Natural Resources Wales permitting decisions

Variation and Consolidation of a bespoke Permit

We have decided to issue a Natural Resource Wales initiated variation for Severn Power Station at West Nash Road, Newport, Gwent, NP18 2BZ operated by Siemens Energy Limited.

The variation number is EPR/HP3737UE/V007

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 Severn Power Station against the published BAT conclusions for Large Combustion Plant.
- Annex 1 – Decision Checklist regarding relevant BAT Conclusions for Large Combustion Plant.

Assessment of Severn Power Station against the published BAT conclusions for large combustion plant.

1. Our decision

We have issued a variation, which will allow Siemens Energy 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 9 April 2010, 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 Regulations (England and Wales) 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, Siemens Energy 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. Siemens Energy Limited have a copy of a consequent baseline report.

- Where their permitted activity involves the release of priority hazardous substances, as defined by the Water Framework Directive, Siemens Energy 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, Siemens Energy 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. No derogation requests were made by Siemens Energy Limited.

The Regulation 61(1) Notice response from the operator was received on the 8 November 2018 and additional information provided on the 30 August 2019.

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 part.

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. This annex 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 Siemens Energy Limited. Following assessment of the Regulation 61(1) response, further information was requested from Siemens Energy Limited (request sent 5 June 2019). 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.

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. 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. Siemens Energy Limited stated that the net electrical efficiency for Severn

Power Station is 54%, which is within this range. There are no BAT-AEELs for net total fuel utilisation, or net mechanical energy efficiency for CCGT ≥600MWth.

5. Changes we have made

Improvement Conditions

Based on the information provided in the Regulation 61(1) response, we consider that we need to set an improvement condition. This condition is set out below. We are using this condition to require the operator to provide Natural Resources Wales with details that need to be established or confirmed during operations.

Reference	Requirement	Date
IC11	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 • 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.	01/01/2021

IC11 – 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, IC11 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.

Following the operator's review of the draft permit, IC7 has been given the revised completion date 30 September 2020, as agreed in Compliance Assessment Report (CAR) NRW0036372. IC8 has been marked as complete as we are satisfied energy efficiency has been assess as part of the BREF review process.

Operational Changes

No operational changes on site.

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. Apart from the 2014 permit variation to relocate the River Usk outfall point, Siemens Energy Limited have confirmed that there has been no change to the effluent quantity or composition. Emission Points W2 and W3 are not considered to include discharges of priority hazardous substances.

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

The LCP on site consists of 1 x 721MWth (LCP324) and 1 x 717MWth (LCP325) combined cycle gas turbines (CCGTs). The ELVs and BAT-AELs are based on an operating regime burning natural gas with unlimited operating hours.

The tables below outline the existing and new limits that have been incorporated into the permit for LCP324 and LCP325 and the reference periods at which they apply. 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 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.

Effective until 16 August 2021:

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

Release point	Parameter	Monthly mean	Daily mean	Maximum hourly means in a year	95th%ile of hourly means in a year	Effective till
A1 and A2	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	50 mg/m^3 70% to base load[1]	50 mg/m^3 70% to base load[1] and MSUL/MSDL to base load[2]	100 mg/m^3 70% to base load[1]		16/08/2021
	Carbon Monoxide	100 mg/m^3 70% to base load[1]	110 mg/m^3 70% to base load[1] and MSUL/MSDL to base load[2]		200 mg/m^3 70% to base load[1]	16/08/2021

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.

Effective from 17 August 2021:

There were changes to the ELV's for emissions to air taking into account BAT conclusions from the Large Combustion Plant BREF.

Release point	Parameter	Annual mean	Monthly mean	Daily mean	Maximum hourly means in a year	95th%ile of hourly means in a year	Effective from
A1 and A2	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] and MSUL/MSDL to base load[2]	100 mg/m^3 Effective Dry Low NOx to Base load[1]		17/08/2021
	Carbon Monoxide	30 mg/m^3 Effective Dry Low NOx to Base load[1]	100 mg/m^3 Effective Dry Low NOx to Base load[1]	110 mg/m^3 Effective Dry Low NOx to Base load[1] and MSUL/MSDL to base load[2]		200 mg/m^3 Effective Dry Low NOx to Base load[1]	17/08/2021

Note 1: This ELV applies between the effective dry low NOx threshold and baseload. Effective dry low NOx thresholds are defined in Table S1.5.
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.

The principle of no backsliding was applied to emission limits, 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 associated emission levels (AEL) ranges were specified in the BAT Conclusions, the upper value was applied, unless use of the tighter limit was justified or already used in the permit.

