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CORYTON POWER STATION

ENVIRONMENTAL AND TECHNICAL SCHEDULE

VARIATION APPLICATION UNDER SECTION 36C OF THE ELECTRICITY ACT 1989

RAMBOLL

CORYTON POWER STATION

ENVIRONMENTAL AND TECHNICAL SCHEDULE
Variation Application under Section 36C of the Electricity Act 1989

Project Name:	**CORYTON POWER STATION** **ENVIRONMENTAL AND TECHNICAL SCHEDULE**
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Approved By:	**Will Hazell**

CONTENTS

LIST OF ABBREVIATIONS

ACC	air cooled condenser
AGP	Advanced Gas Path
BEIS	Department for Business, Energy and Industrial Strategy
BoP	balance of plant
BPEO	best practicable environmental option
CCGT	combined cycle gas turbine
CCR	carbon capture readiness
CHP	combined heat and power
CO_2	carbon dioxide
DCO	Development Consent Order
DCS	Distributed Control System
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security and Net Zero
DTI	Department for Trade and Industry
EIA	Environmental Impact Assessment
HCLG	Ministry of Housing, Communities and Local Government
HRSG	heat recovery steam generator
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OCGT	open cycle gas turbine
CECL	Coryton Energy Company, Ltd

1. OVERVIEW

1.1 Coryton Power Station

1.1.1 Coryton Power Station (hereafter referred to as 'Coryton') is a combined cycle gas turbine (CCGT) generating station, located in the Thames Haven near Stanford Le Hope, Essex. Figure 1 presents the site location plan, and Figure 2 presents a layout plan of the existing Site.

1.1.2 On 14 March 1997, the original consent was granted for Coryton under Section 36 of the Electricity Act 1989. The original consent was accompanied by a direction that planning permission be deemed to be granted under Section 90 of the Town and Country Planning Act 1990. Together, these (the original consent and the direction that planning permission be deemed to be granted) comprise the existing consent for Coryton.

1.1.3 Paragraph 3 the existing consent provides that: "*the Development shall be of about 750 MW capacity…*".

1.2 The Proposed Development

1.2.1 CECL is proposing to submit a variation application under Section 36C of the Electricity Act 1989 to the Secretary of State (SoS) for the Department for Energy Security and Net Zero (DESNZ) to allow for an increase in the permitted electricity generation output of Coryton to up to 850 MW capacity.

1.2.2 The Proposed Development relates to the way in which Coryton is authorised to operate and comprises a High Efficiency (HE) upgrade to the existing two gas turbines at Coryton.

1.2.3 This upgrade consists of the retrofit of latest technology "H-class" parts to the internals of the gas turbines to increase the overall plant efficiency and allow for an increase in the electricity generation output to up to 850 MW capacity.

1.2.4 The variation application would also seek a direction to amend various conditions subject to which the planning permission was deemed to be granted under Section 90(2ZA) of the Town and Country Planning Act 1990 that are no longer relevant (i.e. they relate to construction of Coryton and, therefore, are not applicable to the Proposed Development, or they are in some other way out of date).

1.3 Purpose of this Report

1.3.1 The Electricity Generating Stations (Variation of Consents) (England and Wales) Regulations 2013 (as amended) (hereafter referred to as the 'Variation Regulations') set out the procedures for handling variation applications under Section 36C of the 1989 Electricity Act for the construction, extension and operation of electricity generating stations.

1.3.2 Specifically, Regulation 3 of the Variation Regulations outlines the required documents and information necessary for a variation application under Section 36C of the 1989 Electricity Act. These are set out in Table 1.1, alongside a description of where these are provided in the application.

1.3.3 Accordingly, the variation application is accompanied by a number of supporting documents / schedules. Table 1.1 sets out these supporting documents / schedules.

Table 1.1: Variation Application Supporting Documents / Schedules

Document / Schedule Reference		Description
(1)	Variation Application Covering Letter	The variation application is made in writing via the Variation Application Covering Letter.
(2)	Compliance Schedule	The Compliance Schedule set out this required content, along with a description of CECL's compliance.
(3)	Proposed Consultee Schedule	The proposed consultees for the variation application.

Document / Schedule Reference		Description
(4)	Location Plan	A Location Plan of the existing site is provided as part of the application. This is also provided as Figure 1 of this Document.
(5)	Application Site Plan	A Site Layout Plan of the existing power station and Proposed Development (noting that the site plan for the Proposed Development is unchanged from the existing Site Plan). This is also provided as Figure 2 in this Document.
(6)	The Existing Consent	The existing consent for Coryton, comprising the 1997 Original Consent and the accompanying direction that Planning Permission be Deemed to be Granted.
(7)	Proposed Variations to the Existing Consent (Tracked Changes Version)	The proposed variations to the existing consent, shown in tracked changes.
(8)	Proposed Variations to the Existing Consent (Clean Version)	The proposed variations to the existing consent.
(9)	Draft Explanatory Memorandum	An explanatory memorandum summarising the proposed variations to the existing consent, providing the associated explanations / justifications for the proposed variations.
(10)	Environmental and Technical Schedule	This Document.
(11)	Associated Authorisations	The associated authorisations include: • Pipeline Construction Authorisation • Overhead Lines Consent; • Bilateral Connection Agreement • Network Exit Agreement; and • Environmental Permit.

1.3.4 This is Document (10), the Environmental and Technical Schedule, and is accompanied by a number of Appendices comprising:

- Appendix A: September 2023 Environmental Impact Assessment (EIA) Screening Report;
- Appendix B: November 2023 EIA Screening Opinion;
- Appendix C: Supporting Carbon Capture Readiness (CCR) Assessment / Information; and
- Appendix D: Supporting Combined Heat and Power (CHP) Assessment / Information.

