

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/LP3531UL
The Operator is: Sembcorp Utilities (UK) Limited
The Installation is: Package Boiler Island
This Variation Notice number is: EPR/LP3531UL/V004

What this document is about

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

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

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

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

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

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

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

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

How this document is structured

Glossary of terms

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

Glossary of acronyms used in this document

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

APC	Air Pollution Control
BAT	Best Available Technique(s)
BAT-AEEL	BAT Associated Energy Efficiency Level
BAT-AEL	BAT Associated Emission Level
BATc	BAT conclusion
BREF	Best available techniques reference document
CCGT	Combined Cycle Gas Turbine
CEM	Continuous emissions monitor
CHP	Combined heat and power
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DLN	Dry Low NOx burners
DLN-E	Dry Low NOx effective
EIONET	European environment information and observation network is a partnership network of the European Environment Agency
ELV	Emission limit value derived under BAT or an emission limit value set out in IED
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154)
EWC	European waste catalogue
FSA	Food Standards Agency
IC	Improvement Condition
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
LCP	Large Combustion Plant subject to Chapter III of IED
MSUL/MSDL	Minimum start up load/minimum shut-down load
NOx	Oxides of nitrogen (NO plus NO ₂ expressed as NO ₂)
NPV	Net Present Value
OCGT	Open Cycle Gas Turbine
PHE	Public Health England
SAC	Special Area of Conservation
SGN	Sector guidance note
TGN	Technical guidance note
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) and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the notice, we have considered the techniques identified by the Operator for the operation of their installation, and have accepted that the details are sufficient and satisfactory to make those standard conditions appropriate. This document does, however, provide an explanation of our use of “tailor-made” or installation-specific conditions, or where our permit template provides two or more options.

2 How we reached our decision

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

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

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

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

The Operator did not make any such request.

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 28 January 2020. BAT Conclusions 1, 2, 5, 10, 12, 13, 15, 16, 40, 41 and 44.	Response received 13 March 2020.
BAT Conclusions 40 and 44.	Response received 01 April 2020.
Thermal input	Response received 04 May 2020.
Energy efficiency	Response received 05 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.

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 BAT (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.

a. Plant configuration

LCP323 is a 120 MWth package boiler island installation which comprises four 30 MWth gas-fired boilers discharging via four separate flues, within one common windshield at emission point A5.

These combustion units provide steam for industry located within the Wilton International site, which is located approximately 8km north east of Middlesbrough.

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 LCP323, 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
- 3% volume reference oxygen concentration in flue gases.

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

b. NOx limits

NOx limits (mg/Nm ³) – corrected to 3% oxygen							
Averaging	IED (Annex V Part 1)	Existing plant	BREF (BAT C 44, Table 25)	Permit limits	Basis	Limits apply	Monitoring
Annual	None	None	100	100	BREF	MSUL/MSDL to baseload	Continuous
Monthly	100	100	None	100	IED	MSUL/MSDL to baseload	
Daily	110	100 ¹	110	100	BREF IED compliance	MSUL/MSDL to baseload	
95 th %ile of hourly means	200	100 ¹	None	100	IED	MSUL/MSDL to baseload	
1 – Existing permit limits prior to the Chapter III (IED) permit review were tighter than the IED Annex V limits.							

c. CO limits

CO indicative emission levels are a yearly average of 40 mg/Nm³.

The Operator has proposed a yearly average limit of 40 mg/Nm³ (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 3% oxygen							
Averaging	IED (Annex V Part 1)	Existing plant	BREF (BAT C 44, Table 25)	Permit limits	Basis	Limits apply	Monitoring
Annual	None	None	40	40	BREF	MSUL/MSDL to baseload	Continuous
Monthly	100	50 ¹	None	50	IED	MSUL/MSDL to baseload	
Daily	110	50 ¹	None	50	IED	MSUL/MSDL to baseload	
95 th %ile of hr means	200	50 ¹	None	50	IED	MSUL/MSDL to baseload	
1 – Existing permit limits prior to the Chapter III (IED) permit review were tighter than the IED Annex V limits.							

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 S3.4 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 Regulation 61 notice response.

We consider this plant is not BAT in relation to the AEELs.

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
Gas fired boiler					
LCP 323: gas fired boilers					
38 - 40	78-95	None	Note 1	59	NA
<p>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.</p> <p>Note 2: Net total fuel utilisation BAT AEELs may not be achievable if the potential heat demand is too low.</p>					

The Operator confirmed that operation of these boilers is minimal and only happens when there is a higher demand for steam.

We accept that the demand for heat is outside of the control of the Operator.

If the potential heat demand is too low this BAT Conclusion recognises this factor (note 3 of table 23), this is note 2 to the table above.

5 Decision checklist regarding relevant BAT Conclusions

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

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

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

BAT Conclusion requirement topic	Permit condition(s)	Permit table(s)
Environmental Management System	1.1.1	S1.2
BAT AELs	3.1.1 and 3.5.1	S3.1a
Monitoring	2.3, 3.5 and 3.6	S1.2, S1.4, S3.1a
Energy efficiency	1.2 and 2.3	S3.4
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	<p>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:</p> <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> (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: <ul style="list-style-type: none"> (a) monitoring and measurement (see also the Reference Document on the General Principles of Monitoring) (b) corrective and preventive action (c) maintenance of records (d) independent (where practicable) internal and external auditing in order to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained; vi. review of the EMS and its continuing suitability, adequacy and effectiveness by senior management; vii. following the development of cleaner technologies; viii. consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new plant, and throughout its operating life; viii. consideration for the environmental impacts from the eventual decommissioning of the installation at the stage of designing a new plant, and throughout its operating life; 	FC	<p>The Operator confirmed that:</p> <p>An EMS currently exists but is not formalised to ISO 140001. They already have ISO50001 (energy management) and ISO 90001 (quality management system).</p> <p>In their response to our request for information received 13 March 2020 they confirmed that the aim is to achieve certification of the EMS by the middle of 2020.</p> <p>We agree with the Operator's stated compliance.</p>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement												
	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.														
2	BAT is to determine the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the gasification, IGCC and/or combustion units by carrying out a performance test at full load (1), according to EN standards, after the commissioning of the unit and after each modification that could significantly affect the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the unit. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.	CC	The Operator confirmed that: The efficiency is calculated from net fuel input and net heat produced. These figures were taken from their verified CHPQA data for the package boiler scheme but converted from gross to net calorific value (CV). 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 package boiler 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 agree with the Operator's stated compliance.												
3	BAT is to monitor key process parameters relevant for emissions to air and water including those given below. <table border="1" data-bbox="280 1082 1084 1335"> <thead> <tr> <th data-bbox="280 1082 528 1118">Stream</th> <th data-bbox="535 1082 824 1118">Parameter(s)</th> <th data-bbox="831 1082 1084 1118">Monitoring</th> </tr> </thead> <tbody> <tr> <td data-bbox="280 1123 528 1176" rowspan="3">Flue-gas</td> <td data-bbox="535 1123 824 1176">Flow</td> <td data-bbox="831 1123 1084 1176">Periodic or continuous determination</td> </tr> <tr> <td data-bbox="535 1181 824 1233">Oxygen content, temperature, and pressure</td> <td data-bbox="831 1181 1084 1233" rowspan="2">Periodic or continuous measurement</td> </tr> <tr> <td data-bbox="535 1238 824 1291">Water vapour content (2)</td> </tr> <tr> <td data-bbox="280 1295 528 1335">Waste water from flue-gas treatment</td> <td data-bbox="535 1295 824 1335">Flow, pH, and temperature</td> <td data-bbox="831 1295 1084 1335">Continuous measurement</td> </tr> </tbody> </table>	Stream	Parameter(s)	Monitoring	Flue-gas	Flow	Periodic or continuous determination	Oxygen content, temperature, and pressure	Periodic or continuous measurement	Water vapour content (2)	Waste water from flue-gas treatment	Flow, pH, and temperature	Continuous measurement	CC	The Operator confirmed that: Continuous emissions monitors (CEMS) are already in place on the boilers and monitoring the required parameters. We agree with the Operator's stated compliance.
Stream	Parameter(s)	Monitoring													
Flue-gas	Flow	Periodic or continuous determination													
	Oxygen content, temperature, and pressure	Periodic or continuous measurement													
	Water vapour content (2)														
Waste water from flue-gas treatment	Flow, pH, and temperature	Continuous measurement													
4	BAT is to monitor emissions to air with at least the frequency given below	CC	The Operator confirmed that:												

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
	and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.						<p data-bbox="1220 359 1960 411">CEMS are already in place on the boilers and monitoring the required parameters and in accordance with EN generic standards.</p> <p data-bbox="1220 438 1736 470">We agree with the Operator's stated compliance.</p>
	Substance/Parameter	Fuel/Process/Type of combustion plant	Combustion plant total rated thermal input	Standard (s) ⁽⁴⁾	Minimum monitoring frequency ⁽⁵⁾		Monitoring associated with
NH ₃	— When SCR and/or SNCR is used	All sizes	Generic EN standards	Continuous ⁽⁶⁾ (7)		BAT 7	
NO _x	<ul style="list-style-type: none"> — 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 32 BAT 37 BAT 41 BAT 42 BAT 43 BAT 47 BAT 48 BAT 56 BAT 64 BAT 65 BAT 73	

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 on offshore platforms	All sizes	EN 14792	Once every year ⁽⁹⁾	BAT 53			
N ₂ O	— 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	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
	offshore platforms						
	SO ₂	<ul style="list-style-type: none"> — 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	<ul style="list-style-type: none"> — When SCR is used 	All sizes	No EN standard available	Once every year	—	
	Gaseous chlorides, expressed as HCl	<ul style="list-style-type: none"> — 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	
<ul style="list-style-type: none"> — Solid biomass and/or peat 		All sizes	Generic EN standards	Continuous ⁽¹⁵⁾ (16)	BAT 25		
<ul style="list-style-type: none"> — Waste co-incineration 		All sizes	Generic EN standards	Continuous ⁽⁶⁾ (16)	BAT 66 BAT 67		