Annual limits for oxides of nitrogen (NO and NO_2) (NOx) and carbon monoxide (CO) have been added from 17 August 2021 as required by the LCP BREF. As the annual BAT-AELs for CO are indicative in the BAT conclusions, these were applied unless adequate justification was demonstrated that an alternative limit was more appropriate. The existing IED Annex V limits for carbon monoxide (CO) were retained in the permit.

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

Sixteen additional air emission points (A3 – A18) have also been added. A3 – A18 are existing emission points (e.g. emergency diesel generators) but have now been incorporated into table S3.1 of the permit. No limits or monitoring requirements have been set for these emission points.

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.

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 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 for Large Combustion Plant

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. 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;

BAT Conclusion Number	**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** Full details of EMS provided. ISO14001:2015 in place, but at a corporate level and as part of a "Business Management System (BMS)" also incorporating ISO9001, 18001. Siemens are currently progressing towards the ISO45001 and 55001 standards. IC2 (operating and emergency response) in original permit completed and Accident Management Plan provided.

BAT Conclusion Number	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
		Siemens are considered compliant, although further demonstration was requested of the applicability of the EMS to the Newport site, given that it is a group EMS. The Operator provided further information in August 2019, in response to BAT 1 ix – xvi detailing elements of the EMS. A summary of these are below. ix. Sector benchmarking As member of trade associations (e.g. Energy UK) and wider Calon and Siemens group, the Operator considers that benchmarking is carried out. This is considered compliant. x. Quality assurance for fuels The station is gas fired only, hence QA is limited to gas quality via chromatograph and agreements with the gas supplier. This is considered compliant. xi. Management plan for emissions to air/water for OTNOC (Also refer to BAT 10 and BAT 11 responses). Information provided detailing emissions controls via CEMS (for air) and the management of water emissions via sampling prior to discharge. Monitoring stated to be in place during all modes of operation, including OTNOC. Set points and alarms are in place to prevent exceedances of emissions. This is considered compliant. xii. Waste management plan Waste management procedure referenced. The ongoing arrangements in terms of the waste hierarchy, segregation and storage can be reviewed during compliance intervention. Considered compliant.

BAT Conclusion Number	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
		xiii. method to identify and deal with potential uncontrolled and/or unplanned emissions Environmental Aspect and impact register maintained for all potential risks. Accident and incident management plans in place. Risks associated with ignition of fuel (gas) have been considered. This is considered compliant. xiv. Dust management Dust is not considered a likely risk from the operations. This is considered compliant. xv. Noise management Considerable investment made to reduce sound levels were made at the plant commissioning phase (2010) following complaints due to steam venting. This is likely to be either BAT or beyond BAT. Since then there have been no noise issues reported. A noise management plan is in place. Improvement Condition IC5 which required a noise survey was completed. This is considered compliant. xvi. Odour management Fuel gas is odourised, however the operator stated that controls to prevent gas leaks (due to fire/explosion risk) are likely to minimise odour. No other odourous elements considered relevant. Considered compliant.
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** Information provided that efficiency is regularly monitored. Siemens included example of their KPIs which includes new efficiency. Design or current efficiency not stated. However, we requested further information on the method used to

BAT Conclusion Number	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
		determine net electrical efficiency, including a performance test at full load. This may be available from the original commissioning information but was not included in the submitted report. Further information provided in August 2019: A recent performance test was carried out in 2015. The information was provided, detailing the plant performance test ASME PTC 46 (1996) or ISO2314. Gas analysis, sampling and density standards listed.
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** As per BATc, flow, O_2, temperature, pressure, water vapour stated to be monitored using recognised standards. The station is also compliant with the requirements of EN14181 indicating that CEMS monitoring arrangements for air are to a high standard. Ongoing AST and QAL2, QAL3s demonstrate ongoing compliance.
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. Monitor emissions to air with at least the frequency in the corresponding table and in accordance with the EN standards.	**Currently Compliant** The station is natural gas fired and the BATc requires continuous monitoring of NO_x and CO. Comprehensive information included in the submission. All monitoring on both units LCP 324 and LCP 325 is carried out in accordance with the correct established standards (e.g. MCERTS, ISO, UKAS) and guidance. Operator Monitoring Assessment (OMA) audits (most recent in October 2016) undertaken by NRW have verified the monitoring arrangements used on site. Arrangements are subject to BS EN14181 which ensures CEMS are correctly set up, calibrated and monitoring correctly.