2. RELEVANT CONTEXT

2.1 Introduction

2.1.1 This Section considers the relevant legislative, energy policy and planning policy context for the variation application.

2.2 Legislative Context

2.2.1 Section 36C1 of the 1989 Electricity Act provides that:

"(1) *The person for the time being entitled to the benefit of a section 36 consent may make an application to the appropriate authority for the consent to be varied.*

[…]

(4) On an application for a section 36 consent to be varied, the appropriate authority may make such variations to the consent as appear to the authority to be appropriate, having regard (in particular) to—

(a) the applicant's reasons for seeking the variation;

(b) the variations proposed;

(c) *any objections made to the proposed variations, the views of consultees and the outcome of any public inquiry*".

2.2.2 The 'appropriate authority' in this case is the SoS for DESNZ.

2.2.3 Section 90(2ZA)2 of the 1990 Town and Country Planning Act provides that: "On varying a consent under section 36 or 37 of the Electricity Act 1989 in relation to a generating station or electric line in England or Wales, the SoS may give one or more of the following directions (instead of, or as well as, a direction under subsection (2))—

(a) a direction for an existing planning permission deemed to be granted by virtue of a direction under subsection (2) (whenever made) to be varied as specified in the direction;

(b) a direction for any conditions subject to which any such existing planning permission was deemed to be granted to be varied as specified in the direction;

(c) *a direction for any consent, agreement or approval given in respect of a condition subject to which any such existing planning permission was deemed to be granted to be treated as given in respect of a condition subject to which a new or varied planning permission is deemed to be granted*".

2.2.4 The Variation Regulations set out the procedures for handling variation applications under Section 36C of the 1989 Electricity Act for the construction, extension and operation of electricity generating stations.

2.3 Government Guidance

2.3.1 In July 2013, DECC (now DESNZ) published their Variation Guidance[3].

2.3.2 Paragraph 21 of the Variation Guidance states that: "*The power conferred on the Secretary of State … by section 36C of the 1989 Act is a broad and discretionary one to make "such variations … as appear to [the Secretary of State …] to be appropriate". Each application to vary section 36 consent will be considered on its merits on a case by case basis …*".

2.3.3 Paragraph 22 of the Variation Guidance states that: "*… it should be noted that there are two broad categories of case in which it is likely that the Secretary of State … may consider it appropriate to exercise the power in section 36C – namely, to enable:*

[1] Inserted by Section 20 of the 2013 Growth and Infrastructure Act. Available at: http://www.legislation.gov.uk/ukpga/2013/27/section/20/enacted
[2] Inserted by Section 21 of the 2013 Growth and Infrastructure Act. Available at: http://www.legislation.gov.uk/ukpga/2013/27/section/21/enacted
[3] 'Varying Consents granted under Section 36 of the Electricity Act 1989 for Generating Stations in England and Wales: A Guidance Note on the New Process' (DECC, July 2013).

(a) The construction or extension of a generating station (whose construction or extension has either not yet commenced or has not yet been completed) along different lines from those set out in the existing consent;

(b) the operation of a generating station (whether or not it is already operational) in a way that is different from that specified in the existing consent (this may sometimes involve making limited physical alterations to a generating station, but should not involve work that could be characterised as an "extension" of an existing generating station which has been granted section 36 consent [footnote]".

2.3.4 The associated footnote to part (b) explains that: "the extension of an existing [onshore] generating station which has been granted section 36 consent requires development consent under the [Planning Act 2008] … [and] Section 36(9) of the Electricity Act 1989 provides that "'extension', in relation to a generating station, includes the use by the person operating the station of any land … for a purpose directly related to the generation of electricity by that station and 'extend' shall be construed accordingly".

2.3.5 In determining that a proposed variation is appropriate to be made under S36C(4), the SoS should consider:

(a) Whether the change proposed to the generating station (or proposed generating station) concerned is of a kind that it would be reasonable to authorise by means of the variation procedure (regardless of its merits in planning / energy policy terms);

(b) If the answer to question (a) is positive, whether (from a planning / energy policy point of view) the variation should in fact be made, thereby authorising whatever development the making of the variation will permit to be carried out".

2.3.6 In relation to question (b) it will be necessary for applicants to make the case for the changes in planning and energy policy terms.

2.3.7 In relation to question (a), paragraph 25 of the 2013 Variation Guidance states that the scope of what can be authorised under the variation procedure will depend on the provisions of the existing consent, the specific circumstances of the project, and the nature and extent of the proposed development and their environmental effects. The paragraph also makes the point that given: "*…the potentially very large range of different cases that could arise, it is not possible to give definitive guidance in advance on the scope of the variation procedure*".

2.3.8 Paragraph 26 of the 2013 Variation Guidance states that the key point to note is that the variation procedure is not intended as a way of authorising any variation in a developer's plans that would result in development that would be fundamentally different in character or scale from what is authorised by the existing consent. However, the 2013 Variation Guidance goes on to state a number of circumstances which would necessitate a variation under the procedure. Of particular relevance, the third bullet point states: "*Changes in the design of generating stations which have been consented but not constructed which would allow them to generate an amount of power that would be inconsistent with the original consent are likely to be appropriate subject matter for a variation application, provided there are no major changes in the environmental impact of the plant. Similar changes to an existing plant could be appropriate subject matter for a variation application only if they did not involve physical extension of the generation station, relocation of generating plant, or the installation of new equipment that would amount to the construction of a new generating station*" (emphasis added).