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
	HF	<ul style="list-style-type: none"> — Coal and/or lignite — Process fuels from the chemical industry in boilers 	All sizes	No EN standard available	Once every three months ⁽⁶⁾ , ⁽¹³⁾ ⁽¹⁴⁾	BAT 21 BAT 57		
		<ul style="list-style-type: none"> — Solid biomass and/or peat 	All sizes	No EN standard available	Once every year	BAT 25		
		<ul style="list-style-type: none"> — Waste co-incineration 	All sizes	Generic EN standards	Continuous ⁽⁶⁾ ⁽¹⁶⁾	BAT 66 BAT 67		
	Dust	<ul style="list-style-type: none"> — 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		
		<ul style="list-style-type: none"> — Waste co-incineration 	All sizes	Generic EN standards and EN 13284-2	Continuous	BAT 68 BAT 69		
	Metals and metalloids except	<ul style="list-style-type: none"> — Coal and/or lignite — Solid biomass 	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	
	mercury (As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V, Zn)	and/or peat — 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		

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																								
	Formaldehyde	— Natural-gas in spark-ignited lean-burn gas and dual fuel engines	All sizes	No EN standard available	Once every year	BAT 45																										
	CH ₄	— Natural-gas-fired engines	All sizes	EN ISO 25139	Once every year ⁽²⁴⁾	BAT 45																										
	PCDD/F	— Process fuels from chemical industry in boilers — Waste co-incineration	All sizes	EN 1948-1, EN 1948-2, EN 1948-3	Once every six months ⁽¹³⁾ ⁽²⁵⁾	BAT 59 BAT 71																										
5	<p>BAT is to monitor emissions to water from flue-gas treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p> <table border="1" data-bbox="271 850 1093 1396"> <thead> <tr> <th data-bbox="271 850 517 938">Substance/Parameter</th> <th data-bbox="517 850 763 938">Standard(s)</th> <th data-bbox="763 850 920 938">Minimum monitoring frequency</th> <th data-bbox="920 850 1077 938">Monitoring associated with</th> </tr> </thead> <tbody> <tr> <td data-bbox="271 938 517 1002">Total organic carbon (TOC)⁽²⁶⁾</td> <td data-bbox="517 938 763 1002">EN 1484</td> <td data-bbox="763 938 920 1002" rowspan="8">Once every month</td> <td data-bbox="920 938 1077 1002" rowspan="8">BAT 15</td> </tr> <tr> <td data-bbox="271 1002 517 1066">Chemical oxygen demand (COD)⁽²⁶⁾</td> <td data-bbox="517 1002 763 1066">No EN standard available</td> </tr> <tr> <td data-bbox="271 1066 517 1129">Total suspended solids (TSS)</td> <td data-bbox="517 1066 763 1129">EN 872</td> </tr> <tr> <td data-bbox="271 1129 517 1193">Fluoride (F⁻)</td> <td data-bbox="517 1129 763 1193">EN ISO 10304-1</td> </tr> <tr> <td data-bbox="271 1193 517 1257">Sulphate (SO₄²⁻)</td> <td data-bbox="517 1193 763 1257">EN ISO 10304-1</td> </tr> <tr> <td data-bbox="271 1257 517 1321">Sulphide, easily released (S²⁻)</td> <td data-bbox="517 1257 763 1321">No EN standard available</td> </tr> <tr> <td data-bbox="271 1321 517 1385">Sulphite (SO₃²⁻)</td> <td data-bbox="517 1321 763 1385">EN ISO 10304-3</td> </tr> <tr> <td data-bbox="271 1385 517 1396">Metals and metalloids</td> <td data-bbox="517 1385 763 1396">As Cd Cr</td> <td data-bbox="763 1385 920 1396">Various EN standards available (e.g. EN ISO 11885 or</td> <td data-bbox="920 1385 1077 1396"></td> </tr> </tbody> </table>						Substance/Parameter	Standard(s)	Minimum monitoring frequency	Monitoring associated with	Total organic carbon (TOC) ⁽²⁶⁾	EN 1484	Once every month	BAT 15	Chemical oxygen demand (COD) ⁽²⁶⁾	No EN standard available	Total suspended solids (TSS)	EN 872	Fluoride (F ⁻)	EN ISO 10304-1	Sulphate (SO ₄ ²⁻)	EN ISO 10304-1	Sulphide, easily released (S ²⁻)	No EN standard available	Sulphite (SO ₃ ²⁻)	EN ISO 10304-3	Metals and metalloids	As Cd Cr	Various EN standards available (e.g. EN ISO 11885 or		NA	<p>The Operator confirmed in their response to our request for information received 13 March 2020 that this BAT Conclusion is not applicable.</p> <p>We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.</p>
Substance/Parameter	Standard(s)	Minimum monitoring frequency	Monitoring associated with																													
Total organic carbon (TOC) ⁽²⁶⁾	EN 1484	Once every month	BAT 15																													
Chemical oxygen demand (COD) ⁽²⁶⁾	No EN standard available																															
Total suspended solids (TSS)	EN 872																															
Fluoride (F ⁻)	EN ISO 10304-1																															
Sulphate (SO ₄ ²⁻)	EN ISO 10304-1																															
Sulphide, easily released (S ²⁻)	No EN standard available																															
Sulphite (SO ₃ ²⁻)	EN ISO 10304-3																															
Metals and metalloids	As Cd Cr			Various EN standards available (e.g. EN ISO 11885 or																												

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																												
	<table border="1"> <tr> <td data-bbox="293 336 472 368">Cu</td> <td data-bbox="472 336 757 368">EN ISO 17294-2)</td> <td data-bbox="757 336 920 368"></td> <td data-bbox="920 336 1070 368"></td> </tr> <tr> <td data-bbox="293 368 472 400">Ni</td> <td data-bbox="472 368 757 400"></td> <td data-bbox="757 368 920 400"></td> <td data-bbox="920 368 1070 400"></td> </tr> <tr> <td data-bbox="293 400 472 432">Pb</td> <td data-bbox="472 400 757 432"></td> <td data-bbox="757 400 920 432"></td> <td data-bbox="920 400 1070 432"></td> </tr> <tr> <td data-bbox="293 432 472 464">Zn</td> <td data-bbox="472 432 757 464"></td> <td data-bbox="757 432 920 464"></td> <td data-bbox="920 432 1070 464"></td> </tr> <tr> <td data-bbox="293 464 472 579">Hg</td> <td data-bbox="472 464 757 579">Various EN standards available (e.g. EN ISO 12846 or EN ISO 17852)</td> <td data-bbox="757 464 920 579"></td> <td data-bbox="920 464 1070 579"></td> </tr> <tr> <td data-bbox="293 579 472 694">Chloride (Cl⁻)</td> <td data-bbox="472 579 757 694">Various EN standards available (e.g. EN ISO 10304-1 or EN ISO 15682)</td> <td data-bbox="757 579 920 694">—</td> <td data-bbox="920 579 1070 694"></td> </tr> <tr> <td data-bbox="293 694 472 726">Total nitrogen</td> <td data-bbox="472 694 757 726">EN 12260</td> <td data-bbox="757 694 920 726">—</td> <td data-bbox="920 694 1070 726"></td> </tr> </table>	Cu	EN ISO 17294-2)			Ni				Pb				Zn				Hg	Various EN standards available (e.g. EN ISO 12846 or EN ISO 17852)			Chloride (Cl ⁻)	Various EN standards available (e.g. EN ISO 10304-1 or EN ISO 15682)	—		Total nitrogen	EN 12260	—			
Cu	EN ISO 17294-2)																														
Ni																															
Pb																															
Zn																															
Hg	Various EN standards available (e.g. EN ISO 12846 or EN ISO 17852)																														
Chloride (Cl ⁻)	Various EN standards available (e.g. EN ISO 10304-1 or EN ISO 15682)	—																													
Total nitrogen	EN 12260	—																													
6	<p>In order to improve the general environmental performance of combustion plants and to reduce emissions to air of CO and unburnt substances, BAT is to ensure optimised combustion and to use an appropriate combination of the techniques given below.</p> <table border="1"> <thead> <tr> <th data-bbox="293 866 450 898">Technique</th> <th data-bbox="450 866 741 898">Description</th> <th data-bbox="741 866 1070 898">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="293 898 450 1034">a Fuel blending and mixing</td> <td data-bbox="450 898 741 1034">Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type</td> <td data-bbox="741 898 1070 1034">Generally applicable</td> </tr> <tr> <td data-bbox="293 1034 450 1145">b Maintenance of the combustion system</td> <td data-bbox="450 1034 741 1145">Regular planned maintenance according to suppliers' recommendations</td> <td data-bbox="741 1034 1070 1145"></td> </tr> <tr> <td data-bbox="293 1145 450 1281">c Advanced control system</td> <td data-bbox="450 1145 741 1281">See description in Section 8.1</td> <td data-bbox="741 1145 1070 1281">The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system</td> </tr> <tr> <td data-bbox="293 1281 450 1367">d Good design of the</td> <td data-bbox="450 1281 741 1367">Good design of furnace, combustion chambers, burners and associated</td> <td data-bbox="741 1281 1070 1367">Generally applicable to new combustion plants</td> </tr> </tbody> </table>	Technique	Description	Applicability	a Fuel blending and mixing	Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type	Generally applicable	b Maintenance of the combustion system	Regular planned maintenance according to suppliers' recommendations		c Advanced control system	See description in Section 8.1	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system	d Good design of the	Good design of furnace, combustion chambers, burners and associated	Generally applicable to new combustion plants	CC	<p>The Operator confirmed that:</p> <p>b Maintenance of the combustion system. d Good design of the combustion system.</p> <p>This is an appropriate combination of techniques for the installation.</p> <p>We agree with the Operator's stated compliance.</p>													
Technique	Description	Applicability																													
a Fuel blending and mixing	Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type	Generally applicable																													
b Maintenance of the combustion system	Regular planned maintenance according to suppliers' recommendations																														
c Advanced control system	See description in Section 8.1	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system																													
d Good design of the	Good design of furnace, combustion chambers, burners and associated	Generally applicable to new combustion plants																													

