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/CP3035MK
The Operator is: EDF Energy (West Burton Power) Limited
The Installation is: West Burton CCGT
This Variation Notice number is: EPR/CP3035MK/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 (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 includes specific details relating to each LCP, necessary for accurate implementation 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.

An improvement condition (IC11) has been included requiring the Operator to provide annual emissions of dust, sulphur dioxide and oxides of nitrogen including energy usage for the year 01/01/2015 to 31/12/2015. Improvement conditions IC3 and IC5 have had the completion date extended until 31/07/16.

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

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
MSUL/MSDL	Minimum start up load/minimum shut-down load
OCGT	Open Cycle Gas Turbine
TNP	Transitional National Plan

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 31/10/2014 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.
- The proposed emission limits and how they accord with the 2014 BAT review paper.
- 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 31/03/2015.

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. Suitable further information was provided by the Operator on 30/06/2015.

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.	n/a
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.	n/a
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;	n/a
37	Provisions for malfunction and breakdown of abatement equipment including notifying the EA.	n/a
38	Monitoring of air emissions in accordance with Ann V Pt 3	3.5, 3.6
40	Multi-fuel firing	n/a
41(a)	Determination of start-up and shut-down periods	2.3.5 Schedule 1 Table S1.4
72b	For combustion plants which do not operate more than1500 operating hours per year as a rolling average over a period of 5 years, the number of operating hours per year.	n/a
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	n/a
Ann V Pt 1(6(1))	Definition of natural gas	Schedule 6, Interpretation
Ann V Pt 2	Emission limit values	n/a
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	n/a
AnnV Pt3(4)	Measurement of total mercury	n/a
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	n/a
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	n/a

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 EIONET references. The LCP references have changed as follows:

- **LCP 174** is changed to **LCP 121**
- **LCP 175** is changed to **LCP 122**
- **LCP 176** is changed to **LCP 123**

LCP 121
This LCP consists of a 800 MWth CCGT which vents via a single windshield at emission point A1. The unit burns natural gas.

LCP 122
This LCP consists of a 800 MWth CCGT which vents via a single windshield at emission point A2. The unit burns natural gas.

LCP 123
This LCP consists of a 800 MWth CCGT which vents via a single windshield at emission point A3. The unit burns natural gas.

Compliance Route:
The operator has proposed to operate all the LCPs under the ELV compliance route.

Net Rated Thermal Input:
The Applicant has stated that the Net Thermal Input of each LCP is 769 MWth. They have justified this figure in their response to the request for further information (dated 26/06/2015).

Commissioning guarantee performance testing was carried out, by The Department of Thermal Performances of DTG, on the following dates:

- LCP 121: 10th and 11th April 2013;
- LCP 122: 15th and 16th December 2012; and
- LCP 123: 11th and 12th July 2013.

The standards/codes used were:

- ASME PTC 46 – 1996 "overall plant performance" code and where applicable ASME PTC 4.1 –steam generator;
- ASME PTC 4.4 – GTHR steam generator -1981 reaffirmed in 1997;

- ASME PTC 6.1 – steam turbine with condenser flow measurement – last revision in 1984;
- ASME PTC 22 – gas turbine -1997;
- ISO 2314 – test for acceptance of the gas turbines – 1989 revised in 2009; and
- ASME PTC 19.1 – measurement uncertainty – 1998.

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 LCPs in their response to question 6 of the Reg 60, in terms of the output load of 35 MW as one of three discrete processes or thresholds for operational parameters that suit the technical characteristics of the plant, which can be met at the end of start-up or start of shut-down. The other two parameters are:

- the gas turbine is in burner mode 6.3; and
- the gas turbine is running above 2900 rpm.

The parameters for shut down are:

1. The gas turbine load is less than 35 MW
2. The burner is not in mode 6.3
3. The gas turbine speed is running below 2900 rpm
4. The Operator shut down is selected
5. The fast runback control flag is on

The Operator justified the minimum start up load and minimum shut down load in their response to question 6 of the Reg 60 notice.

'A gas turbine (GT) generator electrical load value does not provide an appropriate definition of start up and shut down for the installed technology. This is because the GT run up to steady operating conditions is dependent on various parameters; this means that varying load values are achieved when the start up is finished. The time taken to achieve operating conditions, and therefore the load equivalent to the end of the start up phase, varies according to the physical conditions of ambient temperature, steam turbine metal temperatures, steam temperatures, steam quality and the output of an algorithm embedded into the GE Steam Turbine Stress Evaluator control program. Similarly, the load at which the shut down is initiated is not fixed and is dependent on commercial market conditions and the operation of safety devices.

The burner mode 6.3 is the essential indicator of operation of the installed Dry Low NOx combustion technology.'

We agree with all of these definitions and have set these thresholds in the table S1.4 of the permit accordingly. Standard permit condition 2.3.5 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 3.1 of the permit.

The emission limits that were previously permitted are shown in table 1 below with the Annex v limits in table 2 and the new permitted limits in table 3. Note that the daily limit for NOx has been set at 50 mg/m^3 which is lower than the IED limit, but as they already had this 50 mg/m^3 limit we have kept it to be in line with the BAT review paper.

Table 1 Previous permitted limits from EPR/CP3035MK/V002

Emission point	**Parameter**	**Previous emission limit**	**Reference period**
A1, A2 and A3	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	50 mg/m^3	Daily mean of validated hourly averages
		100 mg/m^3	95 percentile of validated hourly averages within a calendar year
		100 mg/m^3	Annually
	Carbon monoxide	100 mg/m^3	Daily mean of validated hourly averages
	Sulphur dioxide	100 mg/m^3	Daily mean of validated hourly averages

Table 2 Annex V limits

Emission point	**Parameter**	**Annex V limits**
A1, A2, A3	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	50 mg/m^3
	Carbon monoxide	100 mg/m^3

Table 3 New permitted limits EPR/CP3035MK/V004

Emission point	**Parameter**	**Previous emission limit**	**Reference period**
A1, A2, A3	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	50 mg/m^3 MSUL/MSDL to base load	Monthly mean of validated hourly averages
		50 mg/m^3 70% to base load 50 mg/m^3 MSUL/MSDL to base load	Daily mean of validated hourly averages
		100 mg/m^3 MSUL/MSDL to base load	95% of validated hourly averages within a calendar year

	Carbon monoxide	100 mg/m^3 70% to base load 100 mg/m^3 MSUL/MSDL to base load	Monthly mean of validated hourly averages
		100 mg/m^3 70% to base load 100 mg/m^3 MSUL/MSDL to base load	Daily mean of validated hourly averages
		200 mg/m^3 MSUL/MSDL to base load	95% of validated hourly averages within a calendar year

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.

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.

Reporting efficiency:
In order to ensure the efficiency of plant using fossil fuels 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.

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 3.1.3 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.

Improvement condition:
Improvement conditions IC3 and IC5 have only been partially completed. Therefore, improvement conditions IC3 and IC5 have had the completion date extended until 31/07/16.