2.3.9 The Proposed Development results in no external changes to any building / equipment / stack dimensions, elevations, footprints or locations at Coryton. As such, the Proposed Development does not affect the design, size or shape of Coryton and does not amount to an 'extension' of the existing power station as defined in Section 36(9)[4] of the 1989 Electricity Act.

2.3.10 In relation to the Variation Guidance, the Proposed Development is consistent with paragraph 22(b) and paragraph 26 in that there is no "*physical extension of the*

[4] Section 36(9) provides that: "*In this Part "extension", in relation to a generating station, includes the use by the person operating the station of any land or area of waters (wherever situated) for a purpose directly related to the generation of electricity by that station and "extend" shall be construed accordingly*".

generating station, relocation of generating plant or the installation of new equipment that would amount to the construction of a new generating station".

2.4 Energy Policy Context

The National Policy Statements for Energy Infrastructure

2.4.1 The 2008 Planning Act introduced a new system for the consenting of national significant infrastructure projects (NSIPs). This includes projects within the energy sector, including onshore generating stations with a capacity of more than 50 MW. Before such an NSIP can proceed, an application must be submitted for a Development Consent Order (DCO).

2.4.2 In July 2011, the SoS for DECC (now DESNZ) designated a number of National Policy Statements (NPSs) relating to nationally significant energy infrastructure. These included an Overarching NPS for Energy (EN-1), which was updated in March 2023[5], which sets out the Government's overall policy for the delivery of nationally significant energy infrastructure, in addition to five technology-specific NPSs.

2.4.3 Where relevant, EN-1 and the relevant technology-specific NPSs should be read in conjunction. Of most relevance to the variation application is the technology-specific NPS for Natural Gas Electricity Generating Infrastructure (EN-2), also updated in March 2023[6].

2.4.4 While the variation application would not be determined under the Planning Act 2008, the Variation Guidance indicates that the NPSs for energy are of relevance to the SoS's consideration of such applications.

The Need for Natural Gas Fuelled Electricity Generation

2.4.5 EN-1 confirms the need that exists in the UK for nationally significant energy infrastructure, including increases in electricity generation output and improvements in generation efficiency from existing generating stations.

2.4.6 With regards to the urgent need for further electricity infrastructure, Part 3 of EN-1 (Section 3.3) sets out various themes, or components, including:

- Future increases in electricity demand, with EN-1 stating Electricity meets a significant proportion of our overall energy needs and our reliance on it will increase as we transition our energy system to deliver our net zero target. We need to ensure that there is sufficient electricity to always meet demand; with a margin to accommodate unexpectedly high demand and to mitigate risks such as unexpected plant closures and extreme weather events.
- The urgency of the need for further electricity capacity, with EN-1 stating To ensure that there is sufficient electricity to meet demand, new electricity infrastructure will have to be built to replace output from retiring plants and to ensure we can meet increased demand. Our analysis suggests that even with major improvements in overall energy efficiency, and increased flexibility in the energy system, demand for electricity is likely to increase significantly over the coming years and could more than double by 2050

2.4.7 When considering applications for electricity infrastructure, EN-1 states that the SoS should give substantial weight to the contribution that all projects would make toward satisfying this urgent need (Para 3.2.5 – 3.2.6).

2.4.8 With regards to the use of natural gas, Section 3.4 of EN-1 highlights the following:

- Gas will continue to play an important role in the electricity sector, providing vital flexibility to support an increasing amount of low-carbon generation and to maintain security of supply and ensure the system remains reliable and affordable. Whilst the majority of new generating capacity will need to be low carbon, new unabated natural gas generating capacity will also be needed during the transition to net zero;
- Security of supply is a top priority as the UK moves to decarbonise gas supply. The gas system is expected to continue to function well, as it has done to date,

[5] Department for Energy Security and Net Zero, 2023. Overarching National Policy Statement for Energy (EN-1). March 2023.
[6] Department for Energy Security and Net Zero, 2023. National Policy Statement for Natural Gas Electricity Generating Station (EN-2). March 2023.

with a highly diverse range of supply sources and sufficient delivery capacity to more than meet demand; and

- Although the expectation is that low carbon alternatives will be able to replicate the role of natural gas in the electricity system over time, some natural gas-fired generation without CCS, running very infrequently, may still be needed for affordable reliability even in 2050. This can still be net zero consistent if the emissions from their use are balanced by negative emissions from alternative technologies.

2.4.9 Therefore, when considering the use of the use of natural gas, EN-1 indicates that natural gas clearly provides a means by which to provide the required flexibility and resilience within the UK's generation fleet.

2.4.10 EN-1 is clear in establishing the need that exists for increases in electricity generation output and improvements in generation efficiency from existing natural gas fired generating stations, such as that of the variation application, which would allow Coryton to provide a valuable contribution towards meeting this established, identified national need.

2.4.11 Therefore, it is considered that the variation application is consistent with EN-1.

2.4.12 In addition to the above energy policy:

- Section 6 of this Document and **Appendix C** considers the relevant CCR policy context for the variation application; and,
- Section 7 of this Document and **Appendix D** considers the relevant CHP policy context for the variation application.

2.5 Planning Policy Context

National Planning Policy Framework (and Associated Planning Practice Guidance)

2.5.1 The National Planning Policy Framework (NPPF)[7] was updated in September 2023 by the Department of Levelling Up, Housing and Communities. The policies contained within the NPPF are expanded upon and supported by the 'Planning Practice Guidance', which was first published online in March 2014 (also by the Ministry of HCLG) and has been updated periodically since.

2.5.2 The NPPF sets out the Government's planning policies for England and how these are to be applied. It is a material consideration in planning decisions.

