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/EP3337NY
The Operator is: Winnington CHP Limited
The Installation is: Winnington Sodium Carbonate Manufacturing Site
This Variation Notice number is: EPR/EP3337NY/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 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 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 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 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. 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.

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
Peaking	500-1500 operating hours per annum
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 09/12/14 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.
- For gas fired plant, whether they wish to apply for derogation from monitoring when on standby fuels.
- Any request to move from continuous to 6 monthly monitoring, or to derogate from 6 monthly monitoring, with a justification.

A number of versions of the Regulation 60 Notice response from the Operator were received however the final version denoted version 4 was received on 31/03/15 and was taken as the operators final response.

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 03/07/15.

We considered it was in the correct form and contained sufficient information for us to begin our determination of the permit review but not that it necessarily contained all the information we would need to complete that determination.

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.

2.2 Requests for Further Information during determination

Although we were able to consider the Regulation 60 Notice response generally satisfactory at receipt, we did in fact need more information in order to complete our permit review assessment, and issued a further information request on 03/06/15. A copy of the further information request was placed on our public register.

In addition to the response to our further information request, we held a number of meetings with the operator to clarify and discuss the information we had received relating to understanding of the plant loads, customer requirements, and operating modes.

2.3 Alternative compliance routes

In their Regulation 60 Notice response, the operator initially requested multiple compliance routes be considered for their LCP because at that point they had not decided which route they wanted to apply for. The routes requested were:

LCP117 - Annex V Part 1 – ELV , Article 32 – TNP, limited running for Fresh air firing mode for HRSG

LCP408 - Annex V Part 1 – ELV , Article 32 – TNP, Limited running

We were only able to issue the variation notice for single compliance routes per LCP (other than TNP which can apply by pollutant), and the operator confirmed which routes they wanted by email dated 06-11-15. The confirmed routes were:
LCP117 - Article 32 – TNP
LCP408 - Article 32 – TNP

This is what is considered in this decision document.

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.	2.3.7
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.	3.1.4 Schedule 3, Table S3.4
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	2.3.9 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	2.3.8, 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
AnnV Pt 3(1)	Continuous monitoring for >100MWth for specified substances	3.5, 3.6 Schedule 3, Table S3.1
AnnV Pt 3(2, 3, 5)	Monitoring derogations	3.5.1 Schedule 3, Table S3.1

IED Article Reference	IED requirement	Permit condition
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

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:

- LCP169 reference is split and changed to LCP117 and a new LCP number, LCP408, has been added.

LCP117

This LCP consists of two parallel CCGT trains comprising a GT and fired Heat Recovery Boiler, with emissions from each CCGT train venting through either a flue denoted emission point A1 or A2. Both of these flues are located within a common windshield. (The LCP comprises GT1A-139.42MWth, GT1B-139.42MWth, HRSG1A-171.01MWth, and HRSG1B-171.01MWth). The LCP burns natural gas fuel. The operator has also applied to run the GT`s in open cycle for a maximum of 500hours/annum, and during this mode of operation will emit combustion gases through the bypass stacks denoted emission points A3 and A4. The Heat Recovery Boilers are both secondary fired, and principally in an emergency, when the GT`s fail, or the steam load from consumers is low, will continue to run to produce steam and a small amount of electrical power.

LCP408

This LCP comprises 3 package boilers D, E, and F, each of 130MWth net thermal capacity. They are used to provide a backup lower pressure steam capability. The exhausts vent to flues denoted emission points A5, A6 and A7 which are located within a common windshield. They are fired on natural gas but can also operate on distillate which would be used as a backup fuel only.

Compliance Route:
The operator has proposed to operate both LCP117 and LCP408 under the TNP compliance route. The ELVs set for NOx reflect the plants original permitted limits. The operator has also provided DECC Quality Assurance Certificates showing that the CHP plant can operate above 75% efficiency and therefore able to benefit from higher 75mg/m3 NOx emission limits if it wished to do so. However, this would need to be subject to further air quality

dispersion assessment as the level is higher than originally permitted and has not been pursued.

It has also been proposed to continue to operate LCP 117, either GT1A or GT1B, in open-cycle mode for a maximum total for both units of <500hrs/year. LCP117 also has two Heat Recovery Boilers HRSG1A and HRSG1B1B that have supplementary firing. These boilers can operate independently in supplementary firing mode, however, this is not their normal mode of operation, occurring only when a GT trip occurs, or when operating at very low steam (heat) loads to continue to supply customers steam demand during a chemical supply plant shutdown.

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 through application of any necessary pollution abatement techniques. 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 for LCP117 is 620.86MWth, and LCP408 is 389MWth They have justified this figure by providing reference to a Performance Test Report relating to net thermal input conducted by GE Energy Products Europe. The tests are dated 22/08/2000 and were conducted by Laurent Mehl. The GE procedure references International Standard ISO 2314. It is understood that no changes have been made since these tests that would impact the net thermal input and were the figures put forward for the TNP plan. We have accepted this information as it provides a net figure, date and test standard in accordance with our guidance and this information will be audited during routine inspection.

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 LCP117 in their response to question 6 of the Reg 60, in terms of; The output load and percentage of the rated output (28MWe;70% of the GT full base load), and is based on the rated electrical output from just one of the two gas turbines.

For LCP408 the "minimum start up load" and "minimum shut-down load" has been based on the output load and percentage of the rated output from one boiler (30t/hr;25% of full steam output), either boiler D, E, or F.