BAT Conclusion Number	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
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.	**Currently Compliant** [though not directly applicable] There is no flue-gas treatment on site, therefore not applicable. However, the Operator does carry out monitoring of the discharge to surface water (River Usk) from site run off and water treatment plant process. This involves neutralisation before batch discharge. Monitoring includes continuous pH and periodic total ammonia. The discharge only takes place if the effluent is within specification.
6.	**Environmental performance** Improve general environmental performance A variety of techniques	**Currently Compliant** a) Fuel blending not considered applicable for natural gas fired plants. Compliant. b) Regular planned maintenance of the combustion system and associated equipment is carried out on a pre-planned basis via minor and major outages. Further information provided in August 2019 which details the planned outage periods, which include checks of the combustion system burners. c) Computerised control system used to optimise plant performance and control emissions. Parameters are viewed and tracked via live feeds to ensure optimal performance. Further information provided in August 2019, detailing the control system used. Outages planned in 2020 and 2021 on each unit to further improve efficiency and CO control. CO is monitored via CEMS which allows combustion to be adjusted for optimum. Compliant. d) Stated to be a well-designed combustion system. As a newer type of CCGT station with a single shaft GT and ST system, we accept that this

BAT Conclusion Number	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
		is the case. The station operates at the higher end of the BATc efficiency range e) Natural gas fired only. No other alternative fuel is considered better for the environment in this instance. Natural gas is inherently low in particulates and SO_2.
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** Flue gas treatment is not used, therefore 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.	**Currently Compliant** Response states not applicable as active abatement systems are not used or required, however, the site does employ dry low NO_x (DLN) burners. Further information provided in August 2019 regarding gas characterisation (via chromatograph) and control of combustion. CEMS measurements (e.g. CO) used to optimise combustion via a combustion monitoring system. No reference to Wobbe index in relation to monitoring gas quality.
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).	**Currently Compliant** [though not directly applicable] Response states not applicable, presumably as gas is received direct from the network with no control over quality. However, further information was requested by NRW. Additional information provided in August 2019 as part of BAT 6 and 8 in relation to gas characterisation and combustion control. These appear to effectively

BAT Conclusion Number	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
		manage combustion, however, as per BAT 8, there is no reference to Wobbe index in relation to monitoring gas quality.
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** Response states the arrangements including control systems, preventative maintenance and procedures for controlling emissions to air during OTNOC but not emissions to water. However, the response to BATc 14 does cover water emissions via the Accident Management Plan which was submitted as an appendix. A risk assessment of potential discharge scenarios has been considered. Further information was provided in August 2019. An electronic control system is in place for both air and water emissions. Specific documents referred to relating to CEMS and the review of data to prevent abnormal conditions. Additional information provided on routine maintenance to prevent exceedances of emissions to both air and water. Details provided of water emissions control system which prevents out of limit discharges.
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** Air emissions monitoring during OTNOC is considered compliant as CEMS record during all modes of operation. Further information on monitoring emissions to water during OTNOC was provided in August 2019 (for BAT10). This described the system where water is monitored prior to discharge and is would be recirculated to allow pH adjustment if out of spec. References to the supplementary documents for the control of monitoring are also included.

BAT Conclusion Number	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
12.	**Energy efficiency** Increase the energy efficiency for units operated ≥1500 h/yr A variety of techniques	**Currently Compliant** Ref: Section.8.2. Further information received in August 2019. a) Combustion optimisation is included in the submission (Argus combustion monitoring system). b) Optimisation of working medium is included in the submission and includes the use of DLN burners for NOx and hot starts when possible. c) Optimisation of the steam cycle stated to be optimised as part of design. Benson Boiler technology stated to be employed, allowing higher working pressures. Benson technology is cited in the BREF [ref 140]. d) Energy use minimisation has been included. The permit already includes a condition regarding energy efficiency in 1.2.1. The station undertakes regular reviews to ensure energy usage is optimised. Compliant. e) Additional information in August 2019 detailing the GT intake air preheating system which operates at lower loads. At higher loads it does not operate as it affects efficiency. f) Fuel preheating is installed, using intermediate pressure steam. Stated to improve efficiency at baseload of 0.6%. g) Advanced control system is in place. Compliant. h) Feedwater is pre-heated by heat recovered from the HRSG. i) Cogeneration (CHP) condition 1.2.2 of the permit requires a review of CHP potential every 4 years. The last review was December 2018, which concluded that there were no viable options for providing district heating or another local heat sink such as industry, and in part due to the low-grade heat remaining after the steam cycle being unsuitable.

