

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/WP3633CS

The Operator is: Cofely Limited

The Installation is: Huddersfield Chemical Works (Syngenta CHP)

This Variation Notice number is: EPR/WP3633CS/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 a response to our notice 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 response also includes specific details relating to the 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 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 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.

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. 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
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
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)
TNP	Transitional National Plan
WHB	Waste heat boiler

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 October 2015 requiring the Operator to provide information for the LCP, 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.

The Regulation 60 Notice response from the Operator was received on 20 March 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 28 May 2015. The operator applied to enter into the TNP. At the time we considered the information provided was in the correct form and contained sufficient information for us to begin our determination of the permit review. However, subsequent to the operator's responses the operator was informed by DEFRA that they had not been included in the TNP Registry and as such the only compliance route left available to the operator is that of Annex V ELVs.

2.2 Requests for Further Information during determination

As a result of the DEFRA decision the operator was informed that we would have to issue an Annex V ELV permit. The Operator noted in an e-mail dated 20 October that they were not in the TNP and as such must come under Annex V of the IED. The Operator was provided with a draft of the permit indicating the Annex V ELVs applicable to the LCP and they confirmed on 21 December that this was acceptable to them.

A copy of the further information request was placed on our public register.

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.	2.3.6
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	2.3.7 Schedule 1 Table S1.5
72b	For combustion plants which do not operate more than 1500 operating hours per year as a rolling average over a period of 5 years, the number of operating hours per year.	Not applicable
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	2.3.6
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	Not applicable

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	Not applicable
AnnV Part 3(8,9,10)	Monitoring methods	3.5, 3.6
AnnV Pt 4	Monthly, daily, 95%ile hourly emission limit value compliance	Not applicable
AnnV Pt7	Refinery multi-fuel firing SO2 derogation	Not applicable

4. Key Issues

Unless the decision document specifies otherwise we have accepted the operator'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 references. The LCP reference has changed as follows:

- **LCP136** is changed to **LCP61**

The conditions associated with the high-pressure steam boiler (HPB1) are not affected by this variation.

LCP61

This LCP consists of two appliances within the same windshield. The LCP has a total net rated thermal input of 92MW and includes the following appliances:-

- A CHP unit (gas turbine, at 23.4MW and a waste heat boiler at 40MW) – discharging via flue A1.
- An intermediate pressure steam boiler at 28.6MW – discharging via flue A2.

This common windshield, LCP61, is 45m in height.

Compliance Route:

The operator proposed to operate this LCP under the following compliance route:

- ELV

Net Rated Thermal Input:

The Operator has stated that the Net Thermal Input is 92MWth. They stated the individual plant thermal inputs and the total for the LCP without providing an explanation. In response to an RFI the Operator stated they took over the site in January 2012 and claims not to have any data on how these figures were derived other than to provide the technical data for each unit. There is no commissioning / performance guarantee data available.

The operator has not provided sufficient detail as required by both the notice and the request for further information. An Improvement Condition is included in this variation in order to obtain the relevant details:-

IC11:-

The operator shall provide a report in writing to the Environment Agency for agreement which provides the net rated thermal input for LCP95. The net rated thermal input is the 'as built' value unless the plant has been modified significantly resulting in an improvement of the plant efficiency or output that increases the rated thermal input (which typically requires a performance test to demonstrate that guaranteed improvements have been realised).

Evidence to support this figure, in order of preference, shall be in the form of:-

- a) Performance test results* during contractual guarantee testing or at commissioning (quoting the specified standards or test codes),
- b) Performance test results after a significant modification (quoting the specified standards or test codes),
- c) Manufacturer's contractual guarantee value,
- d) Design data, e.g., nameplate rating of a boiler or design documentation for a burner system;
- e) Operational efficiency data as verified and used for heat accountancy purposes,
- f) Data provided as part of Due Diligence during acquisition,

*Performance test results shall be used if these are available.

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.

Release points A1 (combined mode) and A4 (open mode): LCP61 GT and GT+WHB (in supplementary mode)

SU and SD are minimal as the GT provides electricity to a large chemical works 24 hours per day, 7 days per week. Information provided by the operator suggests that in 2014 the GT ran a total of 8290hrs in the year (there being a total of 8760hrs in a year) The operator states that the GT is out of start up when the outlet temperature is 1059°C with a shaft speed of 10,980rpm. At this point the GT is generating and synchronisation occurs at 6.3MWe.

Release point A1 – WHB in auxiliary mode

The boiler provides useful steam to the customer at a temperature of 400°C and 42Bar. The MCR output is 60t/hr. The turndown ratio is 4:1 giving a minimum, useful, export load to the customer of 15t/hr = 25% of the MCR.

