

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/JP3632ZH

The Operator is: Cofely Industrial Energy Services Limited

The Installation is: Barry Cogeneration Plant

This Variation Notice number is: EPR/JP3632ZH/V002

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 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 Non-ESI Review Paper, 28 October 2014” produced by the Environment Agency (referred to as the “2014 Non-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. It also provides a justification for the inclusion of any specific conditions in the permit that are in addition to those included in our generic permit template.

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 registered address changed.

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

Base load	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
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
MCR	Maximum Continuous Rating
MSUL/MSDL	Minimum start up load/minimum shut-down load
Part load operation	operation during a 24 hr period that includes loads between MSUL/MSDL and maximum continuous rating (MCR)
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 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 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 09/06/15. A response to the request for further information was received from the Operator on 15/07/15. Additional information from the Operator was received on 22/11/15.

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. 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.	3.1.3 Schedule 3, Table S3.3
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.	2.3.6 4.2.5 4.3.1d
38	Monitoring of air emissions in accordance with Annex V Pt 3	3.5, 3.6
40	Multi-fuel firing	Not applicable
41(a)	Determination of start-up and shut-down periods	2.3.5 Schedule 1 Table S1.4
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	Not applicable
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 an updated LCP number in accordance with the most recent DEFRA LCP reference numbers. The LCP references have changed as follows:

- **LCP 235** is changed to **LCP 60**

LCP60

This LCP consists of 2 x 21 MWth CCGT's each with up to 38.5 MWth supplementary firing capability, a 69 MWth high pressure (HP) boiler and 2 x 24 MWth medium pressure (MP) boilers which vent via multiple flues within a single windshield. As the LCP comprises units with a mixture of oxygen correction requirements, different technology ELVs and the infrequent operation of the MP boilers, making use of CEMs disproportionate, the monitoring and ELV requirements have been set on an individual flue basis. The CCGTs release at emission points A1 and A3. The HP boiler releases at emission point A2 and the MP boilers at emission points A4 and A5. The units burn natural gas and gas oil as a standby fuel.

Compliance Route:

The operator has proposed to operate this LCP under the TNP compliance route.

For plant operating under the TNP, ELVs are set which have been derived for the period 2016 – 30 June 2020 (the duration of the TNP). At the end of this period it is expected that both Annex V and the revised LCP BREF will become applicable, in which case Annex V or the BAT conclusions must be achieved (whichever is stricter), or operators must have applied for a derogation from the BAT conclusion (if that is stricter Annex V will apply in any event). The operator will apply, at the appropriate time, to vary the permit again to reflect this.

The operator's current proposals to achieve the stricter ELVs by 30 June 2020, are to install dry low NO_x technology on the GTs and appropriate burner upgrades on the boilers. This information is not in any way binding upon the operator and may change.

Net Rated Thermal Input:

The Applicant has stated that the Net Thermal Input is 236 MWth. They have justified this figure by providing thermal performance guarantee documents for

the original GTs and HP plant. This data has been accepted as it is similar to test data for identical plant installed elsewhere. The MP boiler ratings are based upon Hamworthy burner data. This has been accepted as these are very low load factor units for standby purposes and so performance test runs are unlikely to be carried out routinely.

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 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 potential operating modes for the CHP plant are complex and deriving suitable threshold parameters is difficult. The information provided by Cofely sets out different SU/SD process parameters, some conflicting and none justified or supported by emissions profiles.

In order to implement interim SU/SD criteria in the revised CHP plant permit NRW has taken the following approach:

Gas turbines (GT) operating through heat recovery steam generators (HRSG) with no supplementary firing (SF) – start up should be complete once NO_x control steam injection is commissioned. A backstop parameter based upon full load (100%) output is included. This is conservative, but as the GTs will normally be ramped up to full load to maximise power and waste heat generation this is considered to be an acceptable criterion pending further justification provided by the operator through a response to an improvement condition (IC4) to be included in the revised permit. The criterion are also consistent with details provided in the information notice responses.

GTs operating in supplementary firing (SF) mode through the HRSGs – normal operating steam conditions and a backstop steam flow rate based upon statements in the information notice responses relating to compliance with current CO ELVs have been adopted. Again these parameters can be justified in the improvement condition response.

High pressure (HP) boiler and HRSGs operating in auxiliary firing mode - normal operating steam conditions and a backstop steam flow rate based upon statements in the information notice responses relating to compliance with current CO ELVs have been adopted.

Changes in operating mode can also be accommodated by excluding emissions data from reporting by applying the following steam flow rate and GT power output transitions:

GT TEG to SF mode – “SU” period when steam flow rate rises from 8 to >32 t/h

GT SF to TEG mode – “SD” period when steam flow rate falls from 32 to 10 t/h

GT SF to boiler FD mode – “SD” started when GT output <6.2 MWe and complete when steam flow rate >12 t/h

FD mode to GT SF mode – “SU” started when steam flow rate <32 t/h and complete when >32 t/h again.

These mode transition thresholds have not yet been incorporated into the permit for simplicity but may be adopted if justified by the response to improvement condition (IC4).

An improvement condition (IC4) will allow the operator to demonstrate that the interim SU/SD criteria are justified or to provide alternative criteria with suitable justification.

