 3.5.1	S3.1a
Monitoring	2.3, 3.5 and 3.6	S1.2, S1.5, S1.6, S3.1a
Energy efficiency	1.2 and 2.3	S3.3
Noise	2.3 and 3.4	S1.2
Other operating techniques	2.3	S1.2

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

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

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
General			
1	**In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the following features:** i. commitment of the management, including senior management; ii. definition of an environmental policy that includes the continuous improvement of the installation by the management; iii. planning and establishing the necessary procedures, objectives and targets, in conjunction with financial planning and investment; iv. implementation of procedures (a) Structure and responsibility (b) Training (c) Communication (d) Employee involvement (e) Documentation (f) Efficient process control (g) Maintenance programmes (h) Emergency preparedness and response (i) Safeguarding compliance with environmental legislation v. checking performance and taking corrective action, paying particular attention to: (a) monitoring and measurement (see also the Reference Document on the General Principles of Monitoring) (b) corrective and preventive action (c) maintenance of records (d) independent (where practicable) internal and external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; vi. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management; vii. following the development of cleaner technologies; viii. consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new plant, and throughout its operating life; viii. consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new	FC	The Operator confirmed that: An EMS currently exists but is not formalised into ISO 14001. This is currently being progressed. ISO 500001 and ISO 90001 are already in place. In their response to our further information request received 13 March 2020 they confirmed that they anticipated ISO 14001 certification was to be achieved by the middle of 2020. We agree with the Operator's stated compliance.

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>plant, and throughout its operating life;
ix. application of sectoral benchmarking on a regular basis.
Etc - see BAT Conclusions

Applicability. The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have.</td><td></td><td></td></tr>
<tr><td>2</td><td>BAT is to determine the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the gasification, IGCC and/or combustion units by carrying out a performance test at full load (1), according to EN standards, after the commissioning of the unit and after each modification that could significantly affect the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the unit. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</td><td>FC</td><td>The Operator confirmed that:

They monitor energy efficiency on the assets using something called the “assumptions book”. This method is listed in their ISO 50001 management system.

This looks at the GT design criteria for a given set of conditions and measures current performance against what the design criteria states the efficiency to be. There is a variation against this which is measured monthly.

We are not satisfied that the requirements of this BAT Conclusion are met and have set an improvement condition to address the deficiencies.

We do not agree with the Operator’s stated compliance of CC and have set the compliance status to FC.</td></tr>
<tr><td>3</td><td>BAT is to monitor key process parameters relevant for emissions to air and water including those given below.
<table>
<tr><th>Stream</th><th>Parameter(s)</th><th>Monitoring</th></tr>
<tr><td rowspan="3">Flue-gas</td><td>Flow</td><td>Periodic or continuous determination</td></tr>
<tr><td>Oxygen content, temperature, and pressure</td><td rowspan="2">Periodic or continuous measurement</td></tr>
<tr><td>Water vapour content (3)</td></tr>
<tr><td>Waste water from flue-gas treatment</td><td>Flow, pH, and temperature</td><td>Continuous measurement</td></tr>
</table></td><td>CC</td><td>The Operator confirmed that:

CEMS are already in place on this gas turbine and monitoring the required parameters.

We agree with the Operator’s stated compliance.</td></tr>
<tr><td>4</td><td>BAT is to monitor emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not</td><td>CC</td><td>The Operator confirmed that:</td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.
<table>
<tr><th>Substance/ Parameter</th><th>Fuel/Process/Type of combustion plant</th><th>Combustion plant total rated thermal input</th><th>Standard(s) [4]</th><th>Minimum monitoring frequency [5]</th><th>Monitoring associated with</th></tr>
<tr><td>NH_3</td><td>— When SCR and/or SNCR is used</td><td>All sizes</td><td>Generic EN standards</td><td>Continuous [6] [7]</td><td>BAT 7</td></tr>
<tr><td>NO_X</td><td>— Coal and/or lignite including waste co-incineration
— Solid biomass and/or peat including waste co-incineration
— HFO- and/or gas-oil-fired boilers and engines
— Gas-oil-fired gas turbines
— Natural-gas-fired boilers, engines, and turbines
— Iron and steel process gases
— Process fuels from the chemical industry
— IGCC plants</td><td>All sizes</td><td>Generic EN standards</td><td>Continuous [6] [8]</td><td>BAT 20
BAT 24
BAT 28
BAT 32
BAT 37
BAT 41
BAT 42
BAT 43
BAT 47
BAT 48
BAT 56
BAT 64
BAT 65
BAT 73</td></tr>
<tr><td></td><td>— Combustion plants on offshore</td><td>All sizes</td><td>EN 14792</td><td>Once every year [9]</td><td>BAT 53</td></tr>
</table></td><td></td><td>CEMS are already in place on the gas turbine and monitoring the required parameters and in accordance with EN standards.

We agree with the Operator’s stated compliance.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement

	platforms				
N_2O	— Coal and/or lignite in circulating fluidised bed boilers — Solid biomass and/or peat in circulating fluidised bed boilers	All sizes	EN 21258	Once every year [10]	BAT 20 BAT 24
CO	— Coal and/or lignite including waste co-incineration — Solid biomass and/or peat including waste co-incineration — HFO- and/or gas-oil-fired boilers and engines — Gas-oil-fired gas turbines — Natural-gas-fired boilers, engines, and turbines — Iron and steel process gases — Process fuels from the chemical industry — IGCC plants	All sizes	Generic EN standards	Continuous [6] [8]	BAT 20 BAT 24 BAT 28 BAT 33 BAT 38 BAT 44 BAT 49 BAT 56 BAT 64 BAT 65 BAT 73
	— Combustion plants on offshore platforms	All sizes	EN 15058	Once every year [9]	BAT 54

BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	SO_2	— Coal and/or lignite incl waste co-incineration — Solid biomass and/or peat incl waste co-incineration — HFO- and/or gas-oil-fired boilers — HFO- and/or gas-oil-fired engines — Gas-oil-fired gas turbines — Iron and steel process gases — Process fuels from the chemical industry in boilers — IGCC plants	All sizes	Generic EN standards and EN 14791	Continuous [6] [11] [12]	BAT 21 BAT 25 BAT 29 BAT 34 BAT 39 BAT 50 BAT 57 BAT 66 BAT 67 BAT 74		
	SO_3	— When SCR is used	All sizes	No EN standard available	Once every year	—		
	Gaseous chlorides, expressed as HCl	— Coal and/or lignite — Process fuels from the chemical industry in boilers	All sizes	EN 1911	Once every three months [6] [13] [14]	BAT 21 BAT 57		
		— Solid biomass and/or peat	All sizes	Generic EN standards	Continuous [15] [16]	BAT 25		
		— Waste co-incineration	All sizes	Generic EN standards	Continuous [6] [16]	BAT 66 BAT 67		
	HF	— Coal and/or	All sizes	No EN	Once every	BAT 21		

BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
		lignite — Process fuels from the chemical industry in boilers		standard available	three months [6] [13] [14]	BAT 57		
		— Solid biomass and/or peat	All sizes	No EN standard available	Once every year	BAT 25		
		— Waste co-incineration	All sizes	Generic EN standards	Continuous [6] [16]	BAT 66 BAT 67		
	Dust	— Coal and/or lignite — Solid biomass and/or peat — HFO- and/or gas-oil-fired boilers — Iron and steel process gases — Process fuels from the chemical industry in boilers — IGCC plants — HFO- and/or gas-oil-fired engines — Gas-oil-fired gas turbines	All sizes	Generic EN standards and EN 13284-1 and EN 13284-2	Continuous [6] [17]	BAT 22 BAT 26 BAT 30 BAT 35 BAT 39 BAT 51 BAT 58 BAT 75		
		— Waste co-incineration	All sizes	Generic EN standards and EN 13284-2	Continuous	BAT 68 BAT 69		
	Metals and metalloids except mercury	— Coal and/or lignite — Solid biomass and/or peat	All sizes	EN 14385	Once every year [18]	BAT 22 BAT 26 BAT 30		

BAT C No.	Summary of BAT Conclusion requirement						Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	(As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V, Zn)	— HFO- and/or gas-oil-fired boilers and engines						
		— Waste co-incineration	< 300 MW $_{th}$	EN 14385	Once every six months [13]	BAT 68 BAT 69		
			≥ 300 MW $_{th}$	EN 14385	Once every three months [19] [13]			
		— IGCC plants	≥ 100 MW $_{th}$	EN 14385	Once every year [18]	BAT 75		
	Hg	— Coal and/or lignite including waste co-incineration	< 300 MW $_{th}$	EN 13211	Once every three months [13] [20]	BAT 23		
			≥ 300 MW $_{th}$	Generic EN standards and EN 14884	Continuous [16] [21]			
		— Solid biomass and/or peat	All sizes	EN 13211	Once every year [22]	BAT 27		
		— Waste co-incineration with solid biomass and/or peat	All sizes	EN 13211	Once every three months [13]	BAT 70		
		— IGCC plants	≥ 100 MW $_{th}$	EN 13211	Once every year [23]	BAT 75		
	TVOC	— HFO- and/or gas-oil-fired engines — Process fuels from chemical industry in boilers	All sizes	EN 12619	Once every six months [13]	BAT 33 BAT 59		
		— Waste co-incineration with coal, lignite, solid biomass and/or peat	All sizes	Generic EN standards	Continuous	BAT 71		

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><td>Formaldehyde</td><td>— Natural-gas in spark-ignited lean-burn gas and dual fuel engines</td><td>All sizes</td><td>No EN standard available</td><td>Once every year</td><td>BAT 45</td></tr>
<tr><td>CH_4</td><td>— Natural-gas-fired engines</td><td>All sizes</td><td>EN ISO 25139</td><td>Once every year (24)</td><td>BAT 45</td></tr>
<tr><td>PCDD/F</td><td>— Process fuels from chemical industry in boilers
— Waste co-incineration</td><td>All sizes</td><td>EN 1948-1, EN 1948-2, EN 1948-3</td><td>Once every six months (13) (25)</td><td>BAT 59
BAT 71</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>5</td><td>BAT is to monitor emissions to water from flue-gas treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.
<table>
<tr><th colspan="2">Substance/Parameter</th><th>Standard(s)</th><th>Minimum monitoring frequency</th><th>Monitoring associated with</th></tr>
<tr><td colspan="2">Total organic carbon (TOC) (26)</td><td>EN 1484</td><td rowspan="10">Once every month</td><td rowspan="10">BAT 15</td></tr>
<tr><td colspan="2">Chemical oxygen demand (COD) (26)</td><td>No EN standard available</td></tr>
<tr><td colspan="2">Total suspended solids (TSS)</td><td>EN 872</td></tr>
<tr><td colspan="2">Fluoride (F^-)</td><td>EN ISO 10304-1</td></tr>
<tr><td colspan="2">Sulphate (SO_4^{2-})</td><td>EN ISO 10304-1</td></tr>
<tr><td colspan="2">Sulphide, easily released (S^{2-})</td><td>No EN standard available</td></tr>
<tr><td colspan="2">Sulphite (SO_3^{2-})</td><td>EN ISO 10304-3</td></tr>
<tr><td rowspan="2">Metals and metalloids</td><td>As</td><td rowspan="2">Various EN standards available (e.g.</td></tr>
<tr><td>Cd</td></tr>
</table>
</td><td>NA</td><td>In the Operator’s response to our request for information received 13 March 2020 they confirmed that this BAT Conclusion is not applicable because there is no flue-gas treatment at the installation.

This BAT Conclusion is not applicable to the activities carried out at the installation.</td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><td></td><td>Cr</td><td>EN ISO 11885 or EN ISO 17294-2)</td><td></td><td></td></tr>
<tr><td></td><td>Cu</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Ni</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Pb</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Zn</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Hg</td><td>Various EN standards available (e.g. EN ISO 12846 or EN ISO 17852)</td><td></td><td></td></tr>
<tr><td colspan="2">Chloride (Cl^-)</td><td>Various EN standards available (e.g. EN ISO 10304-1 or EN ISO 15682)</td><td></td><td>—</td></tr>
<tr><td colspan="2">Total nitrogen</td><td>EN 12260</td><td></td><td>—</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>6</td><td>In order to improve the general environmental performance of combustion plants and to reduce emissions to air of CO and unburnt substances, BAT is to ensure optimised combustion and to use an appropriate combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Fuel blending and mixing</td><td>Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type</td><td>Generally applicable</td></tr>
<tr><td>b.</td><td>Maintenance of the combustion system</td><td>Regular planned maintenance according to suppliers' recommendations</td><td></td></tr>
<tr><td>c.</td><td>Advanced control system</td><td>See description in Section 8.1</td><td>The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system</td></tr>
<tr><td>d</td><td>Good</td><td>Good design of furnace,</td><td>Generally applicable to new</td></tr>
</table>
</td><td>CC</td><td>The Operator confirmed that the following techniques are implemented:

This is achieved through:

b. maintenance; and
d. good design of the combustion system.

This is an appropriate combination of techniques for the installation.

