

Natural Resources Wales permitting decisions

Variation and Consolidation of a bespoke Permit

We have decided to issue a Natural Resources Wales initiated variation for Baglan Energy Park in Seaway Parade, Port Talbot, SA12 7GE operated by Baglan Operations Limited.

The variation number is **EPR/BJ7891IT/V010**.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

The permit has been varied following the publication of the revised Best Available Techniques (BAT) Reference Document (BREF) for Large Combustion Plant (LCP). The associated BAT conclusions to this document were published on the 17 August 2017 in the Official Journal of the European Union.

This variation incorporates the changes required by the Industrial Emissions Directive following a statutory review of permits in the Large Combustion Plant sector. These include the amendment of the wording of several permit conditions relating to notifications, changes to emission limits and monitoring requirements.

We are satisfied that the operator will be compliant with the published BAT conclusions which will apply from 17 August 2021.

Purpose of this document

This decision document:

- explains how we have carried out our statutory review of the Operator's Permit;
- why we have decided to vary the Permit as a result of that review; and
- why we have included the specific conditions in the revised Permit through the variation notice we are issuing.

It is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our position.

Structure of this document

- Assessment of Baglan Energy Park against the published BAT conclusions for large combustion plant.
- Annex 1 – Decision Checklist regarding relevant BAT Conclusions

Assessment of Baglan Energy Park against the published BAT conclusions for large combustion plant.

1. Our decision

We have issued a variation, which will allow Baglan Operations Limited to operate the installation, subject to the conditions in the varied permit.

The variation does two things:

- it brings the permit into line with our modern regulatory template; and
- it varies the permit where appropriate to reflect the outcome of our statutory review and incorporate Best Available Techniques (BAT) and associated Emission Limit Values (ELVs).

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

The original permit, issued on the 31 December 2001 ensured that the installation, employed Best Available Techniques (BAT) and ensured a high level of protection for human health and the environment. We have altered the permit as a result of the statutory review, and we are confident that the new requirements will deliver a superior level of protection to that which was previously achieved.

2. The legal framework

The variation and consolidation notice (which includes the consolidated Permit as Schedule 2) will be issued under Regulation 20 of the Environmental Permitting (England and Wales) Regulations 2016 (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 Industrial Emissions Directive (IED);
- subject to aspects of other relevant legislation which also have to be addressed.

We consider that, in issuing the variation notice and consolidated permit, it 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.

3. How we reached our decision

Requesting information to demonstrate compliance with BAT Conclusion techniques

We issued a Notice under Regulation 61(1) of the Environmental Permitting (England and Wales) Regulations 2016 on 9 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 relevant BAT Conclusions document.

The Regulation 61(1) notice required the operator to:

- Describe the techniques that will be implemented before 17 August 2021, which will then ensure that operations meet the revised standard, or
- Justify 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
- Justify why an alternative technique will achieve the same level of environmental protection equivalent to the revised standard described in the BAT Conclusions.
- Where the permitted activity involves the use, production or release of a hazardous substance, as defined in Article 3(18) of the Industrial Emissions Directive, Baglan Operations Limited were required to carry out a risk assessment considering the possibility of soil and groundwater contamination at the permitted installation with such substances. Where risk of such contamination is established prepare a baseline report containing information necessary to determine the state of soil and

groundwater contamination so as to make a quantified comparison with the state upon definite cessation of the activity. Baglan Operations Limited have a copy of a consequent baseline report.

- Where the permitted activity involves the release of priority hazardous substances, as defined by the Water Framework Directive, the Baglan Operations Limited were required to carry out a risk screening assessment considering the presence of priority hazardous substances at the permitted installation. Where a risk of these substances is established the operator is to sample the effluent and screen for the priority hazardous substances. If these substances are found to be present in the effluent stream, then assessment using the H1 tool and potential detailed dispersion modelling will be required to demonstrate that the effluent discharge will not have a significant impact to the receiving water.
- Where the compliance with the BAT conclusions leads to the substantial refurbishment or installation of new combustion plant with an aggregate thermal input of greater than 20MWth, which generates more than 100kWth of heat, Baglan Operations Limited must provide sufficient technical and commercial evidence to demonstrate compliance with Article 14, Paragraph 5 of Directive 2012/27/EU on Energy Efficiency. This must include an assessment of the technical feasibility and costs of installing a combined heat and power (CHP) system or providing district heating and, where this assessment shows that the costs are not disproportionate to the benefits, proposals to incorporate these measures into the plant.

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(1) 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. There operator did not apply for a derogation.

The Regulation 61(1) Notice response from the operator was received on 22 November 2018, and additional information received on the 11 September 2019 and 7 February 2020.

We considered that the response contained sufficient information for us to commence determination of the permit review. The operator made no claim for commercial confidentiality. We have not received any information in relation to the Regulation 61(1) Notice response that appears to be confidential in relation to any party.

4. Key issues/Regulation 61(1) response

BAT Conclusions for the large combustion plants were published as a Commission Implementing Decision (2017/1442/EU) in the Official Journal of the EU on 17 August 2017. There are 75 BAT Conclusions. Annex 1 provides a record of decisions made in relation to each relevant BAT Conclusion applicable to the installation. This should be read in conjunction with the permit/variation notice issued.

A detailed response was received from Baglan Operations Limited. Where the operator has concluded that they have achieved BAT, and we are in agreement, no further information/justification has been sought by Natural Resources Wales.

5. Changes we have made

We have added the following as Directly Associated Activities in Table S1.1 of the Permit. These are all emergency activities and do not have emission points in Table S3.1.

Directly Associated Activities			
AR3	SSDG (Safe Shutdown Diesel Generator)	5.4MWth Diesel Generator	Designed for infrequent use to maintain essential supplies in the event of total site power loss. Each unit is tested routinely for reliability, with estimated run times between 20 to 50 hours per annum per unit.
AR4	BSDG (Black Start Diesel Generator)	2.7MWth Diesel Generator	Designed to allow LM2500 start-up in black-start mode in the event of total site power loss. Each unit is tested routinely for reliability, with estimated run times between 20 to 50 hours per annum per unit.

Directly Associated Activities			
AR5	PRFDG (Gas Pipeline Reception Area Emergency Diesel Generator)	0.17MWth Diesel Generator	Designed to maintain essential supplies to the PRF in the event of total site power loss. Each unit is tested routinely for reliability, with estimated run times between 20 to 50 hours per annum per unit.
AR6	DFP (Diesel Fire Pump)	0.75MWth DFP	For use in emergency fire-fighting situations. Each unit is tested routinely for reliability, with estimated run times between 20 to 50 hours per annum per unit.

We have also added Table S1.5 to the Permit for the Effective Dry Load NO_x thresholds.

Table S1.5 Effective Dry Load NO _x thresholds	
Emission Point and Unit Reference	Effective Dry Low NO _x threshold Load in MW and as percent of rated power output (%) and discrete processes
A1, 9H gas turbine	260MW _e gross generated (equivalent to 53% of the guarantee ISO Base Load gross generation)

Improvement Conditions

We consider that we need to set an improvement condition relating to black start operation as set out below.

