

Natural Resources Wales

Review of an Environmental Permit under the Environmental Permitting (England & Wales) Regulations 2010 (as amended)

Decision document recording our decision-making process following review of a permit

The Permit number is: EPR/DP3333TA

The Operator is: RWE Generation UK plc

The Installation is: Pembroke Power Station

This Variation Notice number is: EPR/DP3333TA/V003

What this document is about

All Environmental permits which permit the operation of large combustion plant (LCP), as defined by Articles 28 and 29 of the Industrial Emissions Directive (IED), need to be varied to implement the special provisions for LCP given in the IED, by the 1 January 2016 (Article 82(3)). The IED makes special provisions for LCP under Chapter III, introducing new Emission Limit Values (ELVs) applicable to LCP, referred to in Article 30(2) and set out in Annex V.

The IED provides a period of transition towards the new ELVs via Article 32, the Transitional National Plan (TNP). It also makes provision for plant that wish to be exempted from compliance with the new ELVs in Article 33, the Limited Life Derogation (LLD). Other derogations include limited operating hour regimes for sites using 500 hr or 1500 hr derogations. There are also options for exemption from emission limits based on operating hours.

The operator has submitted responses to our notices requiring information, issued under regulation 60(1) of the Environmental Permitting Regulations (EPR), which has provided us with information on which compliance route they wish to follow for each LCP. The responses also include specific details relating to each LCP, necessary for accurate implementation of the IED requirements. A copy of the regulation 60 notice and the operator's response is available on the public register.

We have reviewed the permit for this installation, including all variations since the last permit consolidation, and referred to the operator's responses to the regulation 60 notices requiring information. This is our decision document, which explains the reasoning for the consolidated variation notice that we have issued.

It explains how we have reviewed and considered the compliance routes and, where relevant, the emissions limits proposed by the Operator for each LCP on the installation. This review has been undertaken with reference to the:

- Chapter III and Annex V of the IED
- “IED BAT ESI Review Paper, 28 October 2014” produced by the Environment Agency (referred to as the “2014 ESI BAT review paper” in this document)
- “Electricity Supply Industry – IED compliance protocol for Utility Boilers and Gas Turbines”, published by the Joint Environmental Programme.

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

As well as implementing the Chapter III IED compliance of the installation, the consolidated variation notice takes into account and brings together in a single document all previous variations that relate to the original permit issue. It also modernises the entire permit to reflect the conditions contained in our current generic permit template.

Administrative changes:

Company name change – formerly RWE Npower plc now RWE Generation UK plc.

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

How this document is structured

Glossary

1. Our decision
2. How we reached our decision
3. The legal framework
4. Key Issues

GLOSSARY

Baseload	means: (i) as a mode of operation, operating for >4000hrs per annum; and (ii) as a load, the maximum load under ISO conditions that can be sustained continuously, i.e. maximum continuous rating
BAT	best available techniques
BREF	best available techniques reference document
CCGT	combined cycle gas turbine
Derogation	as set out in Article 15(4) of the IED
Emergency use	<500 operating hours per annum
ELV	emission limit value set out in either IED or LCPD
GT	gas turbine
IED	Industrial Emissions Directive 2010/75/EC
LCP	large combustion plant – combustion plant subject to Chapter III of IED
LCPD	Large Combustion Plant Directive 2001/80/EC
LLD	Limited Life Derogation
MCR	Maximum Continuous Rating
MSUL/MSDL	Minimum start up load/minimum shut-down load
OCGT	Open Cycle Gas Turbine
Part load operation	operation during a 24 hr period that includes loads between MSUL/MSDL and maximum continuous rating (MCR)

1 Our decision

We have decided to issue the Variation Notice to the Operator. This will allow it to continue to operate the Installation, subject to the conditions in the Consolidated Variation Notice.