BAT Conclusion Number	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
		j) A review of CHP readiness is already required by permit condition 1.2.2 on a 4-yearly basis. The station notes that should a suitable user locate close to site in future, some heat would be available, though of limited viability currently. Compliant. k) Flue-gas condenser. Submission states that this is specific to CHP only. l) Heat accumulation. Only applicable to CHP, therefore not applicable here. m) Wet stack. Related to plants with FGD, therefore not applicable. n) Cooling tower discharge. Only applicable to plants with FGD. o) Fuel pre-drying. This is only relevant for solid fuels. Compliant. p) Minimisation of heat loss. This section is only relevant to solid fuels. Compliant. q) Advanced materials. This is only relevant to new plants. Compliant. r) Steam turbine upgrades. Submission notes that upgrades would be installed as required. Nothing has been identified currently. Compliant. s) Supercritical etc steam conditions. BATc notes that this is applicable to new plant greater than 600MWth. The submission considers this is therefore not applicable. 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.	**Currently Compliant** Further information provided in August 2019. Details of minimisation of water usage and blowdown included. Condensate is returned for re-use. Water usage is stated to be regularly monitored. Water re-use projects have been considered. Permit Condition 1.3.1 required that water efficiency is reviewed every 4 years. Improvement Condition IC7 also requires that wastewater treatment options are considered. Considered compliant, noting that there are some ongoing projects to minimise waste water discharges to the environment.

BAT Conclusion Number	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
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.	**Currently Compliant** Options to reduce the loading of contaminants on effluent have already been undertaken in projects linked to IC7. Accident Management Plan submitted which includes a risk assessment of the potential discharges to the River Usk. Segregation of clean/dirty water streams is part of the regime on site. Treatment options for one of the effluent streams (currently being tankered away) is being progressed locally to achieve an improved environmental outcome. This is considered compliant.
15.	**Reduce emissions to water** Reduce emissions to water from flue-gas treatment A variety of techniques	**Not applicable** Flue gas treatment is not employed on site. Compliant.
16.	**Reduce waste sent for disposal** To reduce the quantity of waste sent for disposal A variety of techniques	**Currently Compliant** Condition 1.4.1 of the permit requires that waste is minimised and reviewed every 4 years (1.4.2). The station has an EMS which included objectives and targets for waste reduction. An audit of the contractor used by Siemens Energy Limited was undertaken in 2018 which confirmed that waste was being appropriately managed and recovered as far as practicable. The waste hierarchy is stated as being used, in order of Reduce, Reuse, Recycle. Some of the wastes also went for energy recovery.
17.	**Reduce noise emissions** To reduce noise emissions A variety of techniques	**Currently Compliant** a) Operational measures: Stated to be part of site EMS risk assessment and procedures to control, assess and minimised noise. Compliant. b) Low-noise equipment. Limited information provided on the acoustic performance of plan items, however the noise assessment for planning and permitting considered the plant noise emissions.

BAT Conclusion Number	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
		c) Noise attenuation. Both the Gas Turbine and Steam Turbine and ancillary equipment are contained within turbine hall buildings. The Air-Cooled Condenser (ACC) duct work was fitted with acoustic lagging soon after construction to prevent noise from steam venting into the ACC during start-up / turbine trips and commissioning work. This appears to have been successful. d) Noise control equipment. See c) also. Further information provided in August 2019 detailing equipment used, such as enclosures around turbines and the use of silencers in key areas. e) Location: Stated to have been considered during design. An Improvement Condition IC5 required a noise assessment to be carried out and to implement any measures as necessary. This was completed. Noise surveys are stated to be carried out periodically to ensure compliance. There have been very few complaints in recent years and none which could be attributed to site operations. In addition, as noted in c) additional lagging was fitted. Noise management plan (document reference provided) in place.
Combustion of solid fuels (coal and/or lignite)		
18.	**Environmental performance** Improve overall performance Techniques in associated table.	**Greyed out sections are not relevant to Gas Turbines.**
19.	**Efficiency** Increase efficiency Techniques in associated table.	
20.	**Prevent or reduce emissions of NOx**	

BAT Conclusion Number	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 while limiting CO and N2O emissions to air from the combustion of coal and/or lignite. A variety of techniques and associated AELs	
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	
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	
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	
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	
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.	

BAT Conclusion Number	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 and associated AELs	
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	
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	
Combustion of liquid fuels (HFO and/or gas-oil-fired boilers)		
28.	**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 HFO and/or gas oil in boilers. A variety of techniques and associated AELs.	
29.	**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 HFO and/or gas oil in boilers. A variety of techniques and associated AELs.	
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.	