Reference	Requirement	Date
9.12	Black Start Operation The operator shall produce and submit a written Black Start Response Plan to Natural Resources Wales, for approval. The plan shall contain an impact assessment demonstrating that there is no significant environmental risk associated with black start operations and: propose a methodology for minimisation of environmental impact during such a period of operation; and	20/01/2021

	include the procedure for the notification of black start operation and its duration. The methodology for operation and reporting set out in the report shall be implemented by the Operator from the date of approval by Natural Resources Wales.	
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IC9.12 – Black Start Operation

There may be circumstances where there may be significant partial or total failure of the electrical supply system across Great Britain (note that the system in Northern Ireland is separate). In this circumstance (a Black Start Event), National Grid ESO (electricity system operator) may issue instructions (Black Start Instructions) to those plant who are providers of black start services to operate in order to re-establish the electrical grid system. More information on Black Start is available on the National Grid ESO website - <https://www.nationalgrideso.com/balancing-services/system-security-services/black-start>

During such an Event, it may be that plant called upon to operate may do so in a mode that is not optimised and may be operated in such a way that not all abatement equipment is operational or effective. It is therefore possible that such plant may exceed emission limit values included in the environmental permits.

To ensure that the impact of such operation is minimised as far as is practical, IC9.12 has been included in the permit. This improvement condition requires that the operator provides to NRW a Black Start Response Plan, which sets out what the operator will do during a Black Start Event.

This plan is expected to include:

1. An assessment of the potential impact from the operation of the plant during a Black Start Event. This can be demonstrated from a generic sector study and after event site specific assessment.

2. What actions (as far as is possible and practical) that the operator will undertake to minimise environmental impact during such a Black Start Instruction.
3. The procedure for the notification to NRW of the Black Start Instruction and how to provide information on the duration of the instruction.

Items 1 to 3 can also be addressed by inclusion of the above points in an updated version of the IED Compliance Protocol.

Operational Changes

There are no operational changes on site as a result of this variation.

Emissions to Water

As part of our delivery of the Water Framework Directive requirements, we need to identify and assess the impact for all discharges to surface waters and/or sewer from the site for priority hazardous substances and any other relevant substances. The emissions monitoring for these substances should be carried out using the methods and standards described in the M18 guidance on “Monitoring of discharges to water and sewer”.

With reference to the risk assessment guidance on the gov.uk website entitled “Surface water pollution risk assessment for your environmental permit” (accessible via: <https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit>) the company carried out the following assessments:

- Screening tests for priority hazardous pollutants and any other relevant priority hazardous substances.
- For any substance which is not screened out by the screening tests further modelling, as described in the risk assessment guidance “Surface water pollution risk assessment for your environmental permit”.

The substances were screened out by the screening tests and therefore there was no need to carry out Phase 2 modelling. Baglan Operations Limited have confirmed there

have been no changes to the discharges from that noted within the Reg61(1) submissions.

As noted within these submissions within the Reg61(1) and the current Environmental Permit, the process and cooling water system (Emission Point W1) comprises treated site effluent and cooling water which is discharged to the River Neath. Table S3.2 in the Environmental Permit gives the list of all substances that are monitored at Emission Point W1:

To date, there have been no breaches or non-compliances with the emission limits or monitoring requirements. No changes are made to the monitoring requirements for emissions to water as a result of this variation.

Emissions to Water – Article 15(4) Derogations

No derogations.

Emissions to Air

There were changes to the ELVs for emissions to air taking into account BAT conclusions from the large combustion plant BREF.

The LCP on site consist of 3 x 849.3MWth input (LCP15 9H, LCP15 LM2500 and a Gas-fired auxiliary boiler of 90.5 MWth), combined cycle gas turbines (CCGTs). The ELVs and BAT-AELs are based on an operating regime burning natural gas LCP 15 9H running with unlimited operating hours and the LCP15 LM2500 and Auxiliary boiler running for 1500 hours.

The LCP BAT-AELs set out for combustion of gaseous fuels (natural gas) are stated within the following BAT Conclusions: BAT 42, 43, 44 and 45. The tables below outline the existing and new limits that have been incorporated into the permit and the reference periods at which they apply. The emission limits and monitoring requirements have been incorporated into Schedule 3 of the permit and the reference conditions are in Schedule 6 of the permit. The relevant BAT-AELS will apply from the implementation date of the BAT Conclusions.

The table below outlines the existing parameters and limits set to implement the IED Annex V Limits.

Effective until 16 August 2021:

Release point	Parameter	Annual mean,	Monthly mean,	Daily mean,	Maximum validated hourly averages,	Effective until
A1	Oxides of nitrogen (NO and NO ₂ expressed as NO ₂)	No limit set	50 mg/m ³ 70% to Base load ¹	51 mg/m ³ 70% to base load ¹ 51 mg/m ³ MSUL/MSDL to base load ²	76.5 mg/m ³ 70% to base load ¹	16 August 2021
A1	Carbon Monoxide	No limit set	20 mg/m ³ 70% to base load ¹	20 mg/m ³ 70% to base load 20 mg/m ³ MSUL/MSDL to base load ²	30 mg/m ³ Effective Dry Low NO _x to Base load ¹	16 August 2021
Note 1: This ELV applies when the load is >70% throughout the reference period. Note 2: This ELV applies when the load varies between MSUL/MSDL and base load during the daily reference period. MSUL and MSDL are defined in table S1.4.						
A2 and A4	Oxides of nitrogen (NO and NO ₂ expressed as NO ₂)	No limit set	105 mg/m ³ 70% to base load ¹	105 mg/m ³ 70% to base load 105 mg/m ³ MSUL/MSDL to base load ²	157.5 mg/m ³ 70% to base load ¹	16 August 2021
	Carbon Monoxide	No limit set	100 mg/m ³ 70% to base load ¹	110 mg/m ³ 70% to base load 110 mg/m ³ MSUL/MSDL to base load ²	200 mg/m ³ 70% to base load ⁽¹⁾	16 August 2021
Note 1: This ELV applies where the load is >70% for the duration of the sampling period. Note 2: This ELV applies where the load varies between MSUL/MSDL and base load during the sampling period. MSUL and MSDL are defined in table S1.4.						
Release point	Parameter	Limit	Monitoring Frequency		Effective until	
A3	Oxides of nitrogen (NO and NO ₂ expressed as NO ₂)	110 mg/m ³	Concentration by calculation, every 4380 operational hours or 2 years, whichever is sooner.		16 August 2021	

	Carbon Monoxide	110 mg/m ³	Concentration by calculation, every 4380 operational hours or 2 years, whichever is sooner.	16 August 2021
	Sulphur Dioxide	38.5 mg/m ³	Concentration by calculation, every 4380 operational hours or 2 years, whichever is sooner.	16 August 2021
	Dust	5.5 mg/m ³	Concentration by calculation, every 4380 operational hours or 2 years, whichever is sooner.	16 August 2021

Effective from 17 August 2021:

The table below outlines the parameters and limits set to implement the BAT-AELs set out in the LCP BREF:

Release point	Parameter	Annual mean,	Monthly mean,	Daily mean,	Maximum validated hourly averages,	Effective from
A1	Oxides of nitrogen (NO and NO ₂ expressed as NO ₂)	40 mg/m ³ Effective Dry Low NOx to Base load ¹	50 mg/m ³ Effective Dry Low NOx to Base load ¹	50 mg/m ³ Effective Dry Low NOx to Base load ¹ 50 mg/m ³ MSUL/MSDL to Base Load ³	76.5 mg/m ³ 70% to Base load ³	17 August 2021
	Carbon Monoxide	30 mg/m ³ Effective Dry Low NOx to Base load ¹	20 mg/m ³ Effective Dry Low NOx to Base load ¹	20 mg/m ³ Effective Dry Low NOx to Base load ¹ 20 mg/m ³ MSUL/MSDL to base load ²	30 mg/m ³ Effective Dry Low NOx to Base load ¹	17 August 2021
A2 and A4	Oxides of nitrogen (NO and NO ₂ expressed as NO ₂)	No limit set	105 mg/m ³ 70% to base load ¹	80 mg/m ³ 70% to base load ¹ 80 mg/m ³ MSUL/MSDL to base load ²	157.5 mg/m ³ 70% to base load ¹	17 August 2021
	Carbon Monoxide	No limit set	100 mg/m ³ 70% to base load ¹ 110 mg/m ³	110 mg/m ³ 70% to base load ¹	200 mg/m ³ 70% to base load ¹	17 August 2021