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

The Consolidated Variation Notice contains many conditions taken from our standard Environmental Permit template including the relevant annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the Notice, we have considered the techniques identified by the operator for the operation of their installation, and have accepted that the details are sufficient and satisfactory to make those standard conditions appropriate. This document does, however, provide an explanation of our use of “tailor-made” or installation-specific conditions, or where our Permit template provides two or more options.

2 How we reached our decision

2.1 Requesting information relating to the requirements of Chapter III of and Annex V to the IED

We issued a Notice under Regulation 60(1) of the Environmental Permitting (England and Wales) Regulations 2010 (a Regulation 60 Notice) on 14/11/14 requiring the Operator to provide information for each LCP they operate, including:

- The type of plant, size and configuration.
- The proposed compliance routes.
- Minimum start up and shut down loads.
- The proposed emission limits and how they accord with the 2014 BAT review paper.
- For higher efficiency gas turbines where they wish to apply for the NO_x emission derogation, the energy efficiency details of the LCP.
- For gas turbines, proposed emission limits for each unit between the MSUL/MSDL and 70% load, with a justification.

The Regulation 60 Notice response from the Operator was received on 30/03/15.

We considered that the response did not contain sufficient information for us to commence determination of the permit review. We therefore issued a further information request to the Operator on 08/06/15. A response to the request for further information was received from the Operator on 30/07/15.

The Operator made no claim for commercial confidentiality. We have not received any information in relation to the Regulation 60 Notice response that appears to be confidential in relation to any party.

3 The legal framework

The Consolidated Variation Notice will be issued under Regulations 18 and 20 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

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

We consider that, in issuing the Consolidated Variation Notice, 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.

Meeting the requirements of the IED

The table below shows how each requirement of the IED has been addressed by the permit conditions.

IED Article Reference	IED requirement	Permit condition
30(6)	If there is an interruption in the supply of gas, an alternative fuel may be used and the permit emission limits deferred for a period of up to 10 days, except where there is an overriding need to maintain energy supplies. NRW shall be notified immediately.	Not applicable
32(4)	For installations that have applied to derogate from the IED Annex V emission limits by means of the transitional national plan, the monitoring and reporting requirements set by UK Government shall be complied with.	Not applicable
33(1)b	For installations that have applied to derogate from the IED Annex V emission limits by means of the Limited Life Derogation, the operator shall submit annually a record of the number of operating hours since 1 January 2016.	Not applicable
37	Provisions for malfunction and breakdown of abatement equipment including notifying NRW.	Not applicable
38	Monitoring of air emissions in accordance with Ann V Pt 3	3.5, 3.6
40	Multi-fuel firing	Not applicable
41(a)	Determination of start-up and shut-down periods	2.3.6 Schedule 1 Table S1.5
Ann V Pt 1(1)	All emission limit values shall be calculated at a temperature of 273,15 K, a pressure of 101,3 kPa and after correction for the water vapour content of the waste gases and at a standardised O ₂ content of 6 % for solid fuels, 3 % for combustion plants, other than gas turbines and gas engines using liquid and gaseous fuels and 15 % for gas turbines and gas engines.	Schedule 6, Interpretation
Ann V Pt 1	Emission limit values	3.1.2 Schedule 3, Table S3.1
Ann V Pt 1	For plants operating less than 500 hours per year, record the used operating hours	2.3.5, 4.2.2d
Ann V Pt 1(6(1))	Definition of natural gas	Schedule 6, Interpretation
Ann V Pt 2	Emission limit values	Not applicable
Ann V Pt 3(1)	Continuous monitoring for >100MWth for specified substances	3.5, 3.6 Schedule 3, Table S3.1
Ann V Pt 3(2, 3, 5)	Monitoring derogations	3.5.1 Schedule 3, Table S3.1
Ann V Pt3(4)	Measurement of total mercury	Not applicable