We agree with the Operator’s stated compliance.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<table><tr><td>.</td><td>design of the combustion equipment</td><td>combustion chambers, burners and associated devices</td><td>combustion plants</td></tr><tr><td>e.</td><td>Fuel choice</td><td>Select or switch totally or partially to another fuel(s) with a better environmental profile (e.g. with low sulphur and/or mercury content) amongst the available fuels, including in start-up situations or when back-up fuels are used</td><td>Applicable within the constraints associated with the availability of suitable types of fuel with a better environmental profile as a whole, which may be impacted by the energy policy of the Member State, or by the integrated site's fuel balance in the case of combustion of industrial process fuels. For existing combustion plants, the type of fuel chosen may be limited by the configuration and the design of the plant</td></tr></table>		
7	In order to reduce emissions of ammonia to air from the use of selective catalytic reduction (SCR) and/or selective non-catalytic reduction (SNCR) for the abatement of NO_X emissions, BAT is to optimise the design and/or operation of SCR and/or SNCR (e.g. optimised reagent to NO_X ratio, homogeneous reagent distribution and optimum size of the reagent drops). **BAT-associated emission levels** The BAT-associated emission level (BAT-AEL) for emissions of NH_3 to air from the use of SCR and/or SNCR is < 3–10 mg/Nm^3 as a yearly average or average over the sampling period. The lower end of the range can be achieved when using SCR and the upper end of the range can be achieved when using SNCR without wet abatement techniques. In the case of plants combusting biomass and operating at variable loads as well as in the case of engines combusting HFO and/or gas oil, the higher end of the BAT-AEL range is 15 mg/Nm^3.	NA	The Operator confirmed that: No SCR or SNCR used. We can conclude that this BAT Conclusion is not applicable to the activities carried out at the installation.

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>8</td><td>In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.</td><td>CC</td><td>The Operator confirmed that:

Regular monitoring and maintenance of the equipment is carried out.

We agree with the Operators stated compliance.</td></tr>
<tr><td>9</td><td>In order to improve the general environmental performance of combustion and/or gasification plants and to reduce emissions to air, BAT is to include the following elements in the quality assurance/quality control programmes for all the fuels used, as part of the environmental management system (see BAT 1):
(i) Initial full characterisation of the fuel used including at least the parameters listed below and in accordance with EN standards. ISO, national or other international standards may be used provided they ensure the provision of data of an equivalent scientific quality;
(ii) Regular testing of the fuel quality to check that it is consistent with the initial characterisation and according to the plant design specifications. The frequency of testing and the parameters chosen from the table below are based on the variability of the fuel and an assessment of the relevance of pollutant releases (e.g. concentration in fuel, flue-gas treatment employed);
(iii) Subsequent adjustment of the plant settings as and when needed and practicable (e.g. integration of the fuel characterisation and control in the advanced control system (see description in Section 8.1)).
Description
Initial characterisation and regular testing of the fuel can be performed by the operator and/or the fuel supplier. If performed by the supplier, the full results are provided to the operator in the form of a product (fuel) supplier specification and/or guarantee.
<table><tr><th>Fuel(s)</th><th>Substances/Parameters subject to characterisation</th></tr><tr><td>Biomass/peat</td><td>— LHV
— moisture</td></tr></table></td><td>FC</td><td>The Operator confirmed that:

Details of how points (i), (ii) and (iii) are implemented are not required for natural gas.

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.

We agree with the Operators stated compliance of CC for natural gas.

However, for the natural gas from Egdon Resources authorised in table S2.1 of the permit we are required to set an improvement condition, refer to section 4.3 of this document.

We have set this BAT Conclusion to FC.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement		Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
		— 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_4, C_2H_6, C_3, C_4+, CO_2, N_2, Wobbe index		
	Process fuels from the chemical industry ([27])	— Br, C, Cl, F, H, N, O, S		
		— Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)		
	Iron and steel process gases	— LHV, CH_4 (for COG), C_XH_Y (for COG), CO_2, H_2, N_2, total sulphur, dust, Wobbe index		
	Waste ([28])	— LHV		
		— Moisture		
		— Volatiles, ash, Br, C, Cl, F, H, N, O, S		
		— Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Tl, V, Zn)		

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
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: — appropriate design of the systems considered relevant in causing OTNOC that may have an impact on emissions to air, water and/or soil (e.g. low-load design concepts for reducing the minimum start-up and shutdown loads for stable generation in gas turbines), — set-up and implementation of a specific preventive maintenance plan for these relevant systems, — review and recording of emissions caused by OTNOC and associated circumstances and implementation of corrective actions if necessary, — periodic assessment of the overall emissions during OTNOC (e.g. frequency of events, duration, emissions quantification/estimation) and implementation of corrective actions if necessary.	CC	The Operator confirmed that: - Standard operating procedures (controlled documents) are used to adjust for optimum load ensuring the load does not fall below minimum levels and to ensure system balance for good environmental performance of emissions. In their response to our request for information received 13 March 2020 they confirmed that: - Fuel/air mix is optimised and automated and is mainly used at times of start-up and shut-down - Review of emissions caused by OTNOC. Emissions are displayed real time in the control room and monitored 24 hours per day. CEMS are in place. Emissions are reviewed after OTNOC but no formal procedure is in place. - Assessment after OTNOC takes place and any issues are logged or reported and actions are assigned if necessary. We agree with the Operator's stated compliance.
11	BAT is to appropriately monitor emissions to air and/or to water during OTNOC. ***Description*** The monitoring can be carried out by direct measurement of emissions or by monitoring of surrogate parameters if this proves to be of equal or better scientific quality than the direct measurement of emissions. Emissions during start-up and shutdown (SU/SD) may be assessed based on a detailed emission measurement carried out for a typical SU/SD procedure at least once every year, and using the results of this measurement to estimate the emissions for each and every SU/SD throughout the year.	CC	The Operator confirmed that: Whilst operational the gas turbine operates at optimal load. If there are abnormal operating conditions then the gas turbine would be shut-down until these were able to be corrected. If the CEMS fails a portable meter is deployed. We agree with the Operator's stated compliance.

