

Environment Agency

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/AP32333LU
The Operator is: Centrica PB Limited
The Installation is: Peterborough Power Station
This Variation Notice number is: EPR/AP32333LU/V004

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. 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).

The operator has submitted a response to our notice requiring information, issued under regulation 60(1) of the Environmental Permitting Regulations (EPR), which has provided us with the required information on which compliance route they wish to follow for each LCP, a number of specific details relating to each LCP. A copy of the regulation 60 notice and the operators response is available on the public register.

We have reviewed the permit for this installation, and referred to the operators response to the regulation 60 notice 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 II and annex V of the IED
- “BAT Review for the period 1 January 2016 until implementation of new BAT conclusions, or end of the TNP/LLD (as appropriate) E&W” paper produced by the Environment Agency dated 28 October 2014 (referred to as the “2014 BAT review paper” in this document)
- Electricity Supply Industry – IED compliance protocol for utility boilers and gas turbines document 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.

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. Annex 1– Review of operating techniques within the Installation against BAT Conclusions.
5. Annex 2 – Review and assessment of derogation request(s) made by the operator in relation to BAT Conclusions which include an Associated Emission Level (AEL) value.
6. Annex 3 – Improvement Conditions

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
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
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 31/10/14 requiring the Operator to provide information for each LCP they operate, including:

- the type of plant, size and configuration;
- the proposed compliance route;
- Minimum start up and shut down loads; and
- The proposed emission limits and how they accord with the 2014 BAT review paper,

The Regulation 60 Notice response from the Operator was received on 31/03/15.

We considered it was in the correct form and contained sufficient information for us to begin our determination of the permit review.

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. The EA 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 the EA.	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 O2 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	3.1.2 Schedule 3, Table S3.1
AnnV Pt 3(1)	Continuous monitoring for >100MWth for specified substances	3.5, 3.6 Schedule 3, Table S3.1

IED Article Reference	IED requirement	Permit condition
AnnV Pt 3(2, 3, 5)	Monitoring derogations	3.5.1 Schedule 3, Table S3.1
AnnV Pt3(4)	Measurement of total mercury	Not Applicable
AnnV Pt3(6)	EA 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
AnnV Pt3(7)	Monitoring requirements	3.5.1 Schedule 3, Table S3.1
AnnV Part 3(8,9,10)	Monitoring methods	3.5, 3.6
AnnV Pt 4	Monthly, daily, 95%ile hourly emission limit value compliance	3.5.1 Schedule 3, Table S3.1
AnnV Pt7	Refinery multi-fuel firing SO2 derogation	Not Applicable

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:

- **LCP 120** is changed to **LCP 55**
- **LCP 121** is changed to **LCP 56**
- **LCP 402** is a new number for proposed new turbines **GT3 and GT4**

The two existing LCPs (LCP55 & LCP56) operate as Open Cycle Gas Turbines (OCGTs). Whilst they were originally constructed as CCGTs, in recent years it has not been economic to operate in combined cycle mode due to the market conditions and the station has only remained operational by switching to open cycle mode via the bypass stacks and emergency operation. The two new combustion units listed in the environmental permit are also OCGTs. There is no CCGT operation planned for the site in future and the site can be considered to be OCGT operation only from 1/1/2016.

Directly associated activities listed in the previous permit for the heat recovery steam generator and steam turbine have been removed as no closed cycle operation is permitted at the installation. Associated redundant emission points have also been removed from the updated permit.

LCP 55

This LCP consists of 1 x 339 MWth OCGT which vents via a single windshield at emission point A2. The unit burns natural gas.

Compliance route

The operator has proposed to operate this LCP under the 500 hours emergency operation compliance route.

Net rated thermal input

The applicant has stated that the net rated thermal input is 395MWth.

This is based on a review of recent plant monitoring data and operational performance test results for the period 01 Jan 2013 to 01 April 2015 has been completed to confirm the baseload thermal input data. This methodology calculates the maximum gas input at base load for each machine as per the

guidance given under ISO 2314:2009 – gas turbine acceptance tests. The results showed the following maximum gas energy input at ISO base load conditions.