BAT C No.	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
		combustion equipment	devices		
7	e	Fuel choice	Select or switch totally or partially to another fuel(s) with a better environmental profile (e.g. with low sulphur and/or mercury content) amongst the available fuels, including in start-up situations or when back-up fuels are used	Applicable within the constraints associated with the availability of suitable types of fuel with a better environmental profile as a whole, which may be impacted by the energy policy of the Member State, or by the integrated site's fuel balance in the case of combustion of industrial process fuels. For existing combustion plants, the type of fuel chosen may be limited by the configuration and the design of the plant	
8				In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.	<p>The Operator confirmed that:</p> <p>Regular monitoring and maintenance of the equipment is carried out.</p> <p>We agree with the Operator's stated compliance.</p>
				In order to reduce emissions of ammonia to air from the use of selective catalytic reduction (SCR) and/or selective non-catalytic reduction (SNCR) for the abatement of NO _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 .	<p>NA</p> <p>The Operator confirmed that:</p> <p>No SCR or SNCR used.</p> <p>This BAT Conclusion is not applicable to the activities carried out at the installation.</p>

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement											
9	<p>In order to improve the general environmental performance of combustion and/or gasification plants and to reduce emissions to air, BAT is to include the following elements in the quality assurance/quality control programmes for all the fuels used, as part of the environmental management system (see BAT 1):</p> <ul style="list-style-type: none"> (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)). <p>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.</p> <table border="1" data-bbox="280 938 1084 1340"> <thead> <tr> <th data-bbox="280 938 548 997">Fuel(s)</th> <th data-bbox="548 938 1084 997">Substances/Parameters subject to characterisation</th> </tr> </thead> <tbody> <tr> <td data-bbox="280 997 548 1225" rowspan="4">Biomass/peat</td> <td data-bbox="548 997 1084 1037">— LHV</td> </tr> <tr> <td data-bbox="548 1037 1084 1077">— moisture</td> </tr> <tr> <td data-bbox="548 1077 1084 1117">— Ash</td> </tr> <tr> <td data-bbox="548 1117 1084 1225">— C, Cl, F, N, S, K, Na — Metals and metalloids (As, Cd, Cr, Cu, Hg, Pb, Zn)</td> </tr> <tr> <td data-bbox="280 1225 548 1340" rowspan="3">Coal/lignite</td> <td data-bbox="548 1225 1084 1265">— LHV</td> </tr> <tr> <td data-bbox="548 1265 1084 1305">— Moisture</td> </tr> <tr> <td data-bbox="548 1305 1084 1340">— Volatiles, ash, fixed carbon, C, H, N, O, S</td> </tr> </tbody> </table>	Fuel(s)	Substances/Parameters subject to characterisation	Biomass/peat	— LHV	— moisture	— Ash	— C, Cl, F, N, S, K, Na — Metals and metalloids (As, Cd, Cr, Cu, Hg, Pb, Zn)	Coal/lignite	— LHV	— Moisture	— Volatiles, ash, fixed carbon, C, H, N, O, S	CC	<p>The Operator confirmed that:</p> <p>Details of how points (i), (ii) and (iii) are implemented are not required for natural gas.</p> <p>We consider that for plants which burn natural gas from the National Grid as a fuel that it is not necessary for the Operator to replicate the testing carried out by the National Grid.</p> <p>We agree with the Operator's stated compliance.</p>
Fuel(s)	Substances/Parameters subject to characterisation													
Biomass/peat	— LHV													
	— moisture													
	— Ash													
	— C, Cl, F, N, S, K, Na — Metals and metalloids (As, Cd, Cr, Cu, Hg, Pb, Zn)													
Coal/lignite	— LHV													
	— Moisture													
	— Volatiles, ash, fixed carbon, C, H, N, O, S													

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																
	<table border="1"> <tr> <td data-bbox="280 327 548 375"></td> <td data-bbox="548 327 1084 375">— Br, Cl, F</td> </tr> <tr> <td data-bbox="280 375 548 446"></td> <td data-bbox="548 375 1084 446">— Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Ti, V, Zn)</td> </tr> <tr> <td data-bbox="280 446 548 526">HFO</td> <td data-bbox="548 446 1084 526">— Ash — C, S, N, Ni, V</td> </tr> <tr> <td data-bbox="280 526 548 614">Gas oil</td> <td data-bbox="548 526 1084 614">— Ash — N, C, S</td> </tr> <tr> <td data-bbox="280 614 548 694">Natural gas</td> <td data-bbox="548 614 1084 694">— LHV — CH₄, C₂H₆, C₃, C₄+, CO₂, N₂, Wobbe index</td> </tr> <tr> <td data-bbox="280 694 548 805">Process fuels from the chemical industry⁽²⁷⁾</td> <td data-bbox="548 694 1084 805">— Br, C, Cl, F, H, N, O, S — Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Ti, V, Zn)</td> </tr> <tr> <td data-bbox="280 805 548 877">Iron and steel process gases</td> <td data-bbox="548 805 1084 877">— LHV, CH₄ (for COG), C_xH_y (for COG), CO₂, H₂, N₂, total sulphur, dust, Wobbe index</td> </tr> <tr> <td data-bbox="280 877 548 1059">Waste⁽²⁸⁾</td> <td data-bbox="548 877 1084 1059">— 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, Ti, V, Zn)</td> </tr> </table>		— Br, Cl, F		— Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Ti, V, Zn)	HFO	— Ash — C, S, N, Ni, V	Gas oil	— Ash — N, C, S	Natural gas	— LHV — CH ₄ , C ₂ H 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, Ti, V, Zn)	Iron and steel process gases	— LHV, CH ₄ (for COG), C _x H _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, Ti, V, Zn)		
	— Br, Cl, F																		
	— Metals and metalloids (As, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sb, Ti, V, Zn)																		
HFO	— Ash — C, S, N, Ni, V																		
Gas oil	— Ash — N, C, S																		
Natural gas	— LHV — CH ₄ , C ₂ H 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, Ti, V, Zn)																		
Iron and steel process gases	— LHV, CH ₄ (for COG), C _x H _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, Ti, V, Zn)																		
10	<p>In order to reduce emissions to air and/or to water during other than normal operating conditions (OTNOC), BAT is to set up and implement a management plan as part of the environmental management system (see BAT 1), commensurate with the relevance of potential pollutant releases, that includes the following elements:</p> <ul style="list-style-type: none"> — 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 	CC	<p>The Operator confirmed that the following elements are included:</p> <ul style="list-style-type: none"> - 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. <p>In their response to our request for information received 13 March 2020 they confirmed that:</p> <ul style="list-style-type: none"> - Fuel/air mix is optimised and automated and is mainly used at times of start-up and shut-down 																

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement										
	<p>for these relevant systems,</p> <ul style="list-style-type: none"> — 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. 		<p>- 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.</p> <p>- Assessment after OTNOC takes place and any issues are logged or reported and actions are assigned if necessary.</p> <p>We agree with the Operator's stated compliance.</p>										
11	<p>BAT is to appropriately monitor emissions to air and/or to water during OTNOC.</p> <p>Description</p> <p>The monitoring can be carried out by direct measurement of emissions or by monitoring of surrogate parameters if this proves to be of equal or better scientific quality than the direct measurement of emissions. Emissions during start-up and shutdown (SU/SD) may be assessed based on a detailed emission measurement carried out for a typical SU/SD procedure at least once every year, and using the results of this measurement to estimate the emissions for each and every SU/SD throughout the year.</p>	CC	<p>The Operator confirmed that:</p> <p>The boilers only operate at optimal load, otherwise they are off. If the CEMS fails a portable meter is deployed.</p> <p>We agree with the Operator's stated compliance.</p>										
12	<p>In order to increase the energy efficiency of combustion, gasification and/or IGCC units operated $\geq 1\,500$ h/yr, BAT is to use an appropriate combination of the techniques given below.</p> <table border="1" data-bbox="280 922 1086 1374"> <thead> <tr> <th data-bbox="280 922 459 959">Technique</th> <th data-bbox="465 922 786 959">Description</th> <th data-bbox="792 922 1086 959">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="280 963 459 1094">a. Combustion optimisation</td> <td data-bbox="465 963 786 1094">See description in Section 8.2. Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues</td> <td data-bbox="792 963 1086 1374" rowspan="3">Generally applicable</td> </tr> <tr> <td data-bbox="280 1099 459 1302">b. Optimisation of the working medium conditions</td> <td data-bbox="465 1099 786 1302">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 data-bbox="280 1307 459 1374">c. Optimisation of the steam cycle</td> <td data-bbox="465 1307 786 1374">Operate with lower turbine exhaust pressure by utilisation of the lowest possible</td> </tr> </tbody> </table>	Technique	Description	Applicability	a. Combustion optimisation	See description in Section 8.2. Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues	Generally applicable	b. Optimisation of the working medium conditions	Operate at the highest possible pressure and temperature of the working medium gas or steam, within the constraints associated with, for example, the control of NO _x emissions or the characteristics of energy demanded	c. Optimisation of the steam cycle	Operate with lower turbine exhaust pressure by utilisation of the lowest possible	CC	<p>The Operator confirmed that:</p> <p>Air fuel staging is used.</p> <p>In their response to our request for information received 13 March 2020 they confirmed that the following techniques are in place:</p> <p>a. Combustion optimisation g. Advanced control systems</p> <p>Energy Efficiency is monitored using the Assumptions Book, which is a recognised part of the company's ISO 50001. There is an Energy Manual on-site.</p> <p>We agree with the Operator's stated compliance.</p>
Technique	Description	Applicability											
a. Combustion optimisation	See description in Section 8.2. Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues	Generally applicable											
b. Optimisation of the working medium conditions	Operate at the highest possible pressure and temperature of the working medium gas or steam, within the constraints associated with, for example, the control of NO _x emissions or the characteristics of energy demanded												
c. Optimisation of the steam cycle	Operate with lower turbine exhaust pressure by utilisation of the lowest possible												