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>12</td><td>In order to increase the energy efficiency of combustion, gasification and/or IGCC units operated ≥ 1 500 h/yr, BAT is to use an appropriate combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Combustion optimisation</td><td>See description in Section 8.2.
Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues</td><td rowspan="4">Generally applicable</td></tr>
<tr><td>b.</td><td>Optimisation of the working medium conditions</td><td>Operate at the highest possible pressure and temperature of the working medium gas or steam, within the constraints associated with, for example, the control of NO_X emissions or the characteristics of energy demanded</td></tr>
<tr><td>c.</td><td>Optimisation of the steam cycle</td><td>Operate with lower turbine exhaust pressure by utilisation of the lowest possible temperature of the condenser cooling water, within the design conditions</td></tr>
<tr><td>d.</td><td>Minimisation of energy consumption</td><td>Minimising the internal energy consumption (e.g. greater efficiency of the feed-water pump)</td></tr>
<tr><td>e.</td><td>Preheating of combustion air</td><td>Reuse of part of the heat recovered from the combustion flue-gas to preheat the air used in combustion</td><td>Generally applicable within the constraints related to the need to control NO_X emissions</td></tr>
<tr><td>f.</td><td>Fuel preheating</td><td>Preheating of fuel using recovered heat</td><td>Generally applicable within the constraints associated with the boiler design and the need to control</td></tr>
</table></td><td>CC</td><td>The Operator confirmed that the following techniques are employed:

a. Combustion optimisation.
c. Optimisation of steam cycle.
d. A new efficient feed water pump is due to be installed as part of a larger project.
f. Fuel preheating.
h. Feed water preheating.
i. Heat recovery by CHP.

We agree with the Operator’s stated compliance.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement

			NO_x emissions
g.	Advanced control system	See description in Section 8.2. Computerised control of the main combustion parameters enables the combustion efficiency to be improved	Generally applicable to new units. The applicability to old units may be constrained by the need to retrofit the combustion system and/or control command system
h.	Feed-water preheating using recovered heat	Preheat water coming out of the steam condenser with recovered heat, before reusing it in the boiler	Only applicable to steam circuits and not to hot boilers. Applicability to existing units may be limited due to constraints associated with the plant configuration and the amount of recoverable heat
i.	Heat recovery by cogeneration (CHP)	Recovery of heat (mainly from the steam system) for producing hot water/steam to be used in industrial processes/activities or in a public network for district heating. Additional heat recovery is possible from: — flue-gas — grate cooling — circulating fluidised bed	Applicable within the constraints associated with the local heat and power demand. The applicability may be limited in the case of gas compressors with an unpredictable operational heat profile
j.	CHP readiness	See description in Section 8.2.	Only applicable to new units where there is a realistic potential for the future use of heat in the vicinity of the unit
k.	Flue-gas condenser	See description in Section 8.2.	Generally applicable to CHP units provided there is enough demand for low-temperature heat
l.	Heat	Heat accumulation storage in	Only applicable to CHP

BAT C No.	Summary of BAT Conclusion requirement				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
		accumulation	CHP mode	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	Only applicable to new plants		

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><td></td><td></td><td>and thus to achieve increased steam/combustion process efficiencies</td><td></td></tr>
<tr><td>r.</td><td>Steam turbine upgrades</td><td>This includes techniques such as increasing the temperature and pressure of medium-pressure steam, addition of a low-pressure turbine, and modifications to the geometry of the turbine rotor blades</td><td>The applicability may be restricted by demand, steam conditions and/or limited plant lifetime</td></tr>
<tr><td>s.</td><td>Supercritical and ultra-supercritical steam conditions</td><td>Use of a steam circuit, including steam reheating systems, in which steam can reach pressures above 220,6 bar and temperatures above 374 °C in the case of supercritical conditions, and above 250 – 300 bar and temperatures above 580 – 600 °C in the case of ultra-supercritical conditions</td><td>Only applicable to new units of
≥ 600 MW_{th} operated
> 4 000 h/yr.
Not applicable when the purpose of the unit is to produce low steam temperatures and/or pressures in process industries.
Not applicable to gas turbines and engines generating steam in CHP mode.
For units combusting biomass, the applicability may be constrained by high-temperature corrosion in the case of certain biomasses</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>13</td><td>In order to reduce water usage and the volume of contaminated waste water discharged, BAT is to use one or both of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Water recycling</td><td>Residual aqueous streams, including run-off water, from the plant are reused for other purposes. The degree of recycling</td><td>Not applicable to waste water from cooling systems when water treatment chemicals</td></tr>
</table>
</td><td>NA</td><td>The Operator confirmed that:

The water run-off produced by the installation is minimal.

Whilst the Operator stated that they are NC, we consider that this BAT Conclusion is NA to the activities carried out at the installation.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<table><tr><td></td><td></td><td>is limited by the quality requirements of the recipient water stream and the water balance of the plant</td><td>and/or high concentrations of salts from seawater are present</td></tr><tr><td>b.</td><td>Dry bottom ash handling</td><td>Dry, hot bottom ash falls from the furnace onto a mechanical conveyor system and is cooled down by ambient air. No water is used in the process.</td><td>Only applicable to plants combusting solid fuels. There may be technical restrictions that prevent retrofitting to existing combustion plants</td></tr></table>		
14	In order to prevent the contamination of uncontaminated waste water and to reduce emissions to water, BAT is to segregate waste water streams and to treat them separately, depending on the pollutant content. ***Description*** Waste water streams that are typically segregated and treated include surface run-off water, cooling water, and waste water from flue-gas treatment. ***Applicability*** The applicability may be restricted in the case of existing plants due to the configuration of the drainage systems.	CC	The Operator confirmed that: The site is a large industrial site and all effluent goes to a drain via a consent to discharge. Consideration is being given to building an industrial effluent treatment plant but no firm date is in place. It is anticipated that this plant would receive effluent from all industries within Wilton International and not just effluent from this installation. If this is the case, emissions from this plant would be regulated by a discharge consent and therefore this is not relevant to this permit review. Whilst the Operator stated that they are NC, we consider that they are CC with this BAT Conclusion.
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. <table><tr><th colspan="2">Technique</th><th>Typical pollutants prevented/abated</th><th>Applicability</th></tr><tr><td colspan="4">Primary techniques</td></tr><tr><td>a.</td><td>Optimised combustion (see BAT 6) and flue-gas treatment systems (e.g. SCR/SNCR,</td><td>Organic compounds, ammonia (NH_3)</td><td>Generally applicable</td></tr></table>	NA	In their response to our request for information received 13 March 2020 the Operator confirmed that this BAT Conclusion is not applicable. The BAT AELs refer to direct discharges to a receiving water body at the point where the emission leaves the installation. We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.