Release point A2: - The Package Boiler

The boiler is maintained at ca 300°C and 13.7Bar by sparging with intermediate pressure (IP) steam from the steam turbine. If the IP steam pressure to the customer drops to 12.5Bar the boiler burners start up automatically. The MCR output is 28t/hr. The turndown ratio is 4:1 giving a minimum, useful, export load to the customer of 7t/hr which equates to 25% of the MCR.

Start-up and shutdown procedures have been provided for the CCGT, WHB and PB. The MSUL/MSDL data is fit for purpose.

We agree with all of these definitions and have set these thresholds in table S1.4 of the permit accordingly. Standard permit condition 2.3.7 has been set to define the period of start up and shut down, referring to the thresholds in this table.

Table S1.4 Start-up and Shut-down thresholds		
Emission Point and Unit Reference	“Minimum Start-Up Load” Load in MW and as percent of rated power output (%) or steam flow rate in t/hr and as percent of rated thermal output (%) and when two of the criteria listed below for the LCP or unit have been met.	“Minimum Shut-Down Load” Load in MW and as percent of rated power output (%) or steam flow rate in t/hr and as percent of rated thermal output (%) and when two of the criteria listed below for the LCP or unit have been met.
A1: LCP61 GT and GT+WHB (in supplementary mode)	6.3MWe; 100% load at GT outlet temperature 1059°C and GT shaft speed 10,980rpm	6.3MWe; 100% load at GT outlet temperature 1059°C and GT shaft speed 10,980rpm
A1: LCP61 WHB (auxiliary mode)	15t/hr steam; 25% load at 42bar and 400°C	15t/hr steam; 25% load at 42bar and 400°C
A2: LCP61-PB	7t/hr steam; 25% load at 13.7 bar and 300°C	7t.hr steam; 25% load at 13.7 bar and 300°C
A4: LCP61	6.3MWe; 100% load	6.3MWe; 100% load

Emission limits:

The IED (Annex V, Part 4, section 1) requires that each series of periodic measurements must comply with the “emission limit values” set out in the relevant section of Annex V. This is somewhat imprecise as three different ELVs are set, each with a different time basis (monthly, daily and hourly as defined in Annex V, Part 4, Section 1). Periodic monitoring is usually undertaken for a limited time period (ranging from 30 minutes to a number of

hours depending on the details of monitoring standard applicable at the time). Consequently, we believe that the most applicable short term emission limit value applicable where only periodic monitoring is required is the daily average value (i.e. 110% of the headline IED Annex V emission limit value). This is our BAT position. However, we also recognise that this limit value may not be appropriate in some situations (e.g. for those plant that routinely operate at reduced firing rates or where plant operate at highly variable loads). In such cases, a site specific emission limit value would be set, based on the consideration of BAT. Any elevated emission limit value shall not exceed a maximum value of 200% of the headline IED Annex V emission limit value.

The general principle is that the ELV applies across the windshield. However, we acknowledged where a windshield contains combustion gases / flues from different combustion units setting a 'dynamic' ELV (i.e. one that changes according to which units are in operation at any given time) across the windshield to account for these different modes of operation is not always practical. In this case compliance testing on the flues is not undertaken simultaneously moreover the PB runs intermittently. It is therefore considered BAT to set the Annex V ELVs relevant to each type of combustion unit for each flue within the windshield as, by definition, if each flue is compliant with its own Annex V ELV then the windshield will be compliant with any dynamic ELV calculated across it.

LCP61:A1:-

The Operator has undertaken upgrades to the gas turbine and WHB and is able to comply with the 110% headline IED Annex V ELVs for NOx. The current permit limits for CO are tighter than Annex V and have been retained.

LCP61:A2:-

The Operator has confirmed the upper limit of 200% of the headline IED Annex V ELV can be complied with but that notes that one historical measurement would have exceeded it had it been in effect when the measurement was undertaken. The Operator notes this is the maximum that can be permitted and has accepted it. Planned upgrades to the burners have been discussed and will be required to ensure continued compliance.

Historical monitoring data for PB1, release point A2 fired on natural gas.

Oxides of Nitrogen	
ELV/mgm3	385
2011 H1	NT
2011 H2	NT
2012 H1	169
2012 H2	180
2013 H1	209
2013 H2	186.2
2014 H1	193.7
2014 H2	168.3
2015 H1	189.5

The operator did not apply for site specific ELVs to cover the load range from MSUL/MSDL to 70% ISO base load therefore, the current site ELVs apply over all load ranges from MSUL/MSDL to 100% ISO base load.