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, both in terms of the output load (i.e. electricity, heat or power generated) (MW); and this output load as a percentage of the rated thermal output of the combustion plant (%).

The threshold of 75MW for the definition of MSUL has been selected because the gas turbine Variable Inlet Guide Vanes (VIGVs) will be fully open at this load and stable operation is present. The VIGV position changes as start up progresses. It is noted that the gas turbine continues to ramp up the output load after the MSUL position until the desired operational output is achieved. Note the ramp rate is typically of the order of 28 MW/minute.

On commencement of shutdown load starts to drop and the change in VIGV position is subsequently triggered corresponding to approximately 65 MW. The run down rate is typically of the order of 10 MW/min. The threshold is consistent with the implementing decision requirements for stable generation.

LCP 56

This LCP consists of 1 x 346 MWth OCGT which vents via a single windshield at emission point A4. The unit burns natural gas.

Compliance route

The operator has proposed to operate this LCP under the 500 hours emergency operation compliance route.

Net rated thermal input

The applicant has stated that the net rated thermal input is 346 MWth.

This is based on a review of recent plant monitoring data and operational performance test results for the period 01 Jan 2013 to 01 April 2015 has been completed to confirm the baseload thermal input data. This methodology calculates the maximum gas input at base load for each machine as per the guidance given under ISO 2314:2009 – gas turbine acceptance tests. The results showed the following maximum gas energy input at ISO base load conditions.

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, both in terms of the output load (i.e. electricity, heat or power generated) (MW); and this output load as a percentage of the rated thermal output of the combustion plant (%).

The threshold of 75MW for the definition of MSUL has been selected because the gas turbine Variable Inlet Guide Vanes (VIGVs) will be fully open at this load and stable operation is present. The VIGV position changes as start up progresses. It is noted that the gas turbine continues to ramp up the output load after the MSUL position until the desired operational output is achieved. Note the ramp rate is typically of the order of 28 MW/minute.

On commencement of shutdown load starts to drop and the change in VIGV position is subsequently triggered corresponding to approximately 65 MW. The run down rate is typically of the order of 10 MW/min. The threshold is consistent with the implementing decision requirements for stable generation.

LCP 402

This LCP is not yet constructed. It will consist of two gas turbines (GT3 >4) each having a proposed maximum thermal input of 330MWth. These are proposed for OCGT operation. The new gas turbines (designated as emission points A9 and A10 in the environmental permit) will vent via a shared windshield located at A9.

Compliance route

The operator has proposed to operate this LCP under the 500 hours emergency operation compliance route.

Net rated thermal input

A standard Improvement condition (IC11) has been used for the operator to provide a report demonstrating the net thermal input of the LCP following commissioning.

Minimum start up load and Minimum shut-down load.

A standard Improvement condition (IC12) has been used for the operator to provide a report justifying output load, output load as a percentage of thermal output and/or three criteria which can be met at the end of start up or shut down. These thresholds have been set in table S1.5 of the permit accordingly. Standard permit condition 2.3.12 has been set to define the period of start up and shut down, referring to the thresholds in this table

LCP55, 56 & 402

Gas fired plant:

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. For gas turbines we have not required any reporting as the dust emissions will always be reported as zero. This is because natural gas is an ash-free fuel and high efficiency combustion in the gas turbine does not generate additional particulate matter. The fuel gas is always filtered and, in the case of gas turbines, the inlet air is also filtered resulting in a lower dust concentration in the flue than in the surrounding air.

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. [For a new plant in pre-operational commissioning the same requirement applies.]

Resource efficiency metrics:

A more comprehensive suite of reporting metrics has been added to the permit template for ESI plant. Table S4.2 "Resource Efficiency Metrics" has been added requiring the reporting of various resource parameters, as this is an Electrical Supply Industry (ESI) power plant. This table is being used for all ESI plant.

Additional IED Chapter II requirements:

Condition 3.1.4 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.