BAT C No.	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement

	see BAT 7)		
Secondary techniques ([29])			
b.	Adsorption on activated carbon	Organic compounds, mercury (Hg)	Generally applicable
c.	Aerobic biological treatment	Biodegradable organic compounds, ammonium (NH_4^+)	Generally applicable for the treatment of organic compounds. Aerobic biological treatment of ammonium (NH_4^+) may not be applicable in the case of high chloride concentrations (i.e. around 10 g/l)
d.	Anoxic/anaerobic biological treatment	Mercury (Hg), nitrate (NO_3^-), nitrite (NO_2^-)	Generally applicable
e.	Coagulation and flocculation	Suspended solids	Generally applicable
f.	Crystallisation	Metals and metalloids, sulphate (SO_4^{2-}), fluoride (F^-)	Generally applicable
g.	Filtration (e.g. sand filtration, microfiltration, ultrafiltration)	Suspended solids, metals	Generally applicable
h.	Flotation	Suspended solids, free oil	Generally applicable
i.	Ion exchange	Metals	Generally applicable
j.	Neutralisation	Acids, alkalis	Generally applicable
k.	Oxidation	Sulphide (S^{2-}), sulphite (SO_3^{2-})	Generally applicable
l.	Precipitation	Metals and metalloids, sulphate (SO_4^{2-}), fluoride (F^-)	Generally applicable
m	Sedimentation	Suspended solids	Generally applicable

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><td>.</td><td></td><td></td><td></td></tr>
<tr><td>n.</td><td>Stripping</td><td>Ammonia (NH_3)</td><td>Generally applicable</td></tr>
</table>
The BAT-AELs refer to direct discharges to a receiving water body at the point where the emission leaves the installation.
BAT-AELs for direct discharges to a receiving water body from flue-gas treatment
<table>
<tr><th colspan="2" rowspan="2">Substance/Parameter</th><th>BAT-AELs</th></tr>
<tr><th>Daily average</th></tr>
<tr><td colspan="2">Total organic carbon (TOC)</td><td>20–50 mg/l [30] [31] [32]</td></tr>
<tr><td colspan="2">Chemical oxygen demand (COD)</td><td>60–150 mg/l [30] [31] [32]</td></tr>
<tr><td colspan="2">Total suspended solids (TSS)</td><td>10–30 mg/l</td></tr>
<tr><td colspan="2">Fluoride (F^-)</td><td>10–25 mg/l [32]</td></tr>
<tr><td colspan="2">Sulphate (SO_4^{2-})</td><td>1,3–2,0 g/l [32] [33] [34] [35]</td></tr>
<tr><td colspan="2">Sulphide (S^{2-}), easily released</td><td>0,1–0,2 mg/l [32]</td></tr>
<tr><td colspan="2">Sulphite (SO_3^{2-})</td><td>1–20 mg/l [32]</td></tr>
<tr><td rowspan="8">Metals and metalloids</td><td>As</td><td>10–50 µg/l</td></tr>
<tr><td>Cd</td><td>2–5 µg/l</td></tr>
<tr><td>Cr</td><td>10–50 µg/l</td></tr>
<tr><td>Cu</td><td>10–50 µg/l</td></tr>
<tr><td>Hg</td><td>0,2–3 µg/l</td></tr>
<tr><td>Ni</td><td>10–50 µg/l</td></tr>
<tr><td>Pb</td><td>10–20 µg/l</td></tr>
<tr><td>Zn</td><td>50–200 µg/l</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>16</td><td>In order to reduce the quantity of waste sent for disposal from the combustion and/or gasification process and abatement techniques, BAT is to organise operations so as to maximise, in order of priority and taking into account life-cycle thinking:
(a) waste prevention, e.g. maximise the proportion of residues which arise as by-products;
(b) waste preparation for reuse, e.g. according to the specific requested quality criteria;</td><td>CC</td><td>The Operator confirmed that waste goes to an energy recovery plant (d).

In response to our request for information received 13 March 2020 they confirmed that a) to c) are not applicable.

They also confirm that waste management takes place on site and a push to improve the number of recycling streams is planned during 2020.

We agree with the Operator’s stated compliance.</td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>(c) waste recycling;
(d) other waste recovery (e.g. energy recovery),
by implementing an appropriate combination of techniques such as:
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Generation of gypsum as a by-product</td><td>Quality optimisation of the calcium-based reaction residues generated by the wet FGD so that they can be used as a substitute for mined gypsum (e.g. as raw material in the plasterboard industry). The quality of limestone used in the wet FGD influences the purity of the gypsum produced</td><td>Generally applicable within the constraints associated with the required gypsum quality, the health requirements associated to each specific use, and by the market conditions</td></tr>
<tr><td>b.</td><td>Recycling or recovery of residues in the construction sector</td><td>Recycling or recovery of residues (e.g. from semi-dry desulphurisation processes, fly ash, bottom ash) as a construction material (e.g. in road building, to replace sand in concrete production, or in the cement industry)</td><td>Generally applicable within the constraints associated with the required material quality (e.g. physical properties, content of harmful substances) associated to each specific use, and by the market conditions</td></tr>
<tr><td>c.</td><td>Energy recovery by using waste in the fuel mix</td><td>The residual energy content of carbon-rich ash and sludges generated by the combustion of coal, lignite, heavy fuel oil, peat or biomass can be recovered for example by mixing with the fuel</td><td>Generally applicable where plants can accept waste in the fuel mix and are technically able to feed the fuels into the combustion chamber</td></tr>
<tr><td>d.</td><td>Preparation of spent catalyst for reuse</td><td>Preparation of catalyst for reuse (e.g. up to four times for SCR catalysts) restores some or all of the original performance, extending the service life of the catalyst to several decades. Preparation of spent catalyst for reuse is integrated in a catalyst management scheme</td><td>The applicability may be limited by the mechanical condition of the catalyst and the required performance with respect to controlling NO_X and NH_3 emissions</td></tr>
</table></td><td></td><td></td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>17</td><td>In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Operational measures</td><td>These include:
— improved inspection and maintenance of equipment
— closing of doors and windows of enclosed areas, if possible
— equipment operated by experienced staff
— avoidance of noisy activities at night, if possible
— provisions for noise control during maintenance activities</td><td>Generally applicable</td></tr>
<tr><td>b.</td><td>Low-noise equipment</td><td>This potentially includes compressors, pumps and disks</td><td>Generally applicable when the equipment is new or replaced</td></tr>
<tr><td>c.</td><td>Noise attenuation</td><td>Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings</td><td>Generally applicable to new plants. In the case of existing plants, the insertion of obstacles may be restricted by lack of space</td></tr>
<tr><td>d.</td><td>Noise-control equipment</td><td>This includes:
— noise-reducers
— equipment insulation
— enclosure of noisy equipment
— soundproofing of buildings</td><td>The applicability may be restricted by lack of space</td></tr>
<tr><td>e.</td><td>Appropriate location of equipment</td><td>Noise levels can be reduced by increasing the distance between the emitter and the receiver and</td><td>Generally applicable to new plant</td></tr>
</table></td><td>CC</td><td>The Operator confirmed that the following techniques are in place:

a. operational measures are in place as described in a.
c. location of existing assets are on an industrial site and are located specifically away from the nearest residential areas.

We agree with the Operator’s stated compliance.