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
		temperature of the condenser cooling water, within the design conditions			
	d. Minimisation of energy consumption	Minimising the internal energy consumption (e.g. greater efficiency of the feed-water pump)			
	e. Preheating of combustion air	Reuse of part of the heat recovered from the combustion flue-gas to preheat the air used in combustion	Generally applicable within the constraints related to the need to control NO _x emissions		
	f. Fuel preheating	Preheating of fuel using recovered heat	Generally applicable within the constraints associated with the boiler design and the need to control NO _x emissions		
	g. Advanced control system	See description in Section 8.2. Computerised control of the main combustion parameters enables the combustion efficiency to be improved	Generally applicable to new units. The applicability to old units may be constrained by the need to retrofit the combustion system and/or control command system		
	h. Feed-water preheating using recovered heat	Preheat water coming out of the steam condenser with recovered heat, before reusing it in the boiler	Only applicable to steam circuits and not to hot boilers. Applicability to existing units may be limited due to constraints associated with the plant configuration and the amount of recoverable heat		
	i. Heat recovery by cogeneration (CHP)	Recovery of heat (mainly from the steam system) for producing hot water/steam to be used in industrial processes/activities or in a public network for district heating. Additional heat recovery is possible from: — flue-gas — grate cooling	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		

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
		— circulating fluidised bed			
	j. CHP readiness	See description in Section 8.2.	Only applicable to new units where there is a realistic potential for the future use of heat in the vicinity of the unit		
	k. Flue-gas condenser	See description in Section 8.2.	Generally applicable to CHP units provided there is enough demand for low-temperature heat		
	l. Heat accumulation	Heat accumulation storage in CHP mode	Only applicable to CHP plants. The applicability may be limited in the case of low heat load demand		
	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		

BAT C No.	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	p.	Minimisation of heat losses	Minimising residual heat losses, e.g. those that occur via the slag or those that can be reduced by insulating radiating sources	Only applicable to solid-fuel-fired combustion units and to gasification/IGCC units	
	q.	Advanced materials	Use of advanced materials proven to be capable of withstanding high operating temperatures and pressures and thus to achieve increased steam/combustion process efficiencies	Only applicable to new plants	
	r.	Steam turbine upgrades	This includes techniques such as increasing the temperature and pressure of medium-pressure steam, addition of a low-pressure turbine, and modifications to the geometry of the turbine rotor blades	The applicability may be restricted by demand, steam conditions and/or limited plant lifetime	
	s.	Supercritical and ultra-supercritical steam conditions	Use of a steam circuit, including steam reheating systems, in which steam can reach pressures above 220,6 bar and temperatures above 374 °C in the case of supercritical conditions, and above 250 – 300 bar and temperatures above 580 – 600 °C in the case of ultra-supercritical conditions	Only applicable to new units of $\geq 600 \text{ MW}_{\text{th}}$ operated $> 4\,000 \text{ h/yr}$. Not applicable when the purpose of the unit is to produce low steam temperatures and/or pressures in process industries. Not applicable to gas turbines and engines generating steam in CHP mode. For units combusting biomass, the applicability may be constrained by high-temperature corrosion in the case of certain biomasses	

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									
13	<p>In order to reduce water usage and the volume of contaminated waste water discharged, BAT is to use one or both of the techniques given below.</p> <table border="1" data-bbox="277 384 1079 785"> <thead> <tr> <th data-bbox="277 384 421 443">Technique</th> <th data-bbox="421 384 788 443">Description</th> <th data-bbox="788 384 1079 443">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="277 443 421 625">a Water recycling</td> <td data-bbox="421 443 788 625">Residual aqueous streams, including run-off water, from the plant are reused for other purposes. The degree of recycling is limited by the quality requirements of the recipient water stream and the water balance of the plant</td> <td data-bbox="788 443 1079 625">Not applicable to waste water from cooling systems when water treatment chemicals and/or high concentrations of salts from seawater are present</td> </tr> <tr> <td data-bbox="277 625 421 785">b Dry bottom ash handling</td> <td data-bbox="421 625 788 785">Dry, hot bottom ash falls from the furnace onto a mechanical conveyor system and is cooled down by ambient air. No water is used in the process.</td> <td data-bbox="788 625 1079 785">Only applicable to plants combusting solid fuels. There may be technical restrictions that prevent retrofitting to existing combustion plants</td> </tr> </tbody> </table>	Technique	Description	Applicability	a Water recycling	Residual aqueous streams, including run-off water, from the plant are reused for other purposes. The degree of recycling is limited by the quality requirements of the recipient water stream and the water balance of the plant	Not applicable to waste water from cooling systems when water treatment chemicals and/or high concentrations of salts from seawater are present	b Dry bottom ash handling	Dry, hot bottom ash falls from the furnace onto a mechanical conveyor system and is cooled down by ambient air. No water is used in the process.	Only applicable to plants combusting solid fuels. There may be technical restrictions that prevent retrofitting to existing combustion plants	NA	<p>The Operator confirmed that:</p> <p>Minimal water run-off is produced.</p> <p>In their response to our request for information received 13 March 2020 they confirmed that this BAT Conclusion is not applicable.</p> <p>We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.</p>
Technique	Description	Applicability										
a Water recycling	Residual aqueous streams, including run-off water, from the plant are reused for other purposes. The degree of recycling is limited by the quality requirements of the recipient water stream and the water balance of the plant	Not applicable to waste water from cooling systems when water treatment chemicals and/or high concentrations of salts from seawater are present										
b Dry bottom ash handling	Dry, hot bottom ash falls from the furnace onto a mechanical conveyor system and is cooled down by ambient air. No water is used in the process.	Only applicable to plants combusting solid fuels. There may be technical restrictions that prevent retrofitting to existing combustion plants										
14	<p>In order to prevent the contamination of uncontaminated waste water and to reduce emissions to water, BAT is to segregate waste water streams and to treat them separately, depending on the pollutant content.</p> <p>Description Waste water streams that are typically segregated and treated include surface run-off water, cooling water, and waste water from flue-gas treatment.</p> <p>Applicability The applicability may be restricted in the case of existing plants due to the configuration of the drainage systems.</p>	CC	<p>The Operator confirmed that:</p> <p>The site is a large industrial site and all effluent goes to drain via a consent to discharge. Consideration is being given to building an industrial effluent treatment plant but no firm date is in place.</p> <p>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.</p> <p>Whilst the Operator stated that they are NC, we consider that they are CC with this BAT Conclusion.</p>									

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																																	
15	<p>In order to reduce emissions to water from flue-gas treatment, BAT is to use an appropriate combination of the techniques given below, and to use secondary techniques as close as possible to the source in order to avoid dilution.</p> <table border="1" data-bbox="280 440 1084 1362"> <thead> <tr> <th data-bbox="280 440 551 552">Technique</th> <th data-bbox="551 440 763 552">Typical pollutants prevented/abated</th> <th data-bbox="763 440 1084 552">Applicability</th> </tr> </thead> <tbody> <tr> <td colspan="3" data-bbox="280 552 1084 584" style="text-align: center;">Primary techniques</td> </tr> <tr> <td data-bbox="280 584 551 719">a. Optimised combustion (see BAT 6) and flue-gas treatment systems (e.g. SCR/SNCR, see BAT 7)</td> <td data-bbox="551 584 763 719">Organic compounds, ammonia (NH₃)</td> <td data-bbox="763 584 1084 719">Generally applicable</td> </tr> <tr> <td colspan="3" data-bbox="280 719 1084 751" style="text-align: center;">Secondary techniques ⁽²⁹⁾</td> </tr> <tr> <td data-bbox="280 751 551 815">b. Adsorption on activated carbon</td> <td data-bbox="551 751 763 815">Organic compounds, mercury (Hg)</td> <td data-bbox="763 751 1084 815">Generally applicable</td> </tr> <tr> <td data-bbox="280 815 551 1023">c. Aerobic biological treatment</td> <td data-bbox="551 815 763 1023">Biodegradable organic compounds, ammonium (NH₄⁺)</td> <td data-bbox="763 815 1084 1023">Generally applicable for the treatment of organic compounds. Aerobic biological treatment of ammonium (NH₄⁺) may not be applicable in the case of high chloride concentrations (i.e. around 10 g/l)</td> </tr> <tr> <td data-bbox="280 1023 551 1110">d. Anoxic/anaerobic biological treatment</td> <td data-bbox="551 1023 763 1110">Mercury (Hg), nitrate (NO₃⁻), nitrite (NO₂⁻)</td> <td data-bbox="763 1023 1084 1110">Generally applicable</td> </tr> <tr> <td data-bbox="280 1110 551 1166">e. Coagulation and flocculation</td> <td data-bbox="551 1110 763 1166">Suspended solids</td> <td data-bbox="763 1110 1084 1166">Generally applicable</td> </tr> <tr> <td data-bbox="280 1166 551 1254">f. Crystallisation</td> <td data-bbox="551 1166 763 1254">Metals and metalloids, sulphate (SO₄²⁻), fluoride (F⁻)</td> <td data-bbox="763 1166 1084 1254">Generally applicable</td> </tr> <tr> <td data-bbox="280 1254 551 1342">g. Filtration (e.g. sand filtration, microfiltration, ultrafiltration)</td> <td data-bbox="551 1254 763 1342">Suspended solids, metals</td> <td data-bbox="763 1254 1084 1342">Generally applicable</td> </tr> <tr> <td data-bbox="280 1342 551 1362">h. Flotation</td> <td data-bbox="551 1342 763 1362">Suspended solids,</td> <td data-bbox="763 1342 1084 1362">Generally applicable</td> </tr> </tbody> </table>	Technique	Typical pollutants prevented/abated	Applicability	Primary techniques			a. Optimised combustion (see BAT 6) and flue-gas treatment systems (e.g. SCR/SNCR, see BAT 7)	Organic compounds, ammonia (NH ₃)	Generally applicable	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,	Generally applicable	NA	<p>The Operator confirmed in their response to our request for information received 13 March 2020 that this BAT Conclusion is not applicable.</p> <p>We agree that this BAT Conclusion is not applicable to the activities carried out at the installation.</p>
Technique	Typical pollutants prevented/abated	Applicability																																		
Primary techniques																																				
a. Optimised combustion (see BAT 6) and flue-gas treatment systems (e.g. SCR/SNCR, see BAT 7)	Organic compounds, ammonia (NH ₃)	Generally applicable																																		
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,	Generally applicable																																		