2.5.3 The NPPF does not contain specific policies for NSIP applications determined under the 2008 Planning Act for NSIPs because such applications are to be determined in accordance with the decision-making framework set out in the 2008 Planning Act and the relevant NPSs. Similarly, the NPPF does not contain specific policies for applications under the 1989 Electricity Act (such as this variation application).

2.5.4 Nevertheless, the NPPF is considered to form part of the overall framework of national policy against which such applications are to be considered. The following objectives of the NPPF are considered to be relevant to this variation application:

- (Chapter 2) Contributing to achieving sustainable development most notably by supporting growth and innovation and the provision of infrastructure and contributing to protecting and enhancing the natural environment by using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy;
- (Chapter 14) Meeting the challenge of climate change by supporting low-carbon energy; and
- (Chapter 15) Conserving and enhancing the natural environment.

2.5.5 It is considered that the variation application is consistent with the key objectives of the NPPF.

[7] Department of Levelling Up, Housing and Communities, 2023. The National Planning Policy Framework. September 2023.

Local Planning Policy

2.5.6 The current local plan document for Thurrock comprises the Core Strategy and Policies for Management of Development (Core Strategy) which was adopted in 2011 and updated in 2015. It sets out the spatial vision, strategy and planning policies for Thurrock. The Core Strategy does not contain any policies that are of direct relevance to this variation application.

3. THE SITE AND PROPOSED DEVELOPMENT

3.1 Introduction

3.1.1 This section provides a description and comparison of the existing Site and Coryton power station and the Proposed Development.

3.2 The Existing Coryton Power Station

3.2.1 Coryton is a CCGT generating station, located in the Thames Haven near Stanford Le Hope, Thurrock, Essex. Figure 1 presents the location of the existing Site, and Figure 2 presents a layout plan of the existing site.

3.2.2 The existing consent for Coryton provides that: *"the Development shall be of about 750 MW capacity and comprise:*

(a) one or more gas turbines, a heat recovery steam generators and steam turbines;

(b) air cooled condensers;

(c) one 400kv sub-station;

(d) ancillary plant and equipment; and,

(e) the necessary buildings (including administration buildings) and civil engineering works".

3.2.3 Coryton burns natural gas, which is supplied to the site via a connection into the National Grid Gas National Transmission System (NTS) Feeder 5 Pipeline. Natural gas is the primary fuel, and no back-up fuel is required.

3.2.4 During operation, Coryton CCGT burns natural gas in the combustion chamber of the gas turbines from where the resulting hot gases expand and generate sufficient power to drive the air compressor sections and gas turbine generators to produce electrical power. The hot exhaust gases still contain recoverable energy and are used in heat recovery steam generators (HRSGs) to generate steam which is expanded in common steam turbine plant to drive the common steam turbine generator to produce additional electrical power. The steam exhausting the steam turbine plant is passed to an ACC where it is condensed. The resulting condensate is returned to the HRSGs to continue the steam cycle. Subsequently, the flue gases are discharged from the HRSGs via dedicated 59m high stacks.

3.2.5 Overall, the energy demand and heat used is typical of a CCGT generating station.

3.2.6 The gas turbine generators and common steam turbine generator produce electrical power at approximately 19 kV which is stepped up to 400 kV through the three main transformers, and the electricity generated is dispatched to the National Grid Electricity Transmission System.

3.2.7 The use of a combined gas and steam cycle configuration increases the overall fuel efficiency of the generating station compared to an open (gas) cycle configuration, where the hot exhaust gases are directly discharged.

3.2.8 During operation, activities on-site are undertaken in accordance with an Environmental Permit. The latest version, EPR/EP3833LY/V003 was issued in on 10th March 2020 (under the Environmental Permitting (England and Wales) Regulations 2010).

3.3 The Proposed Development

3.3.1 The Proposed Development relates to the way in which Coryton is authorised to operate and involves the installation of the General Electric HE Upgrade to two existing GT26 gas turbines within Coryton. The upgrade comprises the retrofitting of the latest technology 'H-Class' parts of the turbines to increase plant efficiency and increase output.

3.3.2 The HE upgrade improves both the environmental performance and electricity market competitiveness of Coryton by:

- Allowing for an increase in the maximum generation capacity to up to 850 MW capacity;

- Allowing for an improvement in the electricity generation efficiency by approximately 2%; and
- Reducing emissions to air on a per MWh basis.

3.3.3 There would be no changes to any external infrastructure as part of the Proposed Development and therefore no change to the physical external appearance or building footprint. All works associated with the Proposed Development would be within the existing Site boundary.

4. CONSULTATION

4.1 Introduction

4.1.1 This section sets out a summary of the consultation undertaken by the applicant during the pre-application state, what account has been taken of views expressed and, where relevant, a summary of the subsequent actions taken and links to additional information.

4.2 Summary of Consultation

4.2.1 Extensive consultation was undertaken as part of the EIA process during preparation of the original application in 1996.

4.2.2 Additional consultation has been undertaken as part of the preparation of the variation application. This has included both informal consultation and formal consultation (via an EIA screening exercise).

Informal Consultation

4.2.3 Informal consultation has been undertaken via online virtual meetings with DESNZ and Thurrock Borough Council. DESNZ requested that a schedule be submitted that clearly sets out the changes being sought to the existing power station, and the existing consent. This is provided in Documents (7), (8) and (9) of the Application Pack. Thurrock Borough Council raised no specific issues or requests.

Formal Consultation

4.2.4 Formal consultation was undertaken via an EIA Screening exercise. This is discussed further in Section 5 below. Stakeholders consulted through the formal EIA Screening process included the Environment Agency, Natural England, NATS and the Health and Safety Executive. No particular issues relevant to this document or supporting appendices were received from any of the consultees.