We have however included a general noise improvement condition as detailed in section 8 of this document.</td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td><table><tr><td></td><td>and buildings</td><td>by using buildings as noise screens</td><td></td></tr></table></td><td></td><td></td></tr>
<tr><td colspan="4">Combustion of solid fuels only (coal and/or lignite) – BAT Conclusions 18 to 23 deleted
Combustion of solid fuels (solid biomass and/or peat) - BAT Conclusions 24 to 27 deleted
Combustion of liquid fuels (HFO and/or gas-oil-fired boilers) – BAT Conclusions 28 to 30 deleted
Combustion of liquid fuels (HFO and/or gas-oil-fired engines) – BAT Conclusions 31 to 35 deleted
Combustion of liquid fuels (gas oil fired gas turbines) – BAT Conclusions 36 to 39 deleted
Not applicable to the activities carried out at the installation</td></tr>
<tr><td colspan="4">Combustion of gaseous fuels</td></tr>
<tr><td>40</td><td>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.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Combined cycle</td><td>See description in Section 8.2</td><td>Generally applicable to new gas turbines and engines except when operated < 1 500 h/yr.
Applicable to existing gas turbines and engines within the constraints associated with the steam cycle design and the space availability.
Not applicable to existing gas turbines and engines operated < 1 500 h/yr.
Not applicable to mechanical drive gas turbines operated in discontinuous mode with extended load variations and frequent start-ups and shutdowns.
Not applicable to boilers</td></tr>
</table>
BAT-associated energy efficiency levels (BAT-AEELs) for the combustion of natural gas
<table>
<tr><th rowspan="2">Type of combustion unit</th><th colspan="3">BAT-AEELs [136] [137]</th></tr>
<tr><th colspan="2">Net electrical efficiency (%)</th><th>Net total fuel utilisation (%) [138] [139]</th><th colspan="2">Net mechanical energy efficiency (%) [139] [140]</th></tr>
<tr><th>New uni</th><th>Existing unit</th><th>New unit</th><th>Existing unit</th></tr>
</table></td><td>FC</td><td>The Operator confirmed that:

GT2 – 81.4% Net fuel input to GT2 & HRSG (inc feed heat as fuel equivalent).

In their response to our request for information received 13 March 2020 they confirmed that the original test results were at full load only which explains the higher efficiency. The lower heating value (LHV) varies as a result of varying customer steam demand. The BAT AEEL is met.

They also confirmed that the efficiency calculation is based on:

Net Fuel input to GT2 & HRSG (Feed heat produced internally)
Net power from GT2
Net Heat from GT2

These figures are taken from their verified CHPQA data for the GT2 Scheme and converted from gross to net calorific value (CV).

In their response received 01 April 2020 they confirmed that the applicable BAT AEEL is the ‘net total fuel utilisation’.

Refer to section 4.2 of this document.

We are not fully satisfied that the requirements of this BAT Conclusion are met and have set an improvement condition to address the deficiencies.

We do not agree with the Operator’s stated compliance of CC and have set the</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	t		compliance status to FC.

Gas engine	39,5–44 ([141])	35–44 ([141])	56–85 ([141])	No BAT-AEEL.	
Gas-fired boiler	39–42,5	38–40	78–95	No BAT-AEEL.	
Open cycle gas turbine, ≥ 50 MWth	36–41,5	33–41,5	No BAT-AEEL	36,5–41	33,5–41
Combined cycle gas turbine (CCGT)					
CCGT, 50–600 MW_{th}	53–58,5	46–54	No BAT-AEEL	No BAT-AEEL	
CCGT, ≥ 600 MW_{th}	57–60,5	50–60	No BAT-AEEL	No BAT-AEEL	
CHP CCGT, 50–600 MW_{th}	53–58,5	46–54	65–95	No BAT-AEEL	
CHP CCGT, ≥ 600 MW_{th}	57–60,5	50–60	65–95	No BAT-AEEL	

41	In order to prevent or reduce NO_X emissions to air from the combustion of natural gas in boilers, BAT is to use one or a combination of the techniques given below.	NA	This BAT Conclusion is applicable to the combustion of natural gas in boilers and therefore is not applicable to this installation. The Operator stated that they are CC. We don't agree with the Operator's stated compliance. This BAT Conclusion is not applicable to the activities carried out at the installation.

	Technique	Description	Applicability
a.	Air and/or fuel staging	See descriptions in Section 8.3. Air staging is often associated with low-NO_X burners	Generally applicable
b.	Flue-gas recirculation	See description in Section 8.3	
c.	Low-NO_X burners (LNB)		
d.	Advanced control system	See description in Section 8.3. This technique is often	The applicability to old combustion plants may be constrained by the need to

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<table><tr><td></td><td></td><td>used in combination with other techniques or may be used alone for combustion plants operated < 500 h/yr</td><td>retrofit the combustion system and/or control command system</td></tr><tr><td>e.</td><td>Reduction of the combustion air temperature</td><td>See description in Section 8.3</td><td>Generally applicable within the constraints associated with the process needs</td></tr><tr><td>f.</td><td>Selective non–catalytic reduction (SNCR)</td><td></td><td>Not applicable to combustion plants operated < 500 h/yr with highly variable boiler loads. The applicability may be limited in the case of combustion plants operated between 500 h/yr and 1 500 h/yr with highly variable boiler loads</td></tr><tr><td>g.</td><td>Selective catalytic reduction (SCR)</td><td></td><td>Not applicable to combustion plants operated < 500 h/yr. Not generally applicable to combustion plants of < 100 MW_{th}. There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</td></tr></table>		
42	In order to prevent or reduce NO_X 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. <table><tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>a.</td><td>Advanced control system</td><td>See description in Section 8.3. This technique is often used in combination with other techniques or may be used alone for</td><td>The applicability to old combustion plants may be constrained by the need to retrofit the</td></tr></table>	CC	The Operator confirmed that: In their response to our request for information received 13 March 2020 they confirmed that the following techniques are used to manage NOx emissions: a. Advanced control system b. DLN burners and Air staging

BAT C No.	Summary of BAT Conclusion requirement				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			combustion plants operated < 500 h/yr	combustion system and/or control command system		Lean burn concept and advanced lean burn We agree with the Operator's stated compliance.
	b.	Water/steam addition	See description in Section 8.3	The applicability may be limited due to water availability		
	c.	Dry low-NO_X 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_X 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		
	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_{th}. Retrofitting existing combustion plants may be constrained by the availability of sufficient		

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td><table><tr><td></td><td></td><td></td><td>space.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</td></tr></table></td><td></td><td></td></tr>
<tr><td>43</td><td>In order to prevent or reduce NO_X emissions to air from the combustion of natural gas in engines, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Advanced control system</td><td>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</td><td>The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system</td></tr>
<tr><td>b.</td><td>Lean-burn concept</td><td>See description in Section 8.3.
Generally used in combination with SCR</td><td>Only applicable to new gas-fired engines</td></tr>
<tr><td>c.</td><td>Advanced lean-burn concept</td><td rowspan="2">See descriptions in Section 8.3</td><td>Only applicable to new spark plug ignited engines</td></tr>
<tr><td>d.</td><td>Selective catalytic reduction (SCR)</td><td>Retrofitting existing combustion plants may be constrained by the availability of sufficient space.
Not applicable to combustion plants operated < 500 h/yr.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</td></tr>
</table></td><td>NA</td><td>The Operator did not provide a response to this BAT Conclusion.