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																																																																								
	<table border="1"> <tr> <td></td> <td></td> <td>free oil</td> <td></td> </tr> <tr> <td>i.</td> <td>Ion exchange</td> <td>Metals</td> <td>Generally applicable</td> </tr> <tr> <td>j.</td> <td>Neutralisation</td> <td>Acids, alkalis</td> <td>Generally applicable</td> </tr> <tr> <td>k.</td> <td>Oxidation</td> <td>Sulphide (S²⁻), sulphite (SO₃²⁻)</td> <td>Generally applicable</td> </tr> <tr> <td>l.</td> <td>Precipitation</td> <td>Metals and metalloids, sulphate (SO₄²⁻), fluoride (F⁻)</td> <td>Generally applicable</td> </tr> <tr> <td>m</td> <td>Sedimentation</td> <td>Suspended solids</td> <td>Generally applicable</td> </tr> <tr> <td>n.</td> <td>Stripping</td> <td>Ammonia (NH₃)</td> <td>Generally applicable</td> </tr> </table> <p>The BAT-AELs refer to direct discharges to a receiving water body at the point where the emission leaves the installation.</p> <p>BAT-AELs for direct discharges to a receiving water body from flue-gas treatment</p> <table border="1"> <thead> <tr> <th colspan="2" data-bbox="280 783 728 815">Substance/Parameter</th> <th data-bbox="728 783 1077 815">BAT-AELs</th> </tr> <tr> <th colspan="2"></th> <th data-bbox="728 815 1077 847">Daily average</th> </tr> </thead> <tbody> <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 (SO₄²⁻)</td> <td>1,3–2,0 g/l ⁽³²⁾ ₍₃₃₎ ⁽³⁴⁾ ₍₃₅₎</td> </tr> <tr> <td colspan="2">Sulphide (S²⁻), easily released</td> <td>0,1–0,2 mg/l ⁽³²⁾</td> </tr> <tr> <td colspan="2">Sulphite (SO₃²⁻)</td> <td>1–20 mg/l ⁽³²⁾</td> </tr> <tr> <td data-bbox="280 1098 654 1129" rowspan="8">Metals and metalloids</td> <td data-bbox="654 1098 728 1129">As</td> <td data-bbox="728 1098 1077 1129">10–50 µg/l</td> </tr> <tr> <td data-bbox="654 1129 728 1161">Cd</td> <td data-bbox="728 1129 1077 1161">2–5 µg/l</td> </tr> <tr> <td data-bbox="654 1161 728 1193">Cr</td> <td data-bbox="728 1161 1077 1193">10–50 µg/l</td> </tr> <tr> <td data-bbox="654 1193 728 1225">Cu</td> <td data-bbox="728 1193 1077 1225">10–50 µg/l</td> </tr> <tr> <td data-bbox="654 1225 728 1257">Hg</td> <td data-bbox="728 1225 1077 1257">0,2–3 µg/l</td> </tr> <tr> <td data-bbox="654 1257 728 1289">Ni</td> <td data-bbox="728 1257 1077 1289">10–50 µg/l</td> </tr> <tr> <td data-bbox="654 1289 728 1321">Pb</td> <td data-bbox="728 1289 1077 1321">10–20 µg/l</td> </tr> <tr> <td data-bbox="654 1321 728 1353">Zn</td> <td data-bbox="728 1321 1077 1353">50–200 µg/l</td> </tr> </tbody> </table>			free oil		i.	Ion exchange	Metals	Generally applicable	j.	Neutralisation	Acids, alkalis	Generally applicable	k.	Oxidation	Sulphide (S ²⁻), sulphite (SO ₃ ²⁻)	Generally applicable	l.	Precipitation	Metals and metalloids, sulphate (SO ₄ ²⁻), fluoride (F ⁻)	Generally applicable	m	Sedimentation	Suspended solids	Generally applicable	n.	Stripping	Ammonia (NH ₃)	Generally applicable	Substance/Parameter		BAT-AELs			Daily average	Total organic carbon (TOC)		20–50 mg/l ⁽³⁰⁾ ₍₃₁₎ ⁽³²⁾	Chemical oxygen demand (COD)		60–150 mg/l ⁽³⁰⁾ ₍₃₁₎ ⁽³²⁾	Total suspended solids (TSS)		10–30 mg/l	Fluoride (F ⁻)		10–25 mg/l ⁽³²⁾	Sulphate (SO ₄ ²⁻)		1,3–2,0 g/l ⁽³²⁾ ₍₃₃₎ ⁽³⁴⁾ ₍₃₅₎	Sulphide (S ²⁻), easily released		0,1–0,2 mg/l ⁽³²⁾	Sulphite (SO ₃ ²⁻)		1–20 mg/l ⁽³²⁾	Metals and metalloids	As	10–50 µg/l	Cd	2–5 µg/l	Cr	10–50 µg/l	Cu	10–50 µg/l	Hg	0,2–3 µg/l	Ni	10–50 µg/l	Pb	10–20 µg/l	Zn	50–200 µg/l		
		free oil																																																																									
i.	Ion exchange	Metals	Generally applicable																																																																								
j.	Neutralisation	Acids, alkalis	Generally applicable																																																																								
k.	Oxidation	Sulphide (S ²⁻), sulphite (SO ₃ ²⁻)	Generally applicable																																																																								
l.	Precipitation	Metals and metalloids, sulphate (SO ₄ ²⁻), fluoride (F ⁻)	Generally applicable																																																																								
m	Sedimentation	Suspended solids	Generally applicable																																																																								
n.	Stripping	Ammonia (NH ₃)	Generally applicable																																																																								
Substance/Parameter		BAT-AELs																																																																									
		Daily average																																																																									
Total organic carbon (TOC)		20–50 mg/l ⁽³⁰⁾ ₍₃₁₎ ⁽³²⁾																																																																									
Chemical oxygen demand (COD)		60–150 mg/l ⁽³⁰⁾ ₍₃₁₎ ⁽³²⁾																																																																									
Total suspended solids (TSS)		10–30 mg/l																																																																									
Fluoride (F ⁻)		10–25 mg/l ⁽³²⁾																																																																									
Sulphate (SO ₄ ²⁻)		1,3–2,0 g/l ⁽³²⁾ ₍₃₃₎ ⁽³⁴⁾ ₍₃₅₎																																																																									
Sulphide (S ²⁻), easily released		0,1–0,2 mg/l ⁽³²⁾																																																																									
Sulphite (SO ₃ ²⁻)		1–20 mg/l ⁽³²⁾																																																																									
Metals and metalloids	As	10–50 µg/l																																																																									
	Cd	2–5 µg/l																																																																									
	Cr	10–50 µg/l																																																																									
	Cu	10–50 µg/l																																																																									
	Hg	0,2–3 µg/l																																																																									
	Ni	10–50 µg/l																																																																									
	Pb	10–20 µg/l																																																																									
	Zn	50–200 µg/l																																																																									