BAT Conclusion Number	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 liquid fuels (HFO and/or gas-oil-fired engines)		
31.	**Energy efficiency** BAT-associated energy efficiency levels (BAT-AEELs) Specified techniques and associated AEELs.	
32.	**Prevent or reduce emissions of NOx** Prevent or reduce emissions of NOx emissions to air from the combustion of HFO and/or gas oil in reciprocating engines. A variety of techniques and associated AELs	
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	
34.	**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 HFO and/or gas oil in reciprocating engines. A variety of techniques and associated AELs	
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	
Combustion of liquid fuels (gas oil fired gas turbines)		

BAT Conclusion Number	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
36.	**Energy efficiency** BAT-associated energy efficiency levels (BAT-AEELs) Specified techniques and associated AEELs.	
37.	**Prevent or reduce emissions of NOx** Prevent or reduce emissions of NOx emissions to air from the combustion of gas oil in gas turbines. A variety of techniques	
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	
39.	**Prevent or reduce emissions of SOx and dust** Prevent or reduce emissions of SOx and dust emissions to air from the combustion of gas oil in gas turbines. A variety of techniques and associated AELs	
Combustion of gaseous fuels (natural gas)		
40.	**Energy efficiency** BAT-associated energy efficiency levels (BAT-AEELs) Specified techniques and associated AEELs	**Currently Compliant** a) Combined Cycle. Severn Power station has two CCGT units (combined cycle), meaning it operates a gas and steam turbine in tandem, thereby increasing efficiency. Compliant. As a >600MWth plant, the relevant AEEL is 50 – 60% net electrical efficiency. Siemens Energy Limited stated that their efficiency is 54% which is within this range. Further detail on the method of calculation i.e. ISO base load provided in August 2019. **See response to BAT 2.**

BAT Conclusion Number	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
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	**Not applicable** For boilers only.
42.	**Prevent or reduce emissions of NOx** Prevent or reduce emissions of NOx emissions to air from the combustion of natural gas in gas turbines A variety of techniques. Please also define effective dry low NOx load where applicable.	**Currently Compliant** a) Advanced control system in place. b) Stated that water/steam addition is not applicable. See point (e) c) DLN burners are stated to be fitted. d) Stated to have a control system which optimises performance. It is assumed that this would include ensuring optimum efficiency at different loads. Further details provided in BAT 12 on advanced control system.. e) Low NOx burners. Stated to be NA as presumably DLN is installed. However, the low NOx burners may be applicable to the supplementary firing of the HRSGs (if applicable). Further information provided in August 2019 detailing hybrid burner ring technology, which does not require steam or water injection in NOx control (see point (b)). DLN stated to become effective at 217MW(e) on each unit which equates to MSUL / MSDL. Gas premix mode also in place as f) SCR is stated not applicable for gas turbines in this instance as NOx is controlled by other means. Table 24 AELs. Range for CCGT<75% efficiency, >600MWth for NOx is 10-40mg/m3 annual average, and 18-50mg/m3 for daily average. Siemens state an annual average of between 22 and 33mg/m3, and 19 – 32mg/mg daily average. This puts their emissions within the correct BAT-AEL ranges. Compliant.

BAT Conclusion Number	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
43.	**Prevent or reduce emissions of NOx** Prevent or reduce emissions of NOx emissions to air from the combustion of natural gas in engines. A variety of techniques	**Not applicable** to gas turbines.
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	**Currently Compliant** Stated that the combustion control is optimised to minimise CO. BAT AELS for CCGTs >50MWth is 3 – 30mg/m3 as an annual average. Siemens state a range of 1.3 to 4.7. This is well within the AEL range.
45.	**Prevent or reduce emissions of non-methane volatile organic compounds (NMVOC) and methane emissions** 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	**Not applicable** to CCGTs.
Combustion of iron and steel process gases		
46.		**Not applicable**
47.		

BAT Conclusion Number	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
48.		
49.		
50.		
51.		
Combustion of gaseous and/or liquid fuels on offshore platforms		
52.		
53.		
54.		
Combustion of process fuels from the chemical industry		
55.		

BAT Conclusion Number	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
56.		
57.		
58.		
59.		
Co-incineration of waste		
60.		
61.		
62.		
63.		
64.		

BAT Conclusion Number	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
65.		
66.		
67.		
68.		
69.		
70.		
71.		
Gasification		
72.		
73.		

BAT Conclusion Number	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
74.		
75.		