5. RELEVANT ENVIRONMENTAL ASSESSMENT REQUIREMENTS

5.1.1 The Variation Guidance (at paragraph 36) states that, when considering a variation application under Section 36C of the 1989 Electricity Act, both the decision maker and the applicant must have complied with the relevant [environmental assessment] requirements".

5.1.2 Paragraph 37 subsequently states that:

> *"it is expected that applications to vary section 36 consents will invariably need to be accompanied by some form of environmental statement. In cases where the changes that it is proposed to make to the design of the generating station do not result in the overall development having a different environmental impact from the generating station as originally consented, it may be that only minor updating of the original environmental statement is required, to take account of (or confirm the absence of) any changes in the wider environmental context of the development…"*

5.1.3 In respect of the requirement for the variation application to be accompanied by an environmental statement (or updated environmental statement), the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 apply (hereafter referred to as 'the EIA Regulations').

5.1.4 Regulation 10(1) of the EIA Regulations states:

> *"A person (the "developer") who intends to make an application for a section 36 or 37 consent, or a section 36 variation, for development may request the relevant authority to make a screening decision".*

5.1.5 The EIA Regulations also set out the required content of a request for an EIA screening decision.

5.1.6 Accordingly, on 28th September 2023, CECL submitted an EIA Screening Report to the SoS for DESNZ. The EIA Screening Report supported CECL's request that the SoS adopt a screening decision that the Proposed Development is not EIA Development on the basis that it is considered unlikely to give rise to any significant environmental effects. The EIA Screening Report is included in **Appendix A**.

5.1.7 Subsequently, on 22nd November 2023, the SoS adopted an EIA Screening Opinion that the Proposed Development is not EIA Development, noting that:

> *"…the documents provided with the Applicant's email of 28 September 2023 and the evidence supplied by the relevant LPA are sufficient and that she can conclude that the Proposed Development is not EIA development under these Regulations as it is unlikely to have any significant effects on the environment."*

5.1.8 The SoS's EIA Screening Opinion is included in **Appendix B**.

5.1.9 The variation application therefore does not include a new or updated environmental statement. Consideration of the potential environmental impacts of the Proposed Development is however considered in detail in the EIA Screening Report, together with justification for why the resulting environmental effects are not considered likely to be significant.

5.1.10 Operational activities are controlled and monitored in accordance with an Environmental Permit (EPR/EP3833LY, version V003). The Proposed Development would not result in a material change to the environmental impacts associated with the plant and it will continue to be in compliance with the existing Environmental Permit for the site.

5.1.11 In light of the above, and the information provided in the accompanying appendices, it is considered that the variation application is compliant with the relevant environmental assessment requirements.

6. RELEVANT CARBON CAPTURE READINESS REQUIREMENTS

6.1.1 **Appendix C** provides a supporting CCR assessment which:

- Under Regulation 6(2)(a) of the 2013 CCR Regulations[8], presents the results of the CCR Assessment for the variation application; and
- Under Regulation 6(2)(b) of the 2013 CCR Regulations, presents other available information on the protection of the environment and human health relevant to the variation application.

6.1.2 The CCR assessment concludes that:

- Regarding potential CO_2 storage areas / sites, it is considered that there are no major barriers to demonstrating potential CO_2 storage sites are available;
- Regarding the technical retrofitting of CO_2 capture equipment requirements, it is considered that there are barriers to demonstrating technical feasibility of retrofitting for CO_2 capture equipment due to space limitations on the Site);
- Regarding the technical CO_2 transport requirements, it is considered that there are no major barriers to demonstrating a technically feasibility solution for CO_2 transport, but there are barriers to delivering a transport solution that would be feasible and viable within the projected operational life of Coryton Power Station; and,
- Regarding the economic assessment, it is considered that there are barriers to demonstrating economic feasibility.

6.1.3 Regarding the protection of the environment and human health, it is considered that:

- The Proposed Development is not EIA Development and would not result in any new or materially different environmental effects from those of the existing power station;
- Regarding Best Available Techniques (BAT), the principles of the BAT Conclusions for Large Combustion Plants[9] are that BAT is to increase / maximise electrical (and energy) efficiency, and prevent and / or reduce emissions, including CO_2 emissions. Should it be the case that the SoS cannot vary the existing consent for Coryton, the principles of the BAT Conclusions would not be achieved;
- Regarding previous UK precedence, there are several case studies where consent has been granted where the application included consideration of CCR, but CCR conditions were not applied and/or the CCR conditions were not met; and
- Whilst the CCR Assessment has demonstrated that there are barriers to retrofitting CO_2 capture equipment in terms of both technical and economic feasibility, this does not preclude a demonstration that an alternative decarbonisation option could be technically and economically feasible.

[8] The Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013.

[9] Commissioning Implementing Decision 2017/1442 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU, for large combustion plants.

7. RELEVANT COMBINED HEAT AND POWER REQUIREMENTS

7.1.1 **Appendix D** provides a supporting CHP assessment.

7.1.2 The overarching NPS for Energy (EN-1) sets out the Government's overall policy for the delivery of nationally significant energy infrastructure.