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															
16	<p>In order to reduce the quantity of waste sent for disposal from the combustion and/or gasification process and abatement techniques, BAT is to organise operations so as to maximise, in order of priority and taking into account life-cycle thinking:</p> <ul style="list-style-type: none"> (a) waste prevention, e.g. maximise the proportion of residues which) arise as by-products; (b) waste preparation for reuse, e.g. according to the specific requested) quality criteria; (c) waste recycling; (d) other waste recovery (e.g. energy recovery), <p>by implementing an appropriate combination of techniques such as:</p> <table border="1" data-bbox="277 683 1086 1369"> <thead> <tr> <th data-bbox="277 683 456 715">Technique</th> <th data-bbox="456 683 801 715">Description</th> <th data-bbox="801 683 1086 715">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="277 715 456 954">a .</td> <td data-bbox="456 715 801 954">Generation of gypsum as a by-product Quality optimisation of the calcium-based reaction residues generated by the wet FGD so that they can be used as a substitute for mined gypsum (e.g. as raw material in the plasterboard industry). The quality of limestone used in the wet FGD influences the purity of the gypsum produced</td> <td data-bbox="801 715 1086 954">Generally applicable within the constraints associated with the required gypsum quality, the health requirements associated to each specific use, and by the market conditions</td> </tr> <tr> <td data-bbox="277 954 456 1182">b .</td> <td data-bbox="456 954 801 1182">Recycling or recovery of residues in the construction sector Recycling or recovery of residues (e.g. from semi-dry desulphurisation processes, fly ash, bottom ash) as a construction material (e.g. in road building, to replace sand in concrete production, or in the cement industry)</td> <td data-bbox="801 954 1086 1182">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 data-bbox="277 1182 456 1342">c .</td> <td data-bbox="456 1182 801 1342">Energy recovery by using waste in the fuel mix The residual energy content of carbon-rich ash and sludges generated by the combustion of coal, lignite, heavy fuel oil, peat or biomass can be recovered for example by mixing with the fuel</td> <td data-bbox="801 1182 1086 1342">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 data-bbox="277 1342 456 1369">d</td> <td data-bbox="456 1342 801 1369">Preparation</td> <td data-bbox="801 1342 1086 1369">Preparation of catalyst for reuse The applicability may be</td> </tr> </tbody> </table>	Technique	Description	Applicability	a .	Generation of gypsum as a by-product Quality optimisation of the calcium-based reaction residues generated by the wet FGD so that they can be used as a substitute for mined gypsum (e.g. as raw material in the plasterboard industry). The quality of limestone used in the wet FGD influences the purity of the gypsum produced	Generally applicable within the constraints associated with the required gypsum quality, the health requirements associated to each specific use, and by the market conditions	b .	Recycling or recovery of residues in the construction sector Recycling or recovery of residues (e.g. from semi-dry desulphurisation processes, fly ash, bottom ash) as a construction material (e.g. in road building, to replace sand in concrete production, or in the cement industry)	Generally applicable within the constraints associated with the required material quality (e.g. physical properties, content of harmful substances) associated to each specific use, and by the market conditions	c .	Energy recovery by using waste in the fuel mix The residual energy content of carbon-rich ash and sludges generated by the combustion of coal, lignite, heavy fuel oil, peat or biomass can be recovered for example by mixing with the fuel	Generally applicable where plants can accept waste in the fuel mix and are technically able to feed the fuels into the combustion chamber	d	Preparation	Preparation of catalyst for reuse The applicability may be	CC	<p>The Operator confirmed that waste goes to an energy recovery plant (d).</p> <p>In response to our request for information received 13 March 2020 they confirmed that a) to c) are not applicable.</p> <p>They also confirm that waste management takes place on site and a push to improve the number of recycling streams is planned during 2020</p> <p>We agree with the Operator's stated compliance.</p>
Technique	Description	Applicability																
a .	Generation of gypsum as a by-product Quality optimisation of the calcium-based reaction residues generated by the wet FGD so that they can be used as a substitute for mined gypsum (e.g. as raw material in the plasterboard industry). The quality of limestone used in the wet FGD influences the purity of the gypsum produced	Generally applicable within the constraints associated with the required gypsum quality, the health requirements associated to each specific use, and by the market conditions																
b .	Recycling or recovery of residues in the construction sector Recycling or recovery of residues (e.g. from semi-dry desulphurisation processes, fly ash, bottom ash) as a construction material (e.g. in road building, to replace sand in concrete production, or in the cement industry)	Generally applicable within the constraints associated with the required material quality (e.g. physical properties, content of harmful substances) associated to each specific use, and by the market conditions																
c .	Energy recovery by using waste in the fuel mix The residual energy content of carbon-rich ash and sludges generated by the combustion of coal, lignite, heavy fuel oil, peat or biomass can be recovered for example by mixing with the fuel	Generally applicable where plants can accept waste in the fuel mix and are technically able to feed the fuels into the combustion chamber																
d	Preparation	Preparation of catalyst for reuse The applicability may be																

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															
	. of spent 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	limited by the mechanical condition of the catalyst and the required performance with respect to controlling NO _x and NH ₃ emissions																	
17	In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below.			CC	<p>The Operator confirmed that:</p> <p>a. Operational measures are in place as described by this technique c. Location of existing assets are on an industrial site and are located specifically away from the nearest residential areas. Noise monitoring is carried out and reported annually.</p> <p>We agree with the Operator's stated compliance.</p>															
<table border="1"> <thead> <tr> <th data-bbox="271 612 465 639">Technique</th> <th data-bbox="465 612 801 639">Description</th> <th data-bbox="801 612 1093 639">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="271 644 465 986">a . Operational measures</td> <td data-bbox="465 644 801 986"> These include: <ul style="list-style-type: none"> — 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 data-bbox="801 644 1093 986">Generally applicable</td> </tr> <tr> <td data-bbox="271 991 465 1066">b . Low-noise equipment</td> <td data-bbox="465 991 801 1066">This potentially includes compressors, pumps and disks</td> <td data-bbox="801 991 1093 1066">Generally applicable when the equipment is new or replaced</td> </tr> <tr> <td data-bbox="271 1070 465 1225">c . Noise attenuation</td> <td data-bbox="465 1070 801 1225"> Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings </td> <td data-bbox="801 1070 1093 1225">Generally applicable to new plants. In the case of existing plants, the insertion of obstacles may be restricted by lack of space</td> </tr> <tr> <td data-bbox="271 1230 465 1369">d . Noise-control equipment</td> <td data-bbox="465 1230 801 1369"> This includes: <ul style="list-style-type: none"> — noise-reducers — equipment insulation — enclosure of noisy </td> <td data-bbox="801 1230 1093 1369">The applicability may be restricted by lack of space</td> </tr> </tbody> </table>			Technique			Description	Applicability	a . Operational measures	These include: <ul style="list-style-type: none"> — 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 	Generally applicable	b . Low-noise equipment	This potentially includes compressors, pumps and disks	Generally applicable when the equipment is new or replaced	c . Noise attenuation	Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings	Generally applicable to new plants. In the case of existing plants, the insertion of obstacles may be restricted by lack of space	d . Noise-control equipment	This includes: <ul style="list-style-type: none"> — noise-reducers — equipment insulation — enclosure of noisy 	The applicability may be restricted by lack of space	
Technique	Description	Applicability																		
a . Operational measures	These include: <ul style="list-style-type: none"> — 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 	Generally applicable																		
b . Low-noise equipment	This potentially includes compressors, pumps and disks	Generally applicable when the equipment is new or replaced																		
c . Noise attenuation	Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings	Generally applicable to new plants. In the case of existing plants, the insertion of obstacles may be restricted by lack of space																		
d . Noise-control equipment	This includes: <ul style="list-style-type: none"> — noise-reducers — equipment insulation — enclosure of noisy 	The applicability may be restricted by lack of space																		

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											
		equipment — soundproofing of buildings														
	e . Appropriate location of equipment and buildings	Noise levels can be reduced by increasing the distance between the emitter and the receiver and by using buildings as noise screens	Generally applicable to new plant													
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																
Combustion of gaseous fuels																
40	In order to increase the energy efficiency of natural gas combustion, BAT is to use an appropriate combination of the techniques given in BAT 12 and below.			NC	<p>The Operator confirmed that:</p> <p>Package Boiler Island 59%, calculated from the net fuel input (including feed heat as fuel equivalent).</p> <p>In their response to our request for information received 13 March 2020 they confirmed that the package boilers are only used infrequently as an emergency steam supply for customers.</p> <p>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.</p> <p>In their response received 01 April 2020 they confirmed that the applicable BAT AEEL is the 'net total fuel utilisation'.</p> <p>The BAT AEEL is not met, refer to section 4.2 of this document.</p> <p>We do not agree with the Operator's stated compliance of CC and have set this BAT Conclusion to NC.</p>											
	<table border="1"> <thead> <tr> <th data-bbox="280 852 409 916">Technique</th> <th data-bbox="416 852 566 916">Description</th> <th data-bbox="573 852 1084 916">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="280 920 409 1193">a . Combined cycle</td> <td data-bbox="416 920 566 1193">See description in Section 8.2</td> <td data-bbox="573 920 1084 1193"> 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> </tbody> </table>			Technique	Description	Applicability	a . Combined cycle	See description in Section 8.2	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							
Technique	Description	Applicability														
a . Combined cycle	See description in Section 8.2	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														
	BAT-associated energy efficiency levels (BAT-AEELs) for the combustion of natural gas															
	<table border="1"> <thead> <tr> <th data-bbox="280 1259 465 1375" rowspan="2">Type of combustion unit</th> <th colspan="3" data-bbox="472 1259 1084 1289">BAT-AEELs ⁽¹³⁶⁾ ⁽¹³⁷⁾</th> </tr> <tr> <th data-bbox="472 1294 645 1375">Net electrical efficiency (%)</th> <th data-bbox="651 1294 835 1375">Net total fuel utilisation (%) ⁽¹³⁸⁾ ⁽¹³⁹⁾</th> <th data-bbox="842 1294 1084 1375">Net mechanical energy efficiency (%) ⁽¹³⁹⁾ ⁽¹⁴⁰⁾</th> </tr> </thead> <tbody> <tr> <td data-bbox="280 1380 465 1375"></td> <td data-bbox="472 1380 645 1375"></td> <td data-bbox="651 1380 835 1375"></td> <td data-bbox="842 1380 1084 1375"></td> </tr> </tbody> </table>			Type of combustion unit	BAT-AEELs ⁽¹³⁶⁾ ⁽¹³⁷⁾			Net electrical efficiency (%)	Net total fuel utilisation (%) ⁽¹³⁸⁾ ⁽¹³⁹⁾	Net mechanical energy efficiency (%) ⁽¹³⁹⁾ ⁽¹⁴⁰⁾						
Type of combustion unit	BAT-AEELs ⁽¹³⁶⁾ ⁽¹³⁷⁾															
	Net electrical efficiency (%)	Net total fuel utilisation (%) ⁽¹³⁸⁾ ⁽¹³⁹⁾	Net mechanical energy efficiency (%) ⁽¹³⁹⁾ ⁽¹⁴⁰⁾													