			MSUL/MSDL to base load ²			
Note 1: This ELV applies where the load is >70% for the duration of the sampling period. Note 2: This ELV applies where the load varies between MSUL/MSDL and base load during the sampling period. MSUL and MSDL are defined in table S1.4. Note 3: This ELV applies between the effective dry low NOx threshold and baseload. Effective dry low NOx thresholds are defined in Table S1.5.						
Release point	Parameter	Limit	Reference Period	Monitoring Frequency	Effective until	
A3	Oxides of nitrogen (NO and NO ₂ expressed as NO ₂)	110 mg/m ³ 70% to base load		Concentration by calculation, every 4380 operational hours or 2 years, whichever is sooner.	17 August 2021	
	Carbon Monoxide	110 mg/m ³ 70% to base load		Concentration by calculation, every 4380 operational hours or 2 years, whichever is sooner.	17 August 2021	
	Sulphur Dioxide	38.5 mg/m ³		Every 4380 hours or 2 years	17 August 2021	
	Dust	5.5 mg/m ³		Every 4380 hours or 2 years	17 August 2021	

Where applicable, tighter limits than those referenced in the LCP BREF document have remained in place to ensure no backsliding of limits. Maximum figures for hourly means have also been kept rather than changing to 95%iles. The main change in emission limits and monitoring following the publication of the LCP BREF is the inclusion of annual limits which were not previously on the permit.

The operator has proposed limits in line with the BAT-AELs set out in the 2017 LCP BAT Conclusions. Consequently, we have accepted the proposed limits and incorporated them into table S3.1 of the permit emission limits. We have also added two annual limits as required by the BREF. One for Oxides of Nitrogen (NO and NO₂ expressed as NO₂) (NO_x) and Carbon Monoxide (CO) emissions, these are shown in the table above.

Following the operator's review of the permit and as a result of changes in future operations, the Operator has requested for the LCP15 LM2500 operating hours will remain at 1500. Table S3.1(b) in Schedule 3(b) operating hours has now been kept at

1,500. From this there will be a tighter daily limit to CO which is 80mg/m³, for all other emissions points the limits set have either remained or tightened to ensure no backsliding occurs.

The reporting period will begin from the next full reporting period. Specifically, monthly reporting period begins the following completion of full month i.e. September 2021. Daily reporting period begins following completion of first full day i.e. 18 August 2021.

Emissions to Air – Article 15(4) Derogations

No derogations.

Directive 2012/27/EU on Energy Efficiency (EED)

Compliance with the BAT conclusions has not resulted in the substantial refurbishment or installation of new combustion plant with an aggregate thermal input of greater than 20MWth, which generates more than 100kWth of waste heat, and all combustion units at the station will be limited to <1500 hours/year operation. Therefore, it is not necessary to demonstrate compliance with Article 14, paragraph 5 of the EED.

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.

For a ≥600MWth CCGT plant, the relevant BAT-AEEL is 50 – 60% for net electrical efficiency. Baglan Operations Limited stated that the net electrical efficiency for Baglan Energy Park is approximately 56%, which is within this range. There are no BAT-AEELs for net total fuel utilisation, or net mechanical energy efficiency for CCGT ≥600MWth.

Other IED BREFs relevant to the permit review

There are no specific listed activities within Table S1.1 of the permit that are within scope of other published BREFs. Emissions from Storage, Energy Efficiency, Industrial Cooling Systems BREFs and Monitoring Emissions to Air and Water from

IED Installations Reference Report on Monitoring are relevant, however, the key aspects associated with the power station are fixed by the existing infrastructure and no applicable changes or upgrades are appropriate for the remaining life of the station, subject to any requirements to amend conditions in the permit under Article 18 of the IED, or other relevant domestic legislation.

The LCP BATC and the emission monitoring requirements set out in Annex V of IED are in line with the Monitoring Emissions to Air and Water from IED Installations Reference Report on Monitoring. These requirements have been transposed into the Permit.

Condition 1.2 of the permit (Energy Efficiency) requires that the operator shall take appropriate measures to ensure that energy is used efficiently in the combustion activity and also to review on a minimum four yearly basis whether there are opportunities to improve the energy efficiency of the activities and take appropriate measures in line with what is identified. Appropriate measures would include those that are included in the Energy Efficiency BREF.

Similarly permit condition 3.2.1 requires that Emissions of substances not controlled by emission limits (excluding odour) shall not cause pollution and permit condition 3.2.3 requires that all liquids in containers, whose emission to water or land could cause pollution, shall be provided with secondary containment, unless the operator has used other appropriate measures to prevent or where that is not practicable, to minimise, leakage and spillage from the primary container. Appropriate measures would include those that are included in the Emissions from Storage BREF.

These conditions are enforceable and we consider that they are sufficient to prevent unauthorised emissions from storage and deliver continuous improvements in energy efficiency at the installation.

Requirements set out in the Industrial Cooling Systems BREF that are relevant to power stations have been addressed through current compliance with existing legislation associated with European eel protection and fish passage, Habitats Directive risk assessments and other designated site protection, water abstraction control and the Water Framework Directive. Noise has also been assessed during previous determinations.

We recognise that the Emissions from Storage, Energy Efficiency and Industrial Cooling Systems BREFs are now over 10 years old and are due for revision. As such, we consider that the site's compliance with the relevant LCP BATCs, coupled with the permit conditions described above are sufficiently protective as an interim measure, pending the publication of the updated BREFs. Our guidance EPR RGN 12 "Statutory Periodic Permit Reviews" (October 2014) explains that "Permit reviews for installations will normally follow production of revised Best Available Techniques (BAT) standards in EU BAT Reference (BREF) documents for each sector". The permit review is triggered by the publication of the main activity BREF for the sector (LCP in this case) and when this happens, we are required to review the permit against all other relevant extant BREFs at the same time. This ensures that all reviews occur at the same time for a particular sector and that sites where multiple BREFs are applicable are not held in a continuous state of review.

IED paragraph (13) states that "The Commission should aim to update BAT Reference documents not later than 8 years after the publication of the previous version". On this basis, the current LCP BREF is due to be updated by 2025, when the next LCP permit review will be triggered. Any relevant secondary BREFs which have been updated in the meantime (e.g. Emissions from Storage, Energy Efficiency and Industrial Cooling Systems) will be considered as part of this next LCP Permit review, unless the installation undergoes a substantial change as set out in IED Article 20, in which case such a review may occur at an earlier time.

The UK left the EU on 31 January 2020 and entered a Transition Period, during which it will continue to apply EU law. The IED, BAT conclusions published prior to EU Exit and BAT conclusions published during the Transition Period apply in the UK. Arrangements are being put in place to determine BAT for the UK after the end of the Transition Period.

6. Conclusion

We consider that the installation already employed what used to be BAT, and that the operator has achieved significant improvements in performance since the permit was originally granted. The revised BREF and its BAT-AELs provide the opportunity to consider further environmental improvements.

We believe this variation provides a sound basis for ongoing regulation of the installation and we are satisfied that the operator is currently achieving or will be achieving all relevant BAT by 17 August 2021.

We believe that we have ensured compliance with all relevant legal requirements in carrying out this review and making our determination on the variation.