We consider that this BAT Conclusion is not applicable to the activities carried out at the installation because there are no engines at the installation.</td></tr>
</table>

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>44</td><td>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.
Description - See descriptions in Section 8.3.
BAT-associated emission levels (BAT-AELs) for NO_X emissions to air from the combustion of natural gas in gas turbines
<table>
<tr><th rowspan="2">Type of combustion plant</th><th rowspan="2">Combustion plant total rated thermal input (MW_{th})</th><th colspan="2">BAT-AELs (mg/Nm^3) (142) (143)</th></tr>
<tr><th>Yearly average (144) (145)</th><th>Daily average or average over the sampling period</th></tr>
<tr><td colspan="4">Open-cycle gas turbines (OCGTs) (146) (147)</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 < 500 h/yr</td><td>≥ 50</td><td>15–50</td><td>25–55 (148)</td></tr>
<tr><td colspan="4">Combined-cycle gas turbines (CCGTs) (146) (149)</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 < 75 %</td><td>≥ 600</td><td>10–40</td><td>18–50</td></tr>
<tr><td>Existing CCGT with a net total fuel utilisation of ≥ 75 %</td><td>≥ 600</td><td>10–50</td><td>18–55 (150)</td></tr>
<tr><td>Existing CCGT with a net total fuel utilisation of < 75 %</td><td>50–600</td><td>10–45</td><td>35–55</td></tr>
<tr><td>Existing CCGT with a net total fuel utilisation of ≥ 75 %</td><td>50–600</td><td>25–50 (151)</td><td>35–55 (152)</td></tr>
<tr><td colspan="4">Open- and combined-cycle gas turbines</td></tr>
<tr><td>Gas turbine put into operation no later than 27 November 2003, or existing gas turbine for emergency</td><td>≥ 50</td><td>No BAT-AEL</td><td>60–140 (153) (154)</td></tr>
</table></td><td>CC</td><td>The Operator confirmed that they are compliant with both the yearly and daily average BAT AELs for NOx and the indicative yearly average for CO.

We have set limits as detailed in section 4.1 of this document.

We agree with the Operator’s stated compliance.</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement

use and operated < 500 h/yr			
Existing gas turbine for mechanical drive applications — All but plants operated < 500 h/yr	≥ 50	15–50 ([155])	25–55 ([156])

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:

- New OCGT of ≥ 50 MW_{th}: < 5–40 mg/Nm^3. For plants with a net electrical efficiency (EE) greater than 39 %, a correction factor may be applied to the higher end of this range, corresponding to [higher end] × EE/39, where EE is the net electrical energy efficiency or net mechanical energy efficiency of the plant determined at ISO baseload conditions.
- Existing OCGT of ≥ 50 MW_{th} (excluding turbines for mechanical drive applications): < 5–40 mg/Nm^3. The higher end of this range will generally be 80 mg/Nm^3 in the case of existing plants that cannot be fitted with dry techniques for NO_X reduction, or 50 mg/Nm^3 for plants that operate at low load.
- New CCGT of ≥ 50 MW_{th}: < 5–30 mg/Nm^3. For plants with a net electrical efficiency (EE) greater than 55 %, a correction factor may be applied to the higher end of the range, corresponding to [higher end] × EE/55, where EE is the net electrical energy efficiency of the plant determined at ISO baseload conditions.
- Existing CCGT of ≥ 50 MW_{th}: < 5–30 mg/Nm^3. The higher end of this range will generally be 50 mg/Nm^3 for plants that operate at low load.
- Existing gas turbines of ≥ 50 MW_{th} for mechanical drive applications: < 5–40 mg/Nm^3. The higher end of the range will generally be 50 mg/Nm^3 when plants operate at low load.

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

BAT-associated emission levels (BAT-AELs) for NO_X emissions to air from the combustion of natural gas in boilers and engines

Type of combustion plant	BAT-AELs (mg/Nm^3)			
	Yearly average ([157])		Daily average or average over the sampling period	
	New plan	Existing plant ([158])	New plant	Existing plant ([159])

<table>
<tr><th>BAT C No.</th><th>Summary of BAT Conclusion requirement</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><th></th><th>t</th><th></th><th></th><th></th></tr>
<tr><td>Boiler</td><td>10–60</td><td>50–100</td><td>30–85</td><td>85–110</td></tr>
<tr><td>Engine (160)</td><td>20–75</td><td>20–100</td><td>55–85</td><td>55–110 (161)</td></tr>
</table>
As an indication, the yearly average CO emission levels will generally be:
— < 5–40 mg/Nm^3 for existing boilers operated ≥ 1 500 h/yr,
— < 5–15 mg/Nm^3 for new boilers,
— 30–100 mg/Nm^3 for existing engines operated ≥ 1 500 h/yr and for new engines.
</td><td></td><td></td></tr>
<tr><td>45</td><td>In order to reduce non-methane volatile organic compounds (NMVOC) and methane (CH_4) 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.
Description
See descriptions in Section 8.3. Oxidation catalysts are not effective at reducing the emissions of saturated hydrocarbons containing less than four carbon atoms.
BAT-associated emission levels (BAT-AELs) for formaldehyde and CH_4 emissions to air from the combustion of natural gas in a spark-ignited lean-burn gas engine
<table>
<tr><th rowspan="3">Combustion plant total rated thermal input (MW_{th})</th><th colspan="3">BAT-AELs (mg/Nm^3)</th></tr>
<tr><th>Formaldehyde</th><th colspan="2">CH_4</th></tr>
<tr><th colspan="3">Average over the sampling period</th></tr>
<tr><th>New or existing plant</th><th>New plant</th><th>Existing plant</th></tr>
<tr><td>≥ 50</td><td>5–15 (162)</td><td>215–500 (163)</td><td>215–560 (162) (163)</td></tr>
</table>
</td><td>NA</td><td>The Operator did not provide a response to this BAT Conclusion.