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													
		New unit	Existing unit		New unit	Existing unit															
	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 MW _{th}	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.						CC	<p>In their response to our request for information received 13 March 2020 they confirmed that the following techniques are used to manage NO_x emissions:</p> <p>d. Advanced control system; and</p> <p>Combustion optimisation</p> <p>We agree with the Operator's stated compliance.</p>													
	<table border="1"> <thead> <tr> <th data-bbox="271 1002 465 1038">Technique</th> <th data-bbox="465 1002 763 1038">Description</th> <th data-bbox="763 1002 1077 1038">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="271 1038 465 1150">a Air and/or fuel staging</td> <td data-bbox="465 1038 763 1150">See descriptions in Section 8.3. Air staging is often associated with low-NO_x burners</td> <td data-bbox="763 1038 1077 1150" rowspan="3">Generally applicable</td> </tr> <tr> <td data-bbox="271 1150 465 1206">b Flue-gas recirculation</td> <td data-bbox="465 1150 763 1206">See description in Section 8.3</td> </tr> <tr> <td data-bbox="271 1206 465 1262">c Low-NO_x burners (LNB)</td> <td data-bbox="465 1206 763 1262"></td> </tr> <tr> <td data-bbox="271 1262 465 1369">d Advanced control system</td> <td data-bbox="465 1262 763 1369">See description in Section 8.3. This technique is often used in combination with other</td> <td data-bbox="763 1262 1077 1369">The applicability to old combustion plants may be constrained by the need to retrofit the combustion system</td> </tr> </tbody> </table>						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 used in combination with other	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system		
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 used in combination with other	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system																			

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
		techniques or may be used alone for combustion plants operated < 500 h/yr	and/or control command system		
	e . Reduction of the combustion air temperature	See description in Section 8.3	Generally applicable within the constraints associated with the process needs		
	f. Selective non-catalytic reduction (SNCR)		Not applicable to combustion plants operated < 500 h/yr with highly variable boiler loads. The applicability may be limited in the case of combustion plants operated between 500 h/yr and 1 500 h/yr with highly variable boiler loads		
	g . Selective catalytic reduction (SCR)		Not applicable to combustion plants operated < 500 h/yr. Not generally applicable to combustion plants of < 100 MW _{th} . There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr		
42	In order to prevent or reduce NO _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.			NA	<p>The Operator did not provide a response.</p> <p>This BAT Conclusion is for gas turbines so we conclude that it is not applicable to the activities carried out at the installation.</p> <p>We amended the Operator's status from CC to NA.</p>
	Technique	Description	Applicability		
	a . Advanced control system	See description in Section 8.3. This technique is often used in combination with other techniques or may be used alone for combustion plants operated < 500 h/yr	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system		
	b . Water/steam addition	See description in Section 8.3	The applicability may be limited due to water availability		

BAT C No.	Summary of BAT Conclusion requirement			Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	c 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 space. There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr		

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														
43	<p>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.</p> <table border="1" data-bbox="280 411 1084 1027"> <thead> <tr> <th data-bbox="280 411 427 443">Technique</th> <th data-bbox="427 411 745 443">Description</th> <th data-bbox="745 411 1084 443">Applicability</th> </tr> </thead> <tbody> <tr> <td data-bbox="280 443 427 603">a Advanced control system</td> <td data-bbox="427 443 745 603">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 data-bbox="745 443 1084 603">The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system</td> </tr> <tr> <td data-bbox="280 603 427 687">b Lean-burn concept</td> <td data-bbox="427 603 745 687">See description in Section 8.3. Generally used in combination with SCR</td> <td data-bbox="745 603 1084 687">Only applicable to new gas-fired engines</td> </tr> <tr> <td data-bbox="280 687 427 772">c Advanced lean-burn concept</td> <td data-bbox="427 687 745 772" rowspan="2">See descriptions in Section 8.3</td> <td data-bbox="745 687 1084 772">Only applicable to new spark plug ignited engines</td> </tr> <tr> <td data-bbox="280 772 427 1027">d Selective catalytic reduction (SCR)</td> <td data-bbox="745 772 1084 1027">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> </tbody> </table>	Technique	Description	Applicability	a Advanced control system	See description in Section 8.3. This technique is often used in combination with other techniques or may be used alone for combustion plants operated < 500 h/yr	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system	b Lean-burn concept	See description in Section 8.3. Generally used in combination with SCR	Only applicable to new gas-fired engines	c Advanced lean-burn concept	See descriptions in Section 8.3	Only applicable to new spark plug ignited engines	d Selective catalytic reduction (SCR)	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	NA	<p>The Operator did not provide a response to this BAT Conclusion.</p> <p>We conclude that it is not applicable to the activities carried out at the installation.</p>
Technique	Description	Applicability															
a Advanced control system	See description in Section 8.3. This technique is often used in combination with other techniques or may be used alone for combustion plants operated < 500 h/yr	The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system															
b Lean-burn concept	See description in Section 8.3. Generally used in combination with SCR	Only applicable to new gas-fired engines															
c Advanced lean-burn concept	See descriptions in Section 8.3	Only applicable to new spark plug ignited engines															
d Selective catalytic reduction (SCR)		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															
44	<p>In order to prevent or reduce CO emissions to air from the combustion of natural gas, BAT is to ensure optimised combustion and/or to use oxidation catalysts.</p> <p>Description - See descriptions in Section 8.3.</p> <p>BAT-associated emission levels (BAT-AELs) for NO_x emissions to air from the combustion of natural gas in gas turbines</p> <table border="1" data-bbox="280 1214 1084 1370"> <thead> <tr> <th data-bbox="280 1214 591 1370" rowspan="2">Type of combustion plant</th> <th data-bbox="591 1214 759 1370" rowspan="2">Combustion plant total rated thermal input (MW_{th})</th> <th colspan="2" data-bbox="759 1214 1084 1273">BAT-AELs (mg/Nm³) ⁽¹⁴²⁾ ₍₁₄₃₎</th> </tr> <tr> <th data-bbox="759 1273 913 1370">Yearly average ⁽¹⁴⁾ ₍₁₄₅₎</th> <th data-bbox="913 1273 1084 1370">Daily average or average over the</th> </tr> </thead> <tbody> <tr> <td data-bbox="280 1370 591 1377"></td> <td data-bbox="591 1370 759 1377"></td> <td data-bbox="759 1370 913 1377"></td> <td data-bbox="913 1370 1084 1377"></td> </tr> </tbody> </table>	Type of combustion plant	Combustion plant total rated thermal input (MW _{th})	BAT-AELs (mg/Nm ³) ⁽¹⁴²⁾ ₍₁₄₃₎		Yearly average ⁽¹⁴⁾ ₍₁₄₅₎	Daily average or average over the					CC	<p>In their response to our request for information received 13 March 2020 they confirmed that BAT AELs from Table 25 are met.</p> <p>Refer to section 4.1 of this document for the setting of limits.</p> <p>We agree with the Operator's stated compliance.</p>				
Type of combustion plant	Combustion plant total rated thermal input (MW _{th})			BAT-AELs (mg/Nm ³) ⁽¹⁴²⁾ ₍₁₄₃₎													
		Yearly average ⁽¹⁴⁾ ₍₁₄₅₎	Daily average or average over the														

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
				sampling period		
	Open-cycle gas turbines (OCGTs) ⁽¹⁴⁶⁾ ⁽¹⁴⁷⁾					
	New OCGT	≥ 50	15–35	25–50		
	Existing OCGT (excluding turbines for mechanical drive applications) — All but plants operated < 500 h/yr	≥ 50	15–50	25–55 ⁽¹⁴⁸⁾		
	Combined-cycle gas turbines (CCGTs) ⁽¹⁴⁶⁾ ⁽¹⁴⁹⁾					
	New CCGT	≥ 50	10–30	15–40		
	Existing CCGT with a net total fuel utilisation of < 75 %	≥ 600	10–40	18–50		
	Existing CCGT with a net total fuel utilisation of ≥ 75 %	≥ 600	10–50	18–55 ⁽¹⁵⁰⁾		
	Existing CCGT with a net total fuel utilisation of < 75 %	50–600	10–45	35–55		
	Existing CCGT with a net total fuel utilisation of ≥ 75 %	50–600	25–50 ⁽¹⁵¹⁾	35–55 ⁽¹⁵²⁾		
	Open- and combined-cycle gas turbines					
	Gas turbine put into operation no later than 27 November 2003, or existing gas turbine for emergency use and operated < 500 h/yr	≥ 50	No BAT-AEL	60–140 ⁽¹⁵³⁾ ⁽¹⁵⁴⁾		
	Existing gas turbine for mechanical drive applications — All but plants operated < 500 h/yr	≥ 50	15–50 ⁽¹⁵⁵⁾	25–55 ⁽¹⁵⁶⁾		
	<p>As an indication, the yearly average CO emission levels for each type of existing combustion plant operated ≥ 1 500 h/yr and for each type of new combustion plant will generally be as follows:</p> <ul style="list-style-type: none"> — New OCGT of ≥ 50 MW_{th}: < 5–40 mg/Nm³. 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 					