Annex 1: Decision checklist regarding relevant BAT Conclusions

BAT Conclusions for the large combustion plants were published as a Commission Implementing Decision ((EU 2017/1442) in the Official Journal of the EU on 17 August 2017. There are 75 BAT Conclusions. This checklist 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.

All BAT Conclusions arising are listed by number in order below;

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
General BAT conclusions		
1.	Environmental Management Systems Improve overall performance Implement and adhere to an EMS that incorporates key features identified	Currently Compliant Baglan Bay operates under the requirements of GE Energy's EMS, which is certified in accordance with ISO 14001:2015 and is subject to annual audits and reviews with improvement opportunities continuously applied. In accordance with requirements (i) to (xvi) of BAT 1, the EMS includes: • The commitment of senior management; • An environmental policy, including a commitment to the continuous • improvement of the environmental performance of Baglan Bay; • A commitment to follow the development of cleaner technologies;

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
		• Objectives and targets (corresponding with financial planning and investment); • An approach to sectoral benchmarking; • An approach to the review of the EMS, including determination of its continuing suitability, adequacy and effectiveness; • An approach to auditing of the EMS; and, • An approach to the future consideration of environmental impacts from the decommissioning and closure of Baglan Bay. • The EMS includes specific site-operational plans / procedures related to: • Uncontrolled / unintended emissions; • 'Emergency Response / Accident Management'; • Waste management; and, • The reduction of emissions to air and / or water during 'Other Than Normal Operating Conditions' (OTNOC) (including start-up and shut-down periods). • Each of these plans / procedures includes: • An approach for implementation, covering: – Organisational structure and responsibilities; – Recruitment, training, awareness and competence; – Communication; – Employee involvement; – Documentation; – Effective process control; – Planned regular maintenance programmes; and, – Safeguarding compliance with environmental legislation. • An approach to checking performance, including: – Monitoring and measurement; – Preventative and corrective action; and,

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
		- Maintenance of records. Under Improvement Condition (IC) 9.2 of the Environmental Permit, now completed, information on the EMS has previously been provided to Natural Resources Wales. In addition, as part of a rolling 36 month condition of the EMS and under IC 9.6 of the Environmental Permit, a report considering potential environmental improvements is provided to Natural Resources Wales.
2.	Efficiency Determine net electrical efficiency and/or net total fuel utilisation and/or net mechanical efficiency Carry out a performance test at full load.	Currently Compliant The latest 9H performance tests were conducted on 16 December 2009 and 9 May 2010, immediately prior to shut-down and after restart from the April 2010 Outage. The performance tests were conducted in accordance with ASME PTC 24-1996 'Performance Test Code on Overall Plant Performance'. During the Outage, the instrumented combustion cans were removed, and an offline water wash was conducted. Attachment BAT 2.1 provides the 9H combined cycle performance test results (dated 9 July 2010).
3.	Monitoring of process parameters Monitor key process parameters for emissions to air and water specified in the corresponding table. Monitoring of specified process parameters.	Currently Compliant <u>For the 9H and LM2500, as required by the Environmental Permit:</u> For stack gas volume flow, continuous monitoring is undertaken in accordance with BS EN 16911-2:2013 ('Stationary Source Emissions – Manual and Automatic Determination of Velocity and Volume Flow Rate in Ducts: Automated Measuring Systems') and TGN M2 ('Monitoring of Stack Emissions to Air').

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
		- For oxygen and water vapour content, continuous (as appropriate to reference) monitoring is undertaken in accordance with BS EN 14181:2014 ('Stationary Source Emissions: Quality Assurance of Automated Measuring Systems'). - For stack gas temperature and stack gas pressure, continuous (as appropriate to reference) monitoring is traceable to national standards. The 9H and LM2500 are equipped with a Continuous Emissions Monitoring System (CEMS). Under the requirements of the Environmental Permit, information on operation of the CEMS is reported every 12 months to Natural Resources Wales (Form IED CEM 1: 'Continuous Measurement System Invalidation Log'). <u>For the Auxiliary Boiler, as required by the Environmental Permit:</u> - For oxygen, periodic (as appropriate to reference) monitoring is undertaken in accordance with BS EN 14789: 2017 ('Stationary Source Emissions. Determination of Volume Concentration of Oxygen. Standard Reference Method: Paramagnetism'). - For water vapour content, periodic (as appropriate to reference) monitoring is undertaken in accordance with BS EN 14790: 2017 ('Stationary Source Emissions. Determination of Water Vapour in Ducts. Standard Reference Method').
4.	Monitoring of emissions to air Monitor emissions to air with at least the frequency in the corresponding table and in accordance with the EN standards.	Currently Compliant <u>For the 9H and LM2500:</u>

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	Monitor emissions to air with at least the frequency in the corresponding table and in accordance with the EN standards.	Monitoring and reporting is undertaken in accordance with Part 3 (Emission Monitoring) of Annex V of the IED and under the requirements of the Environmental Permit. With regards to natural gas-fired turbines (e.g. the 9H and LM25004), BAT is to monitor the following emissions to air: • Nitrogen oxides (NOx) (on a continuous basis and in accordance with EN Standards); and, • Carbon monoxide (CO) (on a continuous basis, and in accordance with EN Standards). For NOx and CO, monitoring is undertaken in accordance with BS EN 14181:2014 ('Stationary Source Emissions: Quality Assurance of Automated Measuring Systems'). Under the requirements of the Environmental Permit, information on the NOx and CO emissions to air is reported every 3 months to Natural Resources Wales (Form IED CON 2: 'Quarterly Return of Monthly Mean, Monthly Maximum Daily Mean and Annual Return of Hourly Concentration Percentiles'). <u>For the Auxiliary Boiler:</u> Monitoring and reporting is undertaken in accordance with the requirements of the Environmental Permit. With regards to natural gas-fired boilers (e.g. the auxiliary boiler) which have a rated thermal input <100 MW and are operated <1500 hours/year, BAT is to monitor the following emissions to air: • NOx (at least once every six months and in accordance with EN Standards); and,

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
		CO (at least once every six months and in accordance with EN Standards). For NO_x and CO, monitoring is undertaken in accordance with an agreed procedure (between Baglan Operations Limited and Natural Resources Wales) and reported as a "concentration by calculation, every 4380 operational hours or 2 years, whichever is sooner". Under the requirements of the Environmental Permit, information on the NO_x and CO emissions to air is reported every 6 months to Natural Resources Wales.
5.	Monitoring of emissions to water from flue-gas treatment Monitor emissions to water with at least the frequency in the corresponding table and in accordance with the EN standards. Monitor emissions to water with at least the frequency in the corresponding table and in accordance with the EN standards.	Not Applicable – No SCR/SNCR is required/ installed.
6.	Environmental performance Improve general environmental performance A variety of techniques a) Fuel blending and mixing	Currently Compliant Not applicable to natural gas-fired turbines or natural gas-fired boilers.
	b) Maintenance of the combustion system.	Baglan Bay is subject to regular and planned maintenance of the combustion system in accordance with the Original Equipment Manufacturer (OEM) recommendations. In particular: - For the 9H, in addition to the April 2010 Outage, in 2016 an inspection of the combustors was performed. - For the LM2500, in 2018 an Outage, including an inspection of the combustors, was performed.