IED Article Reference	IED requirement	Permit condition
Ann V Pt3(6)	NRW informed of significant changes in fuel type or in mode of operation so can check Pt3 (1-4) still apply	2.3.1 Schedule 1, Table S1.2
Ann V Pt3(7)	Monitoring requirements	3.5.1 Schedule 3, Table S3.1
Ann V Part 3(8,9,10)	Monitoring methods	3.5, 3.6
Ann V Pt 4	Monthly, daily, 95%ile hourly emission limit value compliance	3.5.1 Schedule 3, Table S3.1
Ann V Pt7	Refinery multi-fuel firing SO ₂ derogation	Not applicable

4. Key Issues

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Where relevant and appropriate, we have incorporated the techniques described by the Operator in their Regulation 60 Notice response as specific operating techniques required by the permit, through their inclusion in Table S1.2 of the Consolidated Variation Notice.

The variation notice uses updated LCP numbers in accordance with the most recent DEFRA LCP reference numbers. The LCP references have changed as follows:

- **LCP439** (A1) is changed to **LCP286**;
- **LCP439** (A2) is changed to **LCP382**;
- **LCP439** (A3) is changed to **LCP383**;
- **LCP439** (A4) is changed to **LCP384**; and
- **LCP439** (A5) is changed to **LCP385**.

LCP286

LCP286 consists of 755MWth CCGT, burning natural gas, which can also operate as an OCGT. The combustion gases in both modes of operation vent via emission point A1.

LCP382

LCP382 consists of 756MWth CCGT, burning natural gas, which can also operate as an OCGT. The combustion gases in both modes of operation vent via emission point A2.

LCP383

LCP383 consists of 758MWth CCGT, burning natural gas, which can also operate as an OCGT. The combustion gases in both modes of operation vent via emission point A3.

LCP384

LCP384 consists of 756MWth CCGT, burning natural gas, which can also operate as an OCGT. The combustion gases in both modes of operation vent via emission point A4.

LCP385

LCP385 consists of 756MWth CCGT, burning natural gas, which can also operate as an OCGT. The combustion gases in both modes of operation vent via emission point A5.

Compliance Route:

The operator has proposed to operate the LCPs under the ELV and 500 hour emergency operation compliance routes.

Net Rated Thermal Input:

The Applicant has stated that the Net Thermal Input is 4.2 GW. The rated thermal input provided was derived from the guaranteed performance (efficiency and rated output) following the 2015 C Inspections. Following each C Inspection tests to evaluate the CCGT performance against these guarantees were undertaken by Alstom in accordance with PTC 46-1996: Performance Test Code on overall power plant performance.

Minimum start up load and Minimum shut-down load:

The Operator has defined the “minimum start up load” and “minimum shut-down load” for the LCP in their response to question 6 of the Reg 60, in terms of: the output load (i.e. electricity, heat or power generated) (MW); and this output load as a percentage of the rated output of the combustion plant (%).

We agree with all of these definitions and have set these thresholds in table S1.5 of the permit accordingly. Standard permit condition 2.3.6 has been set to define the period of start-up and shut down, referring to the thresholds in this table.

Emission limits:

The operator has proposed limits in line with annex V of the IED and the 2014 BAT review paper. Consequently we have accepted the proposed limits and incorporated them into table S3.1 of the permit.

Parameter	Existing mg/m³	Reference Period
NO_x	50	Maximum validated hourly averages
CO	300	Maximum validated hourly averages
	100	Daily average of validated hourly averages
SO₂	-	No limit set
Particulate matter	-	No limit set

Parameter	Annex V mg/m ³	New Permit limit mg/m ³	Reference Period
NO_x	100	50	maximum validated hourly averages
	55	50	24 hourly averages
	50	50	Monthly averages
CO	200	200	maximum validated hourly averages
	100	100	24 hourly averages
	100	100	Monthly averages
SO₂	-	-	No limit set
Dust	-	-	No limit set

Sulphur dioxide emissions from natural gas firing of gas turbines and boilers will be reported as six monthly concentrations on the basis of the fuel sulphur content without continuous or periodic monitoring since only trace quantities of sulphur are present in UK natural gas. Dust emissions for natural gas fired boilers will, likewise, be reported on the basis of emission factors without continuous or periodic monitoring.