The operator is currently limited to operating the GT in open mode, discharging via release point A4:LCP61, to 300hrs/year. In the response to the notice, the operator requested this be increased to 500hrs but failed to provide any BAT justification. As a result the current permit limit of 300hrs/year has been retained. There are no ELVs associated with release point A4:LCP61 nor are there any monitoring requirements.

The Operator has requested the higher ELVs associated with CCGTs-CHP where the overall efficiency is >75%. This request is specific to CCGT-CHP which discharges via release point A1 i.e. it is not a request for the whole of the LCP. No process data was provided with the response to the notice. We have included an Improvement condition on order for the Operator to provide the required information and justification:-

IC13:-

The operator shall write to the Environment Agency for approval if an increase in the ELV limits set in table S3.1 of this permit is sought to the allowable limits set out in IED Annex V, Part 1, and paragraph 6.

The written submission from the operator shall contain:-

- verification of the energy efficiency quoted for the plant
- An assessment of any energy efficiency gains that may be gained through the limit increase together with detailed proposals for validating this figure.
- an assessment of the impact of those increased emission limits from site on any air quality objectives.
- Any impact the increased emissions might have on local receptors.

For comparison purposes, the tables below show the current ELVs, those required by the IED and those granted.

LCP61 – Release point A1 (Gas turbine with WHRB in supplementary mode)

Period	Fuel type	Current	IED	Applied for	Granted
NO _x ELVs mg/m ³	Natural gas	125	55	-	55
CO ELVs mg/m ³	Natural gas	100	110	-	100
SO ₂ ELVs mg/m ³	Natural gas	-	-	-	-

LCP61 – Release point A1 (WHRB in auxiliary mode)

Period	Fuel type	Current	IED	Applied for	Granted
NO _x ELVs mg/m ³	Natural gas	125	110 - 200	-	110
	Gas-oil	200	495	-	200
CO ELVs mg/m ³	Natural gas	100	110	-	100
	Gas-oil	150	-	-	-
SO ₂ ELVs mg/m ³	Natural gas	-	38.5	-	38.5
	Gas-oil	-	385	-	385
Dust ELVs mg/m ³	Natural gas	-	5.5	-	5.5
	Gas-oil	-	33	-	33

LCP61 – Release point A2 (PB1)

Period	Fuel type	Current	IED	Applied for	Granted
NO _x ELVs mg/m ³	Natural gas	385	110 - 200	-	200
	Gas-oil	495	495	-	495
CO ELVs mg/m ³	Natural gas	100	110	-	100
	Gas-oil	150	-	-	-
SO ₂ ELVs mg/m ³	Natural gas	-	38.5	-	38.5
	Gas-oil	-	385	-	385
Dust ELVs mg/m ³	Natural gas	-	5.5	-	5.5
	Gas-oil	-	33	-	33

The sampling period will reflect that specified in relevant CEN standards or that in relevant guidance. The monitoring results should be expressed as an average over the sampling period(s) corrected to the relevant reference conditions. There shall be no subtraction of any sampling uncertainty levels from the reported result. However, the sampling uncertainty of the reference monitoring method will be taken into account when assessing compliance. The limit value will be set as an absolute ELV with no percentile allowances (i.e. a 100% compliance basis over the sampling period).

Gas fired gas turbines:

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.

Oil fired gas turbines:

Sulphur dioxide emissions from oil firing of gas turbines and boilers will be reported as six monthly concentrations on the basis of the known fuel sulphur content without continuous or periodic monitoring.

Energy efficiency:

The installation operates as a CHP providing heat and power to three chemical works as part of a multi operator, single installation. The current permit does not have the generic condition for the operator to undertake a 2-yearly review of potential CHP opportunities as it is a dedicated CHP plant for the associated chemical works. Therefore, 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.

Standby fuels:

The operator uses gas as the primary fuel. We permitted the use of gas-oil as a standby fuel, limited to 500ht/year, as part of the permit determination process in 2007. There is no requirement to revisit this assessment. Since it is BAT to use the cleaner gas fuel, gasoil use is limited to 500 hours per year and the current permit ELVs and monitoring requirements have been retained.

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.

There is a requirement to continue to report for 2015 in the transition from LCPD to IED LCP Reporting process annual emissions of dust, sulphur dioxide and oxides of nitrogen including energy usage for the year 01/01/2015 to 31/12/2015. For this reason an Improvement condition has been added to table S1.3

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.

END.