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
		Baglan Operations Limited have advised that the associated inspection reports are available, should Natural Resources Wales wish to review.
	c) Advanced control system.	Baglan Bay implements computer-based advanced control systems to automatically control and optimise combustion efficiency and support the prevention and reduction of emissions. In particular: • The 9H and LM2500 are controlled by an MKVI integrated control system. The system includes associated high-performance monitoring. • The auxiliary boiler is controlled by a PLC control system.
	d) Good design of the combustion system.	Baglan Bay represents a well-designed combustion system.
	e) Fuel choice.	Originally, both natural gas and by-products from the Baglan Bay Chemical Works (from the isopropanol process, including a mixture of gaseous propane and propene and liquid di-isopropyl ether) were used as fuel in LCP 15. In 2004, upon closure of the Baglan Bay Chemical Works, a variation to the Environmental Permit (Variation BX8823IF, determined 3 August 2004) allowed for (amongst other variations) <i>"changes in fuels available for use on the turbines"</i>. As such, currently natural gas only is used as fuel in LCP 15 (the 9H, the LM2500 and the auxiliary boiler), both when the LCP is run as normal and is started-up and shut-down. Natural gas is an inherently clean fuel, and does not produce the emissions of particulate matter (PM10) and sulphur dioxide (SO2) normally associated with the combustion of other fossil fuels. As a result, emissions of PM10 and SO2 will be negligible.

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
7.	Reduce emissions of ammonia to air Reduction of ammonia emissions where SCR or SNCR is used. BAT is to optimise the design and/or operation and to meet associated AELs.	Not Applicable
8.	Prevent or reduce emissions to air Prevent or reduce emissions to air during normal operating conditions. Ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.	Not Applicable
9.	Environmental performance and reduce emissions to air Inclusion of a number of elements in the quality assurance/quality control programmes for all the fuels used, as part of the EMS. Techniques (i), (ii) and (iii).	The 9H has a dry low NOx combustion system DLN2.5. This is integrated into the plant MKVI control system which continually adjusts the gas / fuel ratio to ensure optimum combustion dynamics. Periodic DLN tuning is performed by specialist combustion engineers to ensure combustion health and emissions remain within specification. The LM2500 has a Nox control water injection system. This is integrated into the plant MKVI control system which continually adjusts the gas / fuel air ratio to ensure optimum combustion conditions.
10.	Reduce emissions to air and/or water Prevent or reduce emissions to air during other than normal operating conditions (OTNOC). A variety of techniques.	Currently Compliant Baglan Bay implements computer-based advanced control systems to automatically control and optimise combustion efficiency, and support the prevention and reduction of emissions. In particular:

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	– Appropriate design of the systems relevant in causing OTNOC that may have an impact on emissions to air, water and / or land.	• The 9H and LM2500 are controlled by an MKVI integrated control system. The system includes associated high-performance monitoring. • The auxiliary boiler is controlled by a PLC control system.
	– A specific preventative maintenance plan.	Baglan Bay operates under the requirements of GE Energy's EMS, which is certified in accordance with ISO 14001:2015. As part of the EMS, a specific site-operational plan / procedure is included related to the reduction of emissions to air and / or water during OTNOC (including start-up and shut-down periods).
	– Review and recording of emissions caused by OTNOC (and associated circumstances) and, if necessary, implementation of corrective actions.	The plan / procedure related to the reduction of emissions to air and / or water during OTNOC (including start-up and shut-down periods) also includes an approach to checking performance, including:
	– Periodic assessment of the overall emissions during OTNOC and, if necessary, implementation of corrective actions.	• Monitoring and measurement; • Preventative and corrective action; and, • Maintenance of records.
11.	Monitoring of emissions to air and/or to water Monitoring of emissions to air and/or to water during OTNOC. Appropriately monitor emissions to air and/or to water during OTNOC.	Currently Compliant Monitoring is undertaken in accordance with Part 3 (Emission Monitoring) of Annex V of the IED and under the requirements of the Environmental Permit. As appropriate, monitoring is undertaken in accordance with BS EN 14181:2014 ('Stationary Source Emissions: Quality Assurance of Automated Measuring Systems')

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
		or in accordance with an agreed procedure (between Baglan Operations Limited and Natural Resources Wales). The 9H and LM2500 are equipped with a CEMS. Under the requirements of the Environmental Permit, information on operation of the CEMS is reported every 12 months to the Environment Agency (Form IED CEM 1: 'Continuous Measurement System Invalidation Log').
12.	Energy efficiency Increase the energy efficiency for units operated ≥ 1500 h/yr A variety of techniques	<i>BAT No. 12 is not applicable to the LM2500 or auxiliary boiler as these are operated <1,500 hours/year. Accordingly, the following information is provided mainly for the 9H, with additional information for the LM2500 and auxiliary boiler only when operated in combination with the 9H.</i> Currently Compliant
	a) Combustion optimisation.	The 9H incorporates measures to ensure combustion optimisation. These measures include: a well-designed combustion system; optimisation of the temperature and residence time in the combustion zone; and, the use of an advanced control system. In particular, the 9H is controlled by an MKVI integrated control system which includes associated high-performance monitoring.
	b) Optimisation of the working medium conditions.	The 9H includes a computer-based advanced control system to automatically control and optimise the working medium (natural gas and steam) conditions.
	c) Optimisation of the steam cycle.	During the design, installation and modifications to the 9H, the steam cycle was optimised.

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	d) Minimisation of energy consumption.	Baglan Bay incorporates measures to minimise internal energy consumption, and many aspects of the site's operation have been targeted to ensure the minimisation of energy consumption.
	e) Preheating of combustion air.	Not applicable. Under normal operating conditions, the pre-heating of combustion air lowers the energy efficiency of gas turbines.
	f) Fuel Preheating	Prior to combustion, the 9H incorporates a fuel preheating system using HRSG economiser water. This system is a design requirement to allow for 'Premix' mode of operation to meet the emission requirements.
	g) Advanced control system.	The 9H includes a computer-based advanced control system to automatically control and optimise combustion efficiency, and support the prevention and reduction of emissions. In particular, the 9H is controlled by an MKVI integrated control system which includes associated high-performance monitoring.
	h) Feed-water preheating using recovered heat.	To increase feed-water temperature, the 9H includes a low temperature economiser (preheater) for the high pressure (HP) / intermediate pressure (IP) and low pressure (LP) sections of the HRSG.
	i) Heat recovery by cogeneration.	Baglan Bay (the 9H, the LM2500 and the auxiliary boiler) was originally designed and installed as a CCGT-CHP installation, with the 9H generating electrical power for export to the National Grid, the LM2500 generating heat and power for export to the adjacent Baglan Bay Chemical Works (BP Chemicals Isopropanol Projection Plant) and the auxiliary boiler generating power to start the gas turbines in addition to providing back-up to the LM2500 to ensure continuity of heat and power to the adjacent Baglan Bay Chemical Works. In 2004, upon closure of the Baglan Bay

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
		Chemical Works, the system was modified to allow the LM2500 to operate both in combined cycle mode and in open cycle mode. In combined cycle mode, steam generated by the LM2500 is connected to the 9H steam cycle to supplement the steam supply to the 9H steam turbine. With regards to future CHP opportunities, under Condition 1.2.2 of the Environmental Permit, the Operator is required to review the viability of CHP implementation every 4 years, or in response to any of the following factors: • New plans / significant developments within 15 km of the installation; • Changes to the Local Plan; • Changes to the DECC UK CHP Development Map (or similar); and, • New financial or fiscal incentives for CHP. The results of the review of the viability of CHP is reported to Natural Resources Wales within 2 months of each review, including where there are no changes to the previous review. Based on the results of the previous review, Baglan Operations Limited have advised that no current viable CHP consumer has been identified in the local vicinity.
	j) CHP-Readiness.	Although only noted to be applicable to new plants / units where there is a realistic potential for the future use of heat in the vicinity of the unit, Baglan Bay was originally design and installed as a CHP installation and, under Condition 1.2.2 of the Environmental Permit, reviews the viability of CHP implementation at least every 4 years. The results of the review of the viability of CHP is reported to Natural Resources Wales within 2 months of each review, including where there are no changes to the previous review.