We consider that this BAT Conclusion is not applicable to the activities carried out at the installation because there are no engines at the installation.</td></tr>
<tr><td colspan="4">BAT Conclusions for iron and steel process gases – BAT Conclusions 46 to 51 deleted
BAT Conclusions for offshore platforms – BAT Conclusions BAT 52 to 54 deleted
BAT Conclusions for chemical process gases – BAT Conclusions 55 to 59 deleted
BAT Conclusions for co-incineration – BAT Conclusions 60 to 71</td></tr>
</table>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
BAT Conclusions for gasification – BAT Conclusions 72 to 75 deleted **Not applicable to the activities carried out at the installation**			

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.

The Operator has not made any such request.

7 Emissions to water

There a no direct emissions to water from the installation.

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

8 Additional IED Chapter II requirements:

Condition/table	Justification
Condition 2.3.7, improvement condition IC12 and definition in Schedule 6 added	In the event of a black out National Grid would call on combustion plant to operate and may require them to do so outside their permitted conditions. We have dedicated black start plant and they are permitted to run as such but this scenario is relevant to the rest of the LCP which could be called depending on the circumstances. A risk assessment will be carried out by Energy UK/Joint Environmental Programme on behalf of LCP connected to the National Transmission System. Air emissions modelling will be based on generic black start scenarios to establish whether they have the potential to have a local impact on the environment or not (on a national basis). If the modelling demonstrates that no significant impacts are likely, the plant can operate under condition 2.3.7. This condition allows the hourly ELVs for plants operating under a black start instruction to be discounted for the purpose of reporting. We would also require there to be a procedure in place for minimisation of emissions in the case of a black start event and for reporting in the event of a black start. This modelling and the procedures have not been agreed in advance of the issue of the permit review and therefore a condition linking back to an improvement condition has been included in the permit.
Condition 3.5.1 amended	To reference table S3.3 for process monitoring parameters and to remove reference to annual limits specified in table S3.3.
Condition 3.5.4 amended	To reference table S3.3 process monitoring requirements at emission point S7.
Table S1.1 amended	To amend the thermal input of the gas turbine from 133.1 MWth to 133 MWth and to include the thermal input of 70 MWth for the HRSG.
	To include waste oil storage as a directly associated activity.
Table S1.3 amended to confirm the completion of improvement conditions and the addition of a noise improvement condition	The existing permit contains a specific control for noise in table S1.2 as follows: The venting of steam during start up shall be minimised between the hours of 22:00hrs and 08:00hrs on any calendar day, except where it is essential to maintain plant security. The improvement condition expands on this requiring an updated noise management plan. The update shall include additional noise control measures together with a definition

	for ‘emergency’ operation. Following approval these will be incorporated into table S1.2 of the permit.
	IC8 complete – response received 02 September 2016, no changes to the permit required.
	IC11 complete
Table S1.4 amended	Note 1 added to refer to table S3.3 for process monitoring.
Table S1.5	Amended to redefine the MSUL/MSDL following a telecon 30 April 2020. A formal submission will be required in accordance with existing permit improvement condition IP9.
Table S2.1 amended	To add natural gas, consistent with other permits in the sector.
Table S3.3 deleted (Table S3.4 renumbered to S3.3)	To remove annual limits for cadmium and mercury present in raw materials. This is a legacy requirement where controls were in place for mercury in raw materials, primarily caustic soda. This is now generally ‘mercury free’ and as such we are no longer required to set limits for these parameters in raw materials.
Table S3.4 (now S3.3) amended	Note 1 amended from: The methods will be supplied as per pre operational condition 3. to In accordance with the methods supplied and approved for pre-operational condition 3 in table S1.4 of this permit.
Table S4.1 amended	Sulphur dioxide reporting frequency changed from every six months to every year.
	Mass release of cadmium and mercury to sewer deleted.
	To include process monitoring at emission point S7.
Schedule 6 Interpretation	“energy efficiency” the ISO base load net plant efficiency means the performance value established by acceptance testing following commissioning or performance testing following improvements made to the plant that could affect the efficiency. Deleted and replaced with: “energy efficiency” the annual net plant energy efficiency means the value calculated from the operational data collected over the year.
	Amended the reference conditions interpretation to remove those that are not applicable to the facility.

9 Review and assessment of changes that are not part of the BAT Conclusions derived permit review.

This document should be read in conjunction with the application, supporting information and notice.

Aspect considered	Decision
Receipt of application	
Confidential information	A claim for commercial or industrial confidentiality has not been made.
Identifying confidential information	We have not identified information provided as part of the application that we consider to be confidential.
The site	
Extent of the site of the facility	The Operator has provided a plan 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	The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat. A full assessment of the application and its potential to affect the sites/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 sites/species/habitat as the conditions will provide at least the same level of protection as those in the previous permit and in some cases will provide a higher level of protection to those in the previous permit. We have not consulted Natural England on the application. The decision was taken in accordance with our guidance.

Aspect considered	Decision
Operating techniques	
General operating techniques	We have reviewed the techniques used by the Operator where they are relevant to the BAT Conclusions and compared these with the relevant guidance notes. The permit conditions ensure compliance with the relevant BREF, BAT Conclusions. The ELVs deliver compliance with the BAT-AELs.
Permit conditions	
Updating permit conditions during consolidation	We have updated permit conditions to those in the current generic permit template as part of permit consolidation. The conditions will provide at least the same level of protection as those in the previous permit and in some cases will provide a higher level of protection to those in the previous permit.
Changes to the permit conditions due to an Environment Agency initiated variation	We have varied the permit as stated in the variation notice.
Improvement programme	Based on the information in the Regulation 61 response, we consider that we need to impose an improvement programme. The reasons for this are detailed in the relevant sections of this document.
Emission limits	We have decided that emission limits should be set for the parameters listed in the permit. These are described in the relevant BAT Conclusions in Section 5 of this document. It is considered that the ELVs described above will ensure that significant pollution of the environment is prevented and a high level of protection for the environment is secured.

Aspect considered	Decision
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 Sections 4.1 and 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 BAT Conclusion 2. Based on the information in the application we are satisfied that the Operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.
Reporting	We have specified reporting in the permit for the following parameters: • Nitrogen dioxide • Carbon monoxide • Sulphur dioxide These are described in the relevant BAT Conclusions in Sections 4.1 and 5 of this document.
Operator competence	
Management system	There is no known reason to consider that the Operator will not have the management system to enable them to comply with the permit conditions.
Growth Duty	
Section 108 Deregulation Act 2015 – Growth duty	We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit. Paragraph 1.3 of the guidance says: "The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an

Aspect considered	Decision
	explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation." We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections. We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.