The IED Annex V ELVs for oxides of nitrogen and carbon monoxide apply to OCGTs, CCGTs and mechanical drive gas turbines when the load is >70%. This has been interpreted as 70% of the rated output load. The rated output load used here is the same as that used for calculating the percentage load when specifying the end of start-up and beginning of shut-down.

“Low Load” Gas Turbine Emission Limits set when the load varies between MSUL/MSDL and base load during the daily reference period:

IED Annex V ELVs for GTs apply when the load is >70%. The operator has proposed the following limits:

- Oxides of nitrogen – 50mg/m³
- Carbon Monoxide – 250mg/m³

when the load varies between MSUL/MSDL and base load during the daily reference period.

The part load CO ELV is less than the ELV of 440 mg/m³ determined as the upper limit that is screened out using the JEP methodology for partial combustion pollutants, in particular formaldehyde, associated with part load GT CO emissions agreed with the Regulators.

An air dispersion modelling report was also provided for a proposed CO ELV of 300 mg/m³ with further information submitted in July 2015. This modelling also demonstrated that CO and formaldehyde impacts are acceptable. However, examination of part load CO emissions data for Pembroke and the sister plant Staythorpe using the same Alstom GT26s suggested that a part load ELV of 250mg/m³ was achievable and this was agreed with RWE.

A new pre-operational condition, PO5 has been added to Table S1.4: prior to the operation of a low part load gas turbine operating mode technical details and an environmental impact assessment shall be provided. This will allow for the potential future adoption of technology that allows the GT26 to operate with acceptable emissions at significantly lower loads than the current declared MSUL/MSDL.

No ELVs are required by IED Chapter III for emergency GT plant operating <500 hours per year. Therefore, no ELVs have been set for open cycle operation of the GTs in Table S3.1 (a).

Energy efficiency:

The installation does not have CHP. In line with the DEFRA Part A guidance, to report on the scope for further improvement, a condition has been included for the operator to carry out a 4-yearly efficiency review.

Reporting efficiency:

In order to ensure the efficiency of plant using fossil fuels or biomass is maximised and regularly recorded, condition 1.2.1(c), condition 4.2.2(b) and table S4.2 have been added to the permit.

Monitoring & standards:

Standards for assessment of the monitoring location and for measurement of oxygen, water vapour, temperature and pressure have been added to the permit template for clarity.

A row has been included in table S3.1 which requires the operator to confirm compliance with BS EN 15259 in respect of monitoring location and stack gas velocity profile in the event there is a significant operational change (such as a change of fuel type) to the LCP.

Table S3.1 (a) is included to require monitoring and reporting of emissions when operating in open cycle mode.

<500 hrs:

The operator has applied for up to 500 hours operation of the LCPs as OCGT, We do not consider operation of an OCGT for >500 hours to be BAT and condition 2.3.5 limits operating hours. Should this change as a result of the Balancing Market BAT review currently in progress, the permit may be varied.

Additional IED Chapter II requirements:

Condition 3.1.3 relating to protection of soil, groundwater and groundwater monitoring, has been added in compliance with IED requirements.

Conditions 4.3.1 and 4.3.2 relating to notifications have been amended in compliance with IED requirements.

A new operating technique (Haven Monitoring Programme) has been incorporated in to Table S1.2 Operating Techniques in order to implement a monitoring programme for the Pembrokeshire Marine SAC.

Condition 2.3.7: “There shall be no discharge to water from the activities after 1 May 2012 unless phosphate stripping equipment has been installed and is operational at Pembroke Dock Sewage Treatment Works. It shall reduce phosphate emissions to no more than 1 mg/l (as P) and deliver a net reduction in the phosphate load entering the Milford Haven waterway (taking into account the phosphorus emission from emission point W1(a))” has been deleted from the permit as the requirements have now been achieved.

END