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
		Based on the results of the previous review, Baglan Operations Limited have advised that no current viable CHP consumer has been identified in the local vicinity.
	k) Flue-gas condenser.	Not applicable (noted to be applicable to CHP plants / units).
	l) Heat accumulation.	Not applicable (noted to be applicable to CHP plants / units).
	m) Wet Stack	Not applicable (noted to be applicable to plants / units fitted with flue gas desulphurisation (FGD)).
	n) Cooling tower discharge.	Not applicable (noted to be applicable to plants / units fitted with FGD).
	o) Fuel pre-drying.	Not applicable (noted to be applicable to combustion of biomass and / or peat).
	p) Minimisation of heat losses.	Not applicable (noted to be applicable to combustion of solid fuels, and gasification / integrated gasification combined cycle plants / units).
	q) Advanced materials.	Not applicable (noted to be applicable to new plants / units).
	r) Steam turbine upgrades.	Not applicable. No steam turbine upgrade have been installed to date.
	s) Supercritical and ultra-supercritical steam conditions.	Not applicable (noted to be applicable to new plants / units with a thermal input ≥ 600 MW).

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
13.	Reduce water usage and the volume of contaminated waste water discharged Reduce water usage and the volume of contaminated waste water discharged Use of one or both of the techniques specified in the associated table.	Blowdown of cooling water and boiler water is only performed as necessary based on lab analysis. Suez water are contracted to provide sampling and monitoring services on both the cooling water and boilers at Baglan
14.	Prevent contaminated of uncontaminated waste water and to reduce emissions to water Prevent contaminated of uncontaminated waste water and to reduce emissions to water Segregate waste water streams and to treat them separately, depending on the pollutant content.	Baglan Bay incorporates a site drainage system which segregates waste water streams appropriately to prevent the mixing of uncontaminated surface waters with process waters. These systems include: • Surface water system (Emission Point W2); and, • Process and cooling water system (Emission Point W1): comprising treated site effluent and cooling water which is discharged to the River Neath. Separately, treated sanitary effluent (from the turbine building and administration / services building) is discharged (Emission Point W3) to Dŵr Cymru / Welsh Water. In addition, Baglan Bay operates under the requirements of GE Energy's EMS, which is certified in accordance with ISO 14001:2015. As part of the EMS, specific site-operational plans / procedures are included to related to: uncontrolled / unintended emissions; 'Emergency Response / Accident Management'; and, the reduction of emissions to air and / or water during OTNOC (including start-up and shut-down periods).
15.	Reduce emissions to water Reduce emissions to water from flue-gas treatment	Not Applicable

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	A variety of techniques	
16.	Reduce waste sent for disposal	Baglan Bay operates under the requirements of GE Energy's EMS, which is certified in accordance with ISO 14001:2015. As part of the EMS, a specific site operational plan / procedure is included related to waste management. Under the certification, the plan / procedure is subject to audits and reviews with improvement opportunities continuously applied. Under IC 9.5 of the Environmental Permit, now completed, information on the plan / procedure has previously been provided to Natural Resources Wales. In addition, under Condition 1.4.1 of the Environmental Permit, Baglan Bay is required to be operated in accordance with the waste hierarchy referred to in Article 4 of the Waste Framework Directive ⁵ .
	To reduce the quantity of waste sent for disposal	
	A variety of techniques	
	a) Waste prevention.	
	b) Waste preparation for re-use.	
	c) Waste recycling.	
	d) Other waste recovery (e.g. energy recovery).	
	And use an appropriate combination of:	
	a) Generation of gypsum as a by-product.	Not applicable.
	b) Recycling or recovery of residues in the construction sector.	Not applicable.
	c) Energy recovery by using waste in the fuel mix.	Not applicable.
	d) Preparation of spent catalyst for re-use.	Not applicable.

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
17.	Reduce noise emissions To reduce noise emissions A variety of techniques	
	a) Operational measures.	Baglan Bay operates under the requirements of GE Energy's EMS, which is certified in accordance with ISO 14001:2015. The EMS includes specific site-operational plans / procedures, with each of these plans / procedures including an approach for implementation covering safeguarding compliance with environmental legislation. In addition: - Under IC 9.3 of the Environmental Permit, now completed, a review of the Section 36 Noise Management Plan (NMP) was undertaken to ensure the NMP identified the significant noise sources (both in amplitude and frequency), appropriate noise control / noise minimisation measures and potential improvements. Based on the review, an updated NMP was provided to Natural Resources Wales. - Under IC 9.9 of the Environmental Permit, now completed, a review of the previous noise monitoring work was undertaken. Based on the review and the operation of Baglan Bay, proposals for a risk-based noise monitoring plan / procedure were provided to Natural Resources Wales. Based on these reviews, Baglan Operations Limited have advised that no changes have been required since original construction.
	b) Low-noise equipment.	During the design and consenting (via Section 36 of the Electricity Act 1989) of Baglan Bay, noise emissions were considered and a noise impact assessment was
	c) Noise attenuation.	

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	d) Noise-control equipment.	undertaken. The noise impact assessment considered the proposed location of equipment and buildings with regards to nearby Noise Sensitive Receptors. Subsequently, an appropriate combination of low-noise equipment, noise attenuation and noise-control equipment was implemented.
	e) Appropriate location of equipment and buildings.	
Combustion of solid fuels (coal and/or lignite)		
18.	Environmental performance Improve overall performance Techniques in associated table.	N/A
19.	Efficiency Increase efficiency Techniques in associated table.	N/A
20.	Prevent or reduce emissions of NOx Prevent or reduce emissions of NOx emissions to air while limiting CO and N2O emissions to air from the combustion of coal and/or lignite. A variety of techniques and associated AELs	N/A
21.	Prevent or reduce emissions of SOx, HCl and HF Prevent or reduce emissions of SOx, HCl and HF emissions to air from the combustion of coal and/or lignite. A variety of techniques and associated AELs	N/A
22.	Reduce dust and particulate-bound metal emissions Reduce emissions of dust and particulate-bound metal emissions to air from the combustion of coal and/or lignite. A variety of techniques and associated AELs	N/A

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
23.	Prevent or reduce emissions of mercury Prevent or reduce emissions of mercury emissions to air from the combustion of coal and/or lignite. A variety of techniques and associated AELs	N/A
Combustion of solid fuels (solid biomass and/or peat)		
24.	Prevent or reduce emissions of NOx Prevent or reduce emissions of NOx emissions to air while limiting CO and N2O emissions to air from the combustion of solid biomass and/or peat. A variety of techniques and associated AELs	N/A
25.	Prevent or reduce emissions of SOx, HCl and HF Prevent or reduce emissions of SOx, HCl and HF emissions to air from the combustion of solid biomass and/or peat. A variety of techniques and associated AELs	N/A
26.	Reduce dust and particulate-bound metal emissions Reduce emissions of dust and particulate-bound metal emissions to air from the combustion of solid biomass and/or peat. A variety of techniques and associated AELs	N/A
27.	Prevent or reduce emissions of mercury Prevent or reduce emissions of mercury emissions to air from the combustion of solid biomass and/or peat. A variety of techniques and associated AELs	N/A
Combustion of liquid fuels (HFO and/or gas-oil-fired boilers)		
28.	Prevent or reduce emissions of NOx	N/A