We agree with all of these definitions and have set these thresholds in table S1.4 of the permit accordingly. Standard permit condition 2.3.9 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 selected the TNP compliance route and has therefore proposed limits in line with their currently permitted levels, and the 2014 ESI BAT review paper, for LCP117. In their current permit, compliance was based on a calendar monthly mean, and 95% of all 48hourly mean values not exceeding 110% of the elv, in any calendar year. In their response to the R60 Notice this 48hrly mean has been transposed to a 24hrly mean and an hourly mean at 200% of the monthly mean identified.

The operator has had ongoing discussion with the Agency concerning this daily mean. It becomes more difficult for the plant to achieve the CO daily mean when the plant operates with the heat recovery boilers at low load during periods of lower steam demand. The plant was never designed to operate under such low load conditions but has lost heat customers due to recent production plant closures. Operating the HRSG at these lower loads under reduced steam demand is a trade off between slightly higher daily CO emissions, but less fuel wastage, CO_2 production and steam venting, which would otherwise be required to reduce the CO emission.

We are proposing to address this potential daily CO failure through a regulatory position statement which will allow the plant to continue to serve its customers whilst making improvements to comply with the limit as soon as possible. The operator will be required to submit a report to us for approval, detailing how and by when, it will be able to demonstrate compliance with the emission limit values set in the permit.

Requirements for the operator as detailed in the regulatory position statement:
The operator shall submit a report in writing no later than 1 June 2016 to the Environment Agency for approval. The report must set out proposed measures to improve carbon monoxide emission from the waste heat recovery boilers HRSG1A and HRSG1B, to comply with daily emission limit values for CO required by Table S3.1 Point source emissions to air from LCP No. 117 CCGT fired on natural gas. The report shall include full details of the proposed measures together with a schedule of work and timescales for implementation which should be as soon as practicable.

Following approval of the report by the Environment Agency, the operator shall ensure the work identified as necessary to improve carbon monoxide emission from HRSG1A and HRSG 1B and bring them in to line with the Industrial Emissions Directive 2010 is carried in accordance with the timetable set out in the approved report. Following completion of the work a commissioning report shall be prepared and submitted to the Environment Agency within one month of completion of commissioning to demonstrate that the heat recovery boilers are able to comply with daily carbon monoxide

emission limit values required by the Industrial Emissions Directive 2010 as noted above.

The table below indicates how the ELV`s for NO_x and CO have been transposed. We have included the daily CO limit from IED and this together with the other established limits demonstrates that the "no back sliding principle" has been applied when establishing the limits.

Parameter	Existing mg/m^3 (monthly and 48hrly)	Reference Period	Annex V ELV mg/m^3 (CHP efficiency >75%)	New permit limit mg/m^3
NO_x		95% of validated hourly means within a calendar year	150	120
	66	95% of validated daily means within a calendar year	82.5	66
	60	Monthly mean	75	60
CO		95% of validated hourly means within a calendar year	200	200
	110	Daily mean of validated hourly averages .	110	110
	100	Monthly mean	100	100

The heat recovery boilers HRSG1A and HRSG1B forming part of LCP 117 are both supplementary fired and will continue to operate when a GT trips or under conditions of low steam demand from supplied plants due to periods of shutdown for maintenance. It is not BAT to operate a WHRB in auxiliary mode other than in an emergency. However we have agreed that under emergency (abnormal) conditions, where the GT is taken off-line and where the operator has a credible plan to recover operation of the GT, the Regulator will permit the operation of the WHRB in auxiliary mode and at 15% Oxygen reference conditions for short periods. A record will be required to be maintained of operating hours under these conditions.

We have agreed this for this plant as there are a number of industries which are reliant on both steam and electricity produced by Winnington, including a mine which relies upon the electricity produced as a safety back-up. We have

therefore set emission limits for the plant in this mode of operation and in line with the operators Reg 60 response. These are based upon those within the current permit. However, the current permit has 48hrly limits, whereas the revised permits currently set a 95%ile of the daily mean. The operator has transposed the 48hrly mean to a 24hrly in their response believing it can be achieved. The limits applied are shown in the table below:

Parameter	Existing mg/m^3 (monthly and **48hrly)**	Reference Period	Annex V ELV mg/m^3	New permit limit mg/m^3
NO_x		95% of validated hourly means within a calendar year	200	240
	132 (48hrly)	95% of validated daily means within a calendar year	110	132 (24hrly)
	120	Monthly mean	100	120
CO		95% of validated hourly means within a calendar year		200
	110	Daily mean of validated hourly averages		110
	100	Monthly mean		100

The TNP compliance route has also been selected for LCP408, the three package boilers D, E, and F which are gas fired, but are also able to run on distillate. Limits will be applied for gas only and based upon current permit levels and plant performance detailed on plotted monitoring data sent in response to the request for further information. The operator has advised that distillate is only used during gas supply interruption and therefore no limits have been set. The limits set and how they were derived are outlined in the table below:

Parameter	Existing mg/m^3 (monthly and **48hrly)**	Reference Period	Annex V ELV mg/m^3	New permit limit mg/m^3
NO_x		95% of validated hourly means within a calendar year	200	330
	330	95% of validated daily means within a calendar year	110	330
	300	Monthly mean	100	300
CO		95% of validated hourly means within a calendar year	200	200
	110	Daily mean of validated hourly averages	110	110
	100	Monthly mean	100	100

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.

Energy efficiency:
The plant operates as a CHP, CHPQA Scheme Reference Number 553, and has provided CHPQA certification records from 2001 to 2014. 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 normally uses gas fuel and is currently permitted to use gasoil as a standby fuel. The current permit places no time restriction on its use as a standby fuel and the original permit decision document makes reference to ADMS modelling being carried out at the higher NO_x limit of 350mg/m3. It is BAT to use the cleaner gas fuel and they have applied to use gasoil for up to 10 days at any one time as standby in event of failure of gas supply.

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.

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 3.1.5 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.