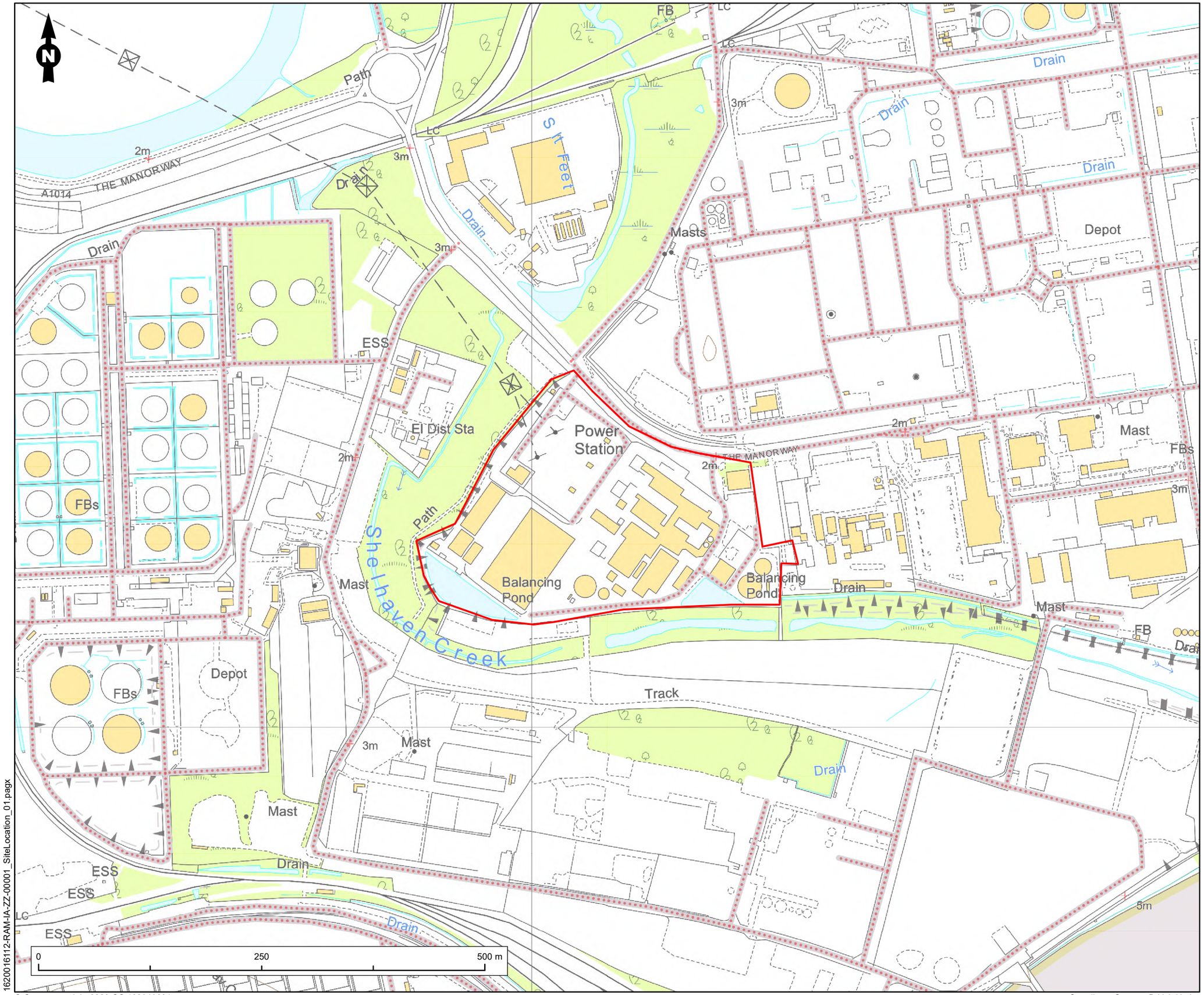
7.1.3 EN-1 states that:

> *"Applications for thermal stations must either include CHP proposals or contain evidence demonstrating that the possibilities for CHP have been fully explored to inform the Secretary of State's consideration of the application."*

7.1.4 The CHP assessment explores the possibilities for CHP and concludes that there are not considered to be any viable CHP opportunities at present.

7.1.5 It is considered that the variation application is compliant with the relevant CHP requirements.

FIGURES



Legend

Site Boundary

Figure Title
Site Location

Project Name
Coryton S36C Variation Application

Project No./Filery ID
1620016114/ REH2023N02405

Date	Figure No.	Revision
November 2023	1	1.0

Prepared By	Scale
SR	1:4,000 @A3

Client
Coryton Energy Company, Ltd

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1620016112-RAM-IA-ZZ-00001_SiteLocation_01.pagx

Prepared using plans provided by InterGen / Ethical Power Connections Limited (Drawing no: EPC-0860-P-E-LA-CR-R1.5)

Coordinate System: British National Grid. Projection: Transverse Mercator. Datum: OSGB 1936.

CORYTON SITE MAP

BUILDINGS

A Security
B MTC & Contractors Facilities
C Car Park
D Lab
E Water Treatment Plant
F Control Room & Permit Office
G Admin Building
H Stores
I Workshop
J 6.6kV Switchgear & Old CCR

PLANT AREAS

1 Gas Reception Facility
2 Gas Compressor House
3 Gas Oil Storage Tanks
4 Cooling Tower
5 Chemical Unloading Bay
6 Fire Pump House
7 Water Tanks
8 ACC (Air Cooled Condenser)
9 Outfall Pond
10 Gas Store & Oil Store
11 Waste Disposal Area
12 400kv Substation & Grid Yard
13 ST Transformer
14 ST
15 GTA Transformer
16 GTA
17 HRSG A
18 GTB Transformer
19 GTB
20 HRSG B
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APPENDIX A:
EIA SCREENING REPORT

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Coryton Energy Company, Ltd

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CORYTON POWER STATION

ENVIRONMENTAL IMPACT ASSESSMENT SCREENING REPORT

PROPOSED VARIATION APPLICATION UNDER SECTION 36C OF THE ELECTRICITY ACT 1989

RAMBOLL

CORYTON POWER STATION

ENVIRONMENTAL IMPACT ASSESSMENT SCREENING REPORT
Proposed Variation Application under Section 36C of the Electricity Act 1989

Project Name:	**CORYTON POWER STATION** **ENVIRONMENTAL IMPACT ASSESSMENT SCREENING REPORT**
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1. OVERVIEW

1.1 Background

1.1.1 Ramboll UK Limited (Ramboll) have been appointed by Coryton Energy Company, Ltd (CECL), a wholly owned subsidiary of InterGen, to prepare an Environmental Impact Assessment (EIA) Screening Report in respect of a proposed variation application under Section 36C of the Electricity Act 1989 for the Coryton Power Station (hereafter referred to as 'Coryton'). The proposed variation application would seek to allow for an increase in the permitted electricity generation output of Coryton from about 750MW to up to 850 MW capacity.