BAT C No.	Summary of BAT Conclusion requirement	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement																							
	<p>mechanical energy efficiency of the plant determined at ISO baseload conditions.</p> <ul style="list-style-type: none"> — Existing OCGT of $\geq 50 \text{ MW}_{\text{th}}$ (excluding turbines for mechanical drive applications): $< 5\text{--}40 \text{ mg/Nm}^3$. The higher end of this range will generally be 80 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 $\geq 50 \text{ MW}_{\text{th}}$: $< 5\text{--}30 \text{ mg/Nm}^3$. For plants with a net electrical efficiency (EE) greater than 55 %, a correction factor may be applied to the higher end of the range, corresponding to [higher end] $\times \text{EE}/55$, where EE is the net electrical energy efficiency of the plant determined at ISO baseload conditions. — Existing CCGT of $\geq 50 \text{ MW}_{\text{th}}$: $< 5\text{--}30 \text{ mg/Nm}^3$. The higher end of this range will generally be 50 mg/Nm^3 for plants that operate at low load. — Existing gas turbines of $\geq 50 \text{ MW}_{\text{th}}$ for mechanical drive applications: $< 5\text{--}40 \text{ mg/Nm}^3$. The higher end of the range will generally be 50 mg/Nm^3 when plants operate at low load. <p>In the case of a gas turbine equipped with DLN burners, these indicative levels correspond to when the DLN operation is effective.</p> <p>BAT-associated emission levels (BAT-AELs) for NO_x emissions to air from the combustion of natural gas in boilers and engines</p> <table border="1" data-bbox="280 997 1079 1220"> <thead> <tr> <th rowspan="3">Type of combustion plant</th> <th colspan="4">BAT-AELs (mg/Nm^3)</th> </tr> <tr> <th colspan="2">Yearly average ⁽¹⁵⁷⁾</th> <th colspan="2">Daily average or average over the sampling period</th> </tr> <tr> <th>New plant</th> <th>Existing plant ⁽¹⁵⁸⁾</th> <th>New plant</th> <th>Existing plant ⁽¹⁵⁹⁾</th> </tr> </thead> <tbody> <tr> <td>Boiler</td> <td>10–60</td> <td>50–100</td> <td>30–85</td> <td>85–110</td> </tr> <tr> <td>Engine ⁽¹⁶⁰⁾</td> <td>20–75</td> <td>20–100</td> <td>55–85</td> <td>55–110 ⁽¹⁶¹⁾</td> </tr> </tbody> </table> <p>As an indication, the yearly average CO emission levels will generally be:</p> <ul style="list-style-type: none"> — $< 5\text{--}40 \text{ mg/Nm}^3$ for existing boilers operated $\geq 1\,500 \text{ h/yr}$, — $< 5\text{--}15 \text{ mg/Nm}^3$ for new boilers, — $30\text{--}100 \text{ mg/Nm}^3$ for existing engines operated $\geq 1\,500 \text{ h/yr}$ and for 	Type of combustion plant	BAT-AELs (mg/Nm^3)				Yearly average ⁽¹⁵⁷⁾		Daily average or average over the sampling period		New plant	Existing plant ⁽¹⁵⁸⁾	New plant	Existing plant ⁽¹⁵⁹⁾	Boiler	10–60	50–100	30–85	85–110	Engine ⁽¹⁶⁰⁾	20–75	20–100	55–85	55–110 ⁽¹⁶¹⁾		
Type of combustion plant	BAT-AELs (mg/Nm^3)																									
	Yearly average ⁽¹⁵⁷⁾		Daily average or average over the sampling period																							
	New plant	Existing plant ⁽¹⁵⁸⁾	New plant	Existing plant ⁽¹⁵⁹⁾																						
Boiler	10–60	50–100	30–85	85–110																						
Engine ⁽¹⁶⁰⁾	20–75	20–100	55–85	55–110 ⁽¹⁶¹⁾																						

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																		
	new engines.																				
45	<p>In order to reduce non-methane volatile organic compounds (NMVOC) and methane (CH₄) 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.</p> <p>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.</p> <p>BAT-associated emission levels (BAT-AELs) for formaldehyde and CH₄ emissions to air from the combustion of natural gas in a spark-ignited lean-burn gas engine</p> <table border="1" data-bbox="280 691 1086 963"> <thead> <tr> <th rowspan="3">Combustion plant total rated thermal input (MW_{th})</th> <th colspan="3">BAT-AELs (mg/Nm³)</th> </tr> <tr> <th>Formaldehyde</th> <th colspan="2">CH₄</th> </tr> <tr> <th colspan="3">Average over the sampling period</th> </tr> <tr> <th></th> <th>New or existing plant</th> <th>New plant</th> <th>Existing plant</th> </tr> </thead> <tbody> <tr> <td>≥ 50</td> <td>5–15 ⁽¹⁶²⁾</td> <td>215–500 ⁽¹⁶³⁾</td> <td>215–560 ⁽¹⁶²⁾ ₍₁₆₃₎</td> </tr> </tbody> </table>	Combustion plant total rated thermal input (MW _{th})	BAT-AELs (mg/Nm ³)			Formaldehyde	CH ₄		Average over the sampling period				New or existing plant	New plant	Existing plant	≥ 50	5–15 ⁽¹⁶²⁾	215–500 ⁽¹⁶³⁾	215–560 ⁽¹⁶²⁾ ₍₁₆₃₎	NA	<p>The Operator did not provide a response to this BAT Conclusion.</p> <p>We conclude that it is not applicable to the activities carried out at the installation.</p>
Combustion plant total rated thermal input (MW _{th})	BAT-AELs (mg/Nm ³)																				
	Formaldehyde		CH ₄																		
	Average over the sampling period																				
	New or existing plant	New plant	Existing plant																		
≥ 50	5–15 ⁽¹⁶²⁾	215–500 ⁽¹⁶³⁾	215–560 ⁽¹⁶²⁾ ₍₁₆₃₎																		
<p>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 deleted BAT Conclusions for gasification – BAT Conclusions 72 to 75 deleted Not applicable to the activities carried out at the installation</p>																					

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

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

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

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

(b) the technical characteristics of the installation concerned.

The Operator has not made any such request.

7 Emissions to water

There are 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
Permit introductory note amended	To remove the specification for natural gas of <35ppm sulphur content. This is not required for natural gas from the National Grid.
Condition 2.3.4 added	To reference existing table S2.1.
Condition 2.3.6, improvement condition IC4 and definition in Schedule 6 added	<p>In the event of a black out National Grid would call on combustion plant to operate and may require them to do so outside their permitted conditions. We have dedicated black start plant and they are permitted to run as such but this scenario is relevant to the rest of the LCP which could be called depending on the circumstances.</p> <p>A risk assessment will be carried out by Energy UK/Joint Environmental Programme on behalf of LCP connected to the National Transmission System. Air emissions modelling will be based on generic black start scenarios to establish whether they have the potential to have a local impact on the environment or not (on a national basis). If the modelling demonstrates that no significant impacts are likely, the plant can operate under condition 2.3.6. 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.</p>
Existing permit condition 3.1.3 deleted and tables S3.2, S4.1 and S4.4 amended	<p>To remove annual limits at emission point S6 for cadmium and mercury present in raw materials.</p> <p>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.</p>
Table S1.1 amended	To amend the thermal input of the LCP from 110.8 MWth to 120 MWth (4 x 30 MWth boilers)
Table S1.2 amended	To change the date received of variation application from 08/09/2010 to 20/09/10, consistent with the duly made date.
Table S1.3 amended	To confirm completion of improvement conditions IC2 and IC3.
Table S1.4 amended	To amend emission point reference from A1 to A5.
Table S2.1	Amended to add natural gas consistent with other permits in the sector.

Table S3.3 amended	To update the noise monitoring standard from BS4142:1997 to BS 4142:2014.
Table S4.1 amended	To include quarterly reporting for oxides of nitrogen and carbon monoxide.
Table S4.4 amended	To include the reporting form for periodic monitoring (SO ₂ and dust).
Schedule 6 Interpretation	Amended to remove “background concentration” which is not applicable to the facility.
	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	
Biodiversity, heritage, landscape and nature conservation	<p>The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat.</p> <p>A full assessment of the application and its potential to affect the 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.</p> <p>We have not consulted Natural England on the application. The decision was taken in accordance with our guidance.</p>

Aspect considered	Decision
Operating techniques	
General operating techniques	<p>We have reviewed the techniques used by the Operator where they are relevant to the BAT Conclusions and compared these with the relevant guidance notes.</p> <p>The permit conditions ensure compliance with the relevant BREF, BAT Conclusions. The ELVs deliver compliance with the BAT AELs.</p>
Permit conditions	
Updating permit conditions during consolidation	<p>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.</p>
Changes to the permit conditions due to an Environment Agency initiated variation	<p>We have varied the permit as stated in the variation notice.</p>
Improvement programme	<p>We have imposed an improvement condition for black start operations.</p> <p>We have also confirmed the completion of improvement condition IC3.</p>
Emission limits	<p>We have decided that emission limits should be set for the parameters listed in the permit.</p> <p>These are described in the relevant BAT Conclusions in sections 4.1 and 5 of this document.</p> <p>For SO₂ a limit of 10 mg/Nm³ was set by the original permit and this was subsequently increased to 35 mg/Nm³ consistent with the benchmark for the sector.</p> <p>For dust a limit of 5 mg/Nm³ was set by the original permit.</p> <p>It is considered that the ELVs described above will</p>

Aspect considered	Decision
	ensure that significant pollution of the environment is prevented and a high level of protection for the environment is secured.
Monitoring	<p>We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified.</p> <p>These are described in the relevant BAT Conclusions in sections 4.1 and 5 of this document.</p> <p>Table S3.4 process monitoring requirements was added to include the requirement to monitor energy efficiency after overhauls on site in line with BAT Conclusion 2.</p> <p>Based on the information in the application we are satisfied that the Operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.</p>
Reporting	<p>We have specified reporting in the permit for the following parameters:</p> <ul style="list-style-type: none"> • Nitrogen dioxide • Carbon monoxide • Sulphur dioxide (IED Chapter III requirement) • Dust (IED Chapter III requirement) <p>These are described in the relevant BAT Conclusions in sections 4.1 and 5 of this document.</p>
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.

Aspect considered	Decision
Growth Duty	
<p>Section 108 Deregulation Act 2015 – Growth duty</p>	<p>We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit.</p> <p>Paragraph 1.3 of the guidance says: “The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation.”</p> <p>We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.</p> <p>We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.</p>