We consider these definitions to be representative and have set these thresholds in 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 existing permit ELVs and partly in line with the 2014 BAT review paper for NO_x. Consequently we have accepted most of the proposed limits and incorporated them into tables 3.1(a), (b), (c) and (d) of the permit.

ELVs have been proposed on a reasonable basis, although not strictly in accordance with the IED BAT review paper. Limited emissions data are provided but the main ELVs proposed for the GT/HRSG units represent approximate equivalence to current ELVs with some head room to allow for plant performance deterioration and to gain experience operating to the different averaging periods.

The main issue arises when deriving ELVs for the HP boiler for the standard oxygen correction of 3%. Current ELVs are set at 15% oxygen and translate to very high ELVs at 3%. The operator has proposed 300 mgNO_x/m³ for all averaging periods, which is the ELV used for the TNP 2016 emissions cap calculation. Examination of the available data suggested that 250 mgNO_x/m³ is more appropriate.

CO ELVs are problematic for the HP boiler at 3% oxygen. The IED BAT review concluded that CO ELVs at the Annex V values should be applied for all TNP plant. The operator has proposed 240 mgNO_x/m³ for all averaging periods, which is equivalent to the current ELV corrected to 3% oxygen. Examination of the available data suggested that the Annex V value of 100 mgNO_x/m³ is achievable, albeit with potential compliance difficulties with the daily value.

All oil firing ELVs for NO_x have been accepted as proposed as these are based upon current ELVs with changes for oxygen correction for the HP boiler and there is no data presented on historic performance.

Other options may be available for setting ELVs without backsliding but the following summarises the proposed approach that reflects current performance while implementing the main requirements set out in the IED BAT review paper:

Release point/unit	95%ile of hourly averages	Daily average	Monthly average
A1 and A3/GT-HRSG at 15% oxygen, gas fired	125 mgNOx/m ³	125 mgNOx/m ³	125 mgNOx/m ³
	80 mgCO/m ³	80 mgCO/m ³	80 mgCO/m ³
A2/HP boiler at 3% oxygen, gas fired	250 mgNOx/m ³	250 mgNOx/m ³	250 mgNOx/m ³
	200 mgCO/m ³	110 mgCO/m ³	100 mgCO/m ³
	-	38.5 mgSO ₂ /m ³	-
	-	5.5 mg dust/m ³	-
A4 and A5/MP boiler at 3% oxygen, gas fired	-	135 mgNOx/m ³	-
		200 mgCO/m ³	
		38.5 mgSO ₂ /m ³	
		5.5 mg dust/m ³	
A1 and A3/GT-HRSG at 15% oxygen, oil fired	160 mgNOx/m ³	160 mgNOx/m ³	160 mgNOx/m ³
	80 mgCO/m ³	80 mgCO/m ³	80 mgCO/m ³
A2/HP boiler at 3% oxygen, oil fired	480 mgNOx/m ³	480 mgNOx/m ³	480 mgNOx/m ³
	200 mgCO/m ³	110 mgCO/m ³	100 mgCO/m ³
	-	385 mgSO ₂ /m ³	-
	-	33 mg dust/m ³	-
A4 and A5/MP boiler at 3% oxygen, oil fired	-	196 mgNOx/m ³	-
		200 mgCO/m ³	
		385 mgSO ₂ /m ³	
		33 mg dust/m ³	

For CO emissions from the HP boiler (release point A2) an improvement condition IC5 has been set requiring a review of BAT for achieving the Annex V ELVs because historic emissions monitoring data suggest that the daily average value may be difficult to achieve. This may be due to the unit being designed as an HRSG for future retrofit of a GT. This retrofit has not taken place due to insufficient power demand at the site and the unit is run continuously in auxiliary mode for steam raising only. A BAT review is required within 6 months and any required modifications will be implemented upon approval by NRW.

The CO ELV for the MP boilers (A4 and A5) has been set at the upper end of the range allowed for extractive testing for <100 MWth boilers – 200 mg/m³ because these boilers only run intermittently and follow demand and extractive testing may have to take place before fully stable conditions are achievable.

Annex V SO₂ and dust ELVs are required for gas and oil fired boilers. 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 monitoring 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.

“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:

- Nitrogen oxides – 125 mg/m³
- Carbon Monoxide – 80mg/m³

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

These ELVs are no higher than the existing plant ELV across the operating load range and so have been accepted.

Standby fuels:

The operator normally uses gas fuel and already has permission to use gas oil as a standby fuel for unlimited periods. Since it is BAT to use the cleaner gas fuel, gas oil use is limited to periods of natural gas supply interruption.

<10,000 hrs:

The operator uses standby plant or auxiliary boilers (MP boilers) aggregating >100MWth which only occasionally operates and has <10,000 hours remaining life. In view of the remaining lifespan, and in accordance with the IED, we have not required installation of CEMs.

Notifications:

Schedule 5, Part C, takes account of the malfunction and breakdown requirements. A breach of permit condition is NOT implicit in notification under Part C.

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.

A further improvement condition (IC6) will allow the operator to demonstrate that the revised data handling requirements that need to be implemented in compliance with the permit will be achieved in the short and long-term. The operator has asked for 6 months to allow DCS software changes to be implemented and will use interim manual data handling to report against the new averaging periods and using the new SU/SD thresholds. These requirements are reflected in IC6.

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.

END