1.2 Overview of Coryton

1.2.1 Coryton is a combined cycle gas turbine (CCGT) generating station, located in the Thames Haven in Stanford Le Hope, Essex. Figure 1 presents the location of the existing Coryton site, and Figure 2 presents a layout plan of the existing site.

1.2.2 On 14 March 1997, the original consent was granted for Coryton under Section 36 of the Electricity Act 1989. The original consent was accompanied by a direction that planning permission be deemed to be granted under Section 90 of the Town and Country Planning Act 1990. Together, these (the original consent and the direction that planning permission be deemed to be granted) comprise the existing consent for Coryton. Appendix A provides further background information on the consenting history of Coryton.

1.2.3 Paragraph 3 the existing consent provides that: "*the Development shall be of about 750 MW capacity…*".

1.3 Overview of the Proposed Development

1.3.1 The Proposed Development comprises a High Efficiency (HE) upgrade to the existing two gas turbines at Coryton (refer to Figure 2: Items 16 and 19).

1.3.2 This upgrade consists of the retrofit of latest technology "H-class" parts to the internals of the gas turbines to increase the overall plant efficiency and allow for an increase in the electricity generation output to up to 850 MW capacity.

1.4 The Proposed Variation Application and Purpose this Report

Proposed Variation Application

1.4.1 CECL is proposing to submit a variation application under Section 36C of the Electricity Act 1989 to the Secretary of State for the Department for Energy Security and Net Zero (DESNZ) to allow for an increase in the permitted electricity generation output of Coryton to up to 850 MW capacity. The proposed variation application would also seek a direction to amend various conditions subject to which the planning permission was deemed to be granted under Section 90(2ZA) of the Town and Country Planning Act 1990 that are no longer relevant (i.e. they relate to construction of Coryton and, therefore, are not applicable to the Proposed Development, or they are in some other way out of date).

1.4.2 The Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 (the EIA Regulations) apply to variation applications under Section 36C of the Electricity Act 1989. Appendix B sets out the relevant policy context related to such a variation application.

Purpose of this Report

1.4.3 Prepared pursuant to Regulation 10(1) of the EIA Regulations[1], this is an EIA Screening Report in respect of the Proposed Development to support CECL's request that the Secretary of State adopts a Screening Opinion to the effect that the Proposed Development does not comprise EIA Development.

1.4.4 The purpose of this EIA Screening Report is to provide the required information to the Secretary of State pursuant to Regulation 6(2) of the EIA Regulations. Table 1.1 provides a summary of the EIA Screening required information, along with the location of this

[1] Regulation 6(1) of the EIA Regulations states: *"A person (the "developer") who intends to make an application for a section 36 or 37 consent, or a section 36 variation, for development may request the relevant authority to make a screening decision".*

information within this EIA Screening Report. Wherever relevant, additional supporting information is provided in the Figures and Appendices.

TABLE 1.1: EIA SCREENING REQUIRED INFORMATION

Required Information			***Location of Required Information***
6 (2)	*"A* [Screening Request] *must be accompanied by –*		
(a)	*the information referred to in Regulation 12;*		Required information pursuant to Regulation 12 of the EIA Regulations is provided below.
	12 (1)	*"The information to be provided by the developer is –*	
	(a)	*a description of the development, including in particular –*	Noting the criteria in Schedule 3 of the EIA Regulations: • Section 2.3 provides a description and comparison of the physical characteristics of the existing development and the Proposed Development. • Section 2.4 provides a description of the l features of the existing site and Proposed Development site.
	(i)	*a description of the physical characteristics of the whole development and, where relevant, demolition works;*	
	(ii)	*a description of the location of the development, with particular regard to the environmental sensitivity of the geographical areas likely to be affected;*	
	(b)	*a description of the aspects of the environment likely to be significantly affected by the development;*	Noting the criteria in Schedule 3 of the EIA Regulations, Section 2.4 provides a description of the existing site and Proposed Development site, including the environmental sensitivity of the natural resources / natural environment to the existing development and the Proposed Development.
	(c)	*a description of any likely significant effects, to the extent the information available on such effects, of the development resulting from –*	Noting the criteria in Schedule 3 of the EIA Regulations, Section 3.5 considers the types / characteristics of potential impacts of the Proposed Development due to / on (amongst others): • Pollution / nuisances due to expected emissions / residues; and, • Production of wastes. • Use of natural resources.
	(i)	*the expected residues and emissions and the production of waste, where relevant;*	
	(ii)	*the use of natural resources, in particular soil, land, water and biodiversity*".	
(b)	*a plan of the site of the development*".		Figure 1 presents the site location plan, and Figure 2 presents a layout plan of the existing development and Proposed Development site.