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	Prevent or reduce emissions of NO _x emissions to air while limiting CO and N ₂ O emissions to air from the combustion of HFO and/or gas oil in boilers. A variety of techniques and associated AELs.	
29.	Prevent or reduce emissions of SO_x, HCl and HF Prevent or reduce emissions of SO _x , HCl and HF emissions to air from the combustion of HFO and/or gas oil in boilers. A variety of techniques and associated AELs.	N/A
30.	Reduce dust and particulate-bound metal emissions Reduce emissions of dust and particulate-bound metal emissions to air from the combustion of HFO and/or gas oil in boilers. A variety of techniques and associated AELs.	N/A
Combustion of liquid fuels (HFO and/or gas-oil-fired engines)		
31.	Energy efficiency BAT-associated energy efficiency levels (BAT-AEELs) Specified techniques and associated AEELs.	N/A
32.	Prevent or reduce emissions of NO_x Prevent or reduce emissions of NO _x emissions to air from the combustion of HFO and/or gas oil in reciprocating engines. A variety of techniques and associated AELs	N/A
33.	Prevent or reduce emissions of CO Prevent or reduce emissions of CO and volatile organic compounds from the combustion of HFO and/or gas oil in reciprocating engines. A variety of techniques and associated AELs	N/A

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
34.	Prevent or reduce emissions of SO_x, HCl and HF Prevent or reduce emissions of SO _x , HCl and HF emissions to air from the combustion of HFO and/or gas oil in reciprocating engines. A variety of techniques and associated AELs	N/A
35.	Reduce dust and particulate-bound metal emissions Reduce emissions of dust and particulate-bound metal emissions to air from the combustion of HFO and/or gas oil in reciprocating engines. A variety of techniques and associated AELs	N/A
Combustion of liquid fuels (gas oil fired gas turbines)		
36.	Energy efficiency BAT-associated energy efficiency levels (BAT-AEELs) Specified techniques and associated AEELs.	N/A
37.	Prevent or reduce emissions of NO_x Prevent or reduce emissions of NO _x emissions to air from the combustion of gas oil in gas turbines. A variety of techniques	N/A
38.	Prevent or reduce emissions of CO Prevent or reduce emissions of CO from the combustion of gas oil in gas turbines. A variety of techniques and associated AELs	N/A
39.	Prevent or reduce emissions of SO_x and dust Prevent or reduce emissions of SO _x and dust emissions to air from the combustion of gas oil in gas turbines. A variety of techniques and associated AELs	N/A

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
Combustion of gaseous fuels (natural gas)		
40.	Energy efficiency BAT-associated energy efficiency levels (BAT-AEELs) Specified techniques and associated AEELs	
	BAT No. 40 is not applicable to the LM2500 ('not applicable to existing gas turbines and engines operated <1,500 hours/year') or the auxiliary boiler ('not applicable to boilers'). Accordingly, the following information is provided mainly for the 9H, with additional information for the LM2500 and auxiliary boiler only when operated in combination with the 9H.	
	a) Combined cycle.	Baglan Bay is a CCGT generating station, with two gas turbines (the 9H and the LM2500), each with an associated HRSG, and one common steam turbine. There is also one gas-fired auxiliary boiler, together with other ancillary plant and equipment. Baglan Bay (the 9H, the LM2500 and the auxiliary boiler) was originally designed and installed as a CCGT CHP installation with the 9H generating electrical power for export to the National Grid, the LM2500 generating heat and power for export to the adjacent Baglan Bay Chemical Works and the auxiliary boiler generating power to start the gas turbines in addition to providing back-up to the LM2500 to ensure continuity of heat and power to the adjacent Baglan Bay Chemical Works. In 2004, upon closure of the Baglan Bay Chemical Works, the system was modified to allow the LM2500 to operate in both combined cycle and in open cycle mode. In combined cycle mode, steam generated by the LM2500 is connected to the 9H steam cycle to supplement the steam supply to the 9H steam turbine.

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	The BAT Associated Energy Efficiency Levels (BAT-AEEL) are not applicable to the LM2500 or the auxiliary boiler (<i>'BAT-AEELs for not apply to units operated <1,500 hours/year'</i>). Accordingly, the following information is provided mainly for the 9H, with additional information for the LM2500 and auxiliary boiler only when operated combination with the 9H. From Table 23, the BAT-AEEL (net electrical efficiency) for an existing CCGT unit with a thermal input ≥ 600 MW: 50 to 60 per cent.	Baglan Bay predominately operates with the 9H, it's associated HRSG and the steam turbine in a 1 + 1 configuration. Infrequently, Baglan Bay also operates with the LM2500 in combined cycle mode, supplementing the steam supply to the 9H steam turbine, in a 2 + 1 configuration. Infrequent operation is also undertaken with the LM2500 in open cycle mode, where the LM2500 operates with gas bypass (with no associated HRSG / steam turbine). The latest 9H performance tests were conducted on 16 December 2009 and 9 May 2010, immediately prior to shut-down and after restart from the April 2010 Outage. The performance tests were conducted in accordance with ASME PTC 24-1996 'Performance Test Code on Overall Plant Performance'. Attachment BAT 2.1 provides the 9H combined cycle performance test results (dated 9 July 2010). The results of the thermal performance test indicated that, after restart, the net electrical efficiency of Baglan Bay was approximately 56.12 per cent. This is within the BAT-AEEL range.
41.	Prevent or reduce emissions of NOx Prevent or reduce emissions of NOx emissions to air from the combustion of natural gas in boilers A variety of techniques	

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	(a) Air and / or fuel staging.	Not applicable.
	(b) Flue-gas recirculation.	The auxiliary boiler incorporates flue-gas recirculation.
	(c) Low-NO _x burners (LNBs).	The auxiliary boiler is equipped with LNBs. The LNBs were installed to ensure compliance with the original Environmental Permit (determined 31 December 2001). The LNB technology becomes effective above when the auxiliary boiler thermal input is >18 MW, which corresponds to approximately 20% load.
	(d) Advanced control system.	Baglan Bay implements computer-based control systems to automatically control and optimise combustion efficiency, and support the prevention and reduction of emissions. In particular, the auxiliary boiler is controlled by a PLC control system.
	(e) Reduction of the combustion air temperature.	Not applicable
	(f) Selective Non-Catalytic Reduction.	Not applicable.

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	(g) Selective Catalytic Reduction.	To meet both the ELVs of the IED and the BAT-Associated Emission Levels (BAT-AELs), a combination of primary techniques (based on (b) flue-gas recirculation, (c) LNBs and (d) advanced control system) are used. As such, no additional secondary techniques (such as (f) Selective Non-Catalytic Reduction or (g) Selective Catalytic Reduction) are required.
	From Table 25, BAT-AEL for NO _x emissions to air for an existing boiler plant: Daily Average / Average over the Sampling Period: 85 – 110 mg/Nm³.	As required by Table S3.1(c) of the Environmental Permit ('Point source emissions to air from existing or new boilers ≥50 <100 MWth'), NO _x emissions to air from the auxiliary boiler are limited to 110 mg/m ³ . This is within the 'Daily Average / Average over the Sampling Period' BAT-AEL range. For NO _x emissions to air, monitoring is undertaken in accordance with an agreed procedure (between Baglan Operations Limited and Natural Resources Wales) and reported as a " <i>concentration by calculation, every 4380 operational hours or 2 years, whichever is sooner</i> ". Baglan Operations Limited have advised that the information on the auxiliary boiler NO _x emissions to air were part of the original submissions, and that this information is due to be confirmed by independent Monitoring Certification Scheme (MCERTS) reference measurements currently planned for January 2019 and agreed with Natural Resources Wales.
42.	Prevent or reduce emissions of NO_x Prevent or reduce emissions of NO _x emissions to air from the combustion of natural gas in gas turbines A variety of techniques. Please also define effective dry low NO _x load where applicable.	