1.4.5 In compiling the required information, Regulation 12 of the EIA Regulations also provides:

- At Regulation 12(2), that: "*The developer must take into account the criteria set out in Schedule 3* [Selection Criteria for Screening Development]*, where relevant, when compiling the* [required] *information* [...]"; and,
- At Regulation 12(3), that: "*When providing the* [required] *information* […] –

  (a) the developer must take into account, where relevant, the available results of other relevant assessments of the effects on the environment undertaken under requirements imposed in accordance with European Union legislation other than the EIA Directive; and,

(b) *the developer may also provide a description of any features of the development and measures envisaged to avoid or prevent what might otherwise be significant adverse effects on the environment*".

2. DESCRIPTION OF THE SITE AND PROPOSED DEVELOPMENT

2.1 The Existing Coryton Power Station

2.1.1 The existing consent for Coryton provides that: *"the Development shall be of about 750 MW capacity and comprise:*

(a) one or more gas turbines, a heat recovery steam generators and steam turbines;

(b) air cooled condensers;

(c) one 400kv sub-station;

(d) ancillary plant and equipment; and,

(e) the necessary buildings (including administration buildings) and civil engineering works".

2.1.2 Coryton burns natural gas, which is supplied to the site via a connection into the National Grid Gas National Transmission System (NTS) Feeder 5 Pipeline. Natural gas is the primary fuel, and no back-up fuel is required.

2.1.3 During operation, Coryton CCGT burns natural gas in the combustion chamber of the gas turbines from where the resulting hot gases expand and generate sufficient power to drive the air compressor sections and gas turbine generators to produce electrical power. The hot exhaust gases still contain recoverable energy and are used in heat recovery steam generators (HRSGs) to generate steam which is expanded in common steam turbine plant to drive the common steam turbine generator to produce additional electrical power. The steam exhausting the steam turbine plant is passed to an ACC where it is condensed. The resulting condensate is returned to the HRSGs to continue the steam cycle. Subsequently, the flue gases are discharged from the HRSGs via dedicated 59m high stacks.

2.1.4 The gas turbine generators and common steam turbine generator produce electrical power at approximately 19 kV which is stepped up to 400 kV through the three main transformers, and the electricity generated is dispatched to the National Grid Electricity Transmission System.

2.1.5 The use of a combined gas and steam cycle configuration increases the overall fuel efficiency of the generating station compared to an open (gas) cycle configuration, where the hot exhaust gases are directly discharged.

2.1.6 During operation, activities on the site are undertaken in accordance with an Environmental Permit. The latest version, EPR/EP3833LY/V003 was issued in on 10th March 2020 (under the Environmental Permitting (England and Wales) Regulations 2010).

2.2 The Proposed Development

2.2.1 The Proposed Development involves the installation of the General Electric HE Upgrade to two existing GT26 gas turbines within Coryton. The upgrade comprises the retrofitting of the latest technology 'H-Class' parts of the turbines to increase plant efficiency and increase output.

2.2.2 The HE upgrade improves both the environmental performance and electricity market competitiveness of Coryton by:

- Allowing for an increase in the electricity generation output by approximately 77MW, increasing the maximum generation capacity to up to 850 MW capacity;
- Allowing for an improvement in the electricity generation efficiency by approximately 2%; and
- Reducing emissions to air on a per MWh basis.

2.2.3 There would be no changes to any external infrastructure as part of the Proposed Development and therefore no change to the physical external appearance or building footprint.

2.3 Characteristics of the Existing and Proposed Development

2.3.1 Table 2.1 provides a description and comparison of the physical characteristics of the existing development and the Proposed Development covering:

- Use of natural resources;
- Risks to population / human health;
- Pollution / nuisances from expected emissions / residues;
- Production of wastes;
- Design / size; and,
- Risks of major accidents and / or disasters.

TABLE 2.1: PHYSICAL CHARACTERISTICS OF THE EXISTING DEVELOPMENT AND THE PROPOSED DEVELOPMENT

Characteristic	***Description for: The Existing Development***	***Description for: The Proposed Development***
USE OF NATURAL RESOURCES		
Natural Gas	Coryton burns natural gas as the primary fuel. No back-up fuel is required.	The Proposed Development comprises the retrofitting of some of the gas turbine components, but requires no changes to the use of materials / natural resources from that of the existing development. Coryton will continue to burn natural gas only.
Chemicals	Small quantities of chemicals (e.g. ammonia, oxygen scavenger and sodium phosphate, along with others) are used in HRSG water dosing. These chemicals are stored in suitable containment areas on the site, and are shielded from the atmosphere. All chemical storage facilities compliant with the Control of Substances Hazardous to Health (COSHH) Regulations 2002, with the air discharged from the shields passing through a device to avoid the uncontrolled release of chemicals to the atmosphere.	
Oils (Lubricating)	Lubricating oils are used in the gas turbines, steam turbine plant and gas turbine / steam turbine generator bearings. Lubricating oils are also used in the control / detection / protection systems. These lubricating oils are stored in tanks located in suitable containment areas on the site. All lubricating oil storage tanks are compliant with the Control of Pollution (Oil Storage) (England) Regulations 2001, with the tanks sited in an impermeable bund capable of containing 110 per cent of the contents of each tank.	
Oils (Transformer)	Transformers oils are used in all major transformers, and are stored within the transformer. Each transformer is located with a containment bund. All containment bunds are compliant with the Control of Pollution (Oil Storage) (England) Regulations 2001, with the containment bunds capable of containing 110 per cent of the contents of the transformer. In addition, each containment bund volume is sized to accommodate fire water deluge quantities as required by fire-fighting codes and standards for extinguishing a transformer fire.	
RISKS TO POPULATION / HEALTH		
Operational Personnel	Coryton employs a direct workforce of the order of 35 operational personnel. There are also temporary jobs for contracted engineering staff during minor / major outages. The operational personnel consist of highly trained individuals responsible for the safe operation of all equipment / plant within environmental and