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	(a) Advanced control system.	Baglan Bay implements computer-based advanced control systems to automatically control and optimise combustion efficiency, and support the prevention and reduction of emissions. In particular, the 9H and LM2500 are controlled by an MKVI integrated control system. This system includes associated high-performance monitoring.
	(b) Water / steam addition.	The LM2500 is equipped with a water injection NOx abatement system. These gas turbine loads correspond approximately to the Minimum Start-Up Load (MSUL) and Minimum Shut-Down Load (MSDL) thresholds reported in Table S1.4 of the Environmental Permit.
	(c) Dry low-NOx burners.	The 9H is equipped with dry low-NOx (DLN) burner technology. The following Table defines the approximate electrical loads at which the DLN technology becomes effective. The original DLN burners have not been changed since installation. These gas turbine loads correspond approximately to the MSUL and MSDL thresholds reported in Table S1.4 of the Environmental Permit.
	(d) Low-load design concept.	Baglan Bay implements computer-based advanced control systems to automatically control and optimise combustion efficiency, and support the prevention and reduction of emissions. In particular, the 9H and LM2500 are controlled by an MKVI integrated control system. This system includes associated high-performance monitoring which allows for the adaption of process control and related equipment to maintain good combustion efficiency when the demand in energy varies.
	(e) LNBs.	Not applicable.
	(f) Selective Catalytic Reduction.	Not applicable.

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
		In particular for the 9H, to meet both the ELVs of the IED and the BAT-AELs, a combination of primary techniques (based on (a) advanced control system, (c) DLN burners and (d) low-load design concept) are used. As such, no additional secondary techniques (such as (f) Selective Catalytic Reduction) are required.
	From Table 24, BAT-AEL for NO _x emissions to air for an existing CCGT unit with a thermal input ≥600 MW and with a net total fuel utilisation of <75 per cent: - Yearly Average: 10 – 40 mg/Nm³; and, - Daily Average: 18 – 50 mg/Nm³.	As noted previously, the gas turbines load at which the DLN technology becomes effective corresponds approximately to the MSUL and MSDL thresholds reported in Table S1.4 of the Environmental Permit. The original DLN burners have not been changed since installation. This information demonstrates that the 9H complies with both the yearly and daily BAT-AELs for NO _x emissions to air. Under the requirements of the Environmental Permit, information on the NO _x emissions to air is reported every 3 months to Natural Resources Wales (Form IED CON 2: 'Quarterly Return of Monthly Mean, Monthly Maximum Daily Mean and Annual Return of Hourly Concentration Percentiles').
	For the LM2500 in combined cycle mode, from Table 24, the BAT-AELs for NO _x emissions to air for: An existing CCGT unit, with a thermal input ≥50 to <600 MW and with a net total fuel utilisation of <75 per cent, Daily Average: 35 – 55 mg/Nm³.	The NO _x emissions to air are reported above the MSUL and MSDL thresholds, when the water injection NO _x abatement system is effective. In terms of compliance with the BAT-AELs, Footnote (5) to Table 24 notes that: <i>“these [yearly and daily] BAT-AELs do not apply to existing turbines for mechanical drive applications or to plants operated <500 hours/year”</i> . As noted previously, with regards to the actual LM2500 operating hours, Table 2.2 demonstrates that the activities are currently operated <500 hours per year (cumulative of both the combined cycle and open cycle mode). Therefore, it is considered that both the yearly and daily BAT-AELs are not applicable to the LM2500 in combined cycle mode.

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	For the LM2500 in open cycle mode, from Table 24, the BAT-AELs for NOx emissions to air for: An existing OCGT unit (per Footnote (7) to Table 24) “<i>put into operation no later than 27 November 2003 and are operated between 500 and 1,500 hours per year</i>” with a thermal input ≥ 50 MW, Daily Average: 25 – 80 mg/Nm³.	The NOx emissions to air are reported above the MSUL and MSDL thresholds, when the water injection NOx abatement system is effective. In terms of compliance with the BAT-AELs, Footnote (5) to Table 24 notes that: “<i>these [yearly and daily] BAT-AELs do not apply to existing turbines for mechanical drive applications or to plants operated <500 hours/year</i>”. As noted previously, with regards to the actual LM2500 operating hours, Table 2.2 demonstrates that the activities are currently operated <500 hours per year (cumulative of both the combined cycle and open cycle mode). Therefore, (whilst the above information demonstrates that the LM2500 in open cycle mode compiles with the daily BAT-AELs for NOx emissions to air) it is considered that both the yearly and daily BAT-AELs are not applicable to the LM2500 in open cycle mode. Nevertheless, as required by Table S3.1(b) of the Environmental Permit (‘Point source emission to air from Gas Turbines operating ≤ 1500 hours LHD’), NOx emissions to air from the LM2500 are limited to 110 mg/m³. The information above demonstrate that the LM2500 (in both combined cycle mode and in open cycle mode) complies with the requirements of the Environmental Permit. Under the requirements of the Environmental Permit, information on the NOx emissions to air is reported every 3 months to Natural Resources Wales (Form IED CON 2: ‘Quarterly Return of Monthly Mean, Monthly Maximum Daily Mean and Annual Return of Hourly Concentration Percentiles’).
43.	Prevent or reduce emissions of NOx	N/A

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	Prevent or reduce emissions of NOx emissions to air from the combustion of natural gas in engines. A variety of techniques	
44.	Prevent or reduce emissions of CO Prevent or reduce emissions of CO emissions to air from the combustion of natural gas A variety of techniques and associated AELs	
		Baglan Bay incorporates measures to ensure combustion optimisation. These measures include: a well-designed combustion system; optimisation of the temperature and residence time in the combustion zone; and, the use of an advanced control system. In particular: • The 9H and LM2500 are controlled by an MKVI integrated control system. • The system includes associated high-performance monitoring. • The auxiliary boiler is controlled by a PLC control system.
		The Operator has stated that the CO from 9H in 206 was 0.4 and 0.8 in 2017. As noted previously, the gas turbines load at which the DLN technology becomes effective corresponds approximately to the MSUL and MSDL thresholds reported in Table S1.4 of the Environmental Permit. The original DLN burners have not been changed since installation. This information demonstrates that the 9H complies with the indicative yearly BATAELs for CO emissions to air. Under the requirements of the Environmental Permit, information on the CO emissions to air is reported every 3 months to the Environment Agency (Form IED CON 2: 'Quarterly Return of Monthly Mean, Monthly Maximum Daily Mean and Annual Return of Hourly Concentration Percentiles').
45.	Prevent or reduce emissions of non-methane volatile organic compounds (NMVOC) and methane emissions	N/A

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
	Prevent or reduce emissions of non-methane volatile organic compounds (NMVOC) and methane emissions to air from the combustion of natural gas in spark-ignited lean-burn gas engines A variety of techniques and associated AELs	
46.		N/A
47.		N/A
48.		N/A
49.		N/A
50.		N/A
51.		N/A
Combustion of gaseous and/or liquid fuels on offshore platforms		
52.		N/A

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
53.		N/A
54.		N/A
Combustion of process fuels from the chemical industry		
55.		N/A
56.		N/A
57.		N/A
58.		N/A
59.		N/A
Co-incineration of waste		
60.		N/A

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
61.		N/A
62.		N/A
63.		N/A
64.		N/A
65.		N/A
66.		N/A
67.		N/A
68.		N/A
69.		N/A
70.		N/A

No	Summary of BAT Conclusion requirement	Status One of the following: Not Applicable, Currently Compliant, Compliant in the future (within 4 years of publication of BAT conclusions), Not Compliant
71.		N/A
Gasification		
72.		N/A
73.		N/A
74.		N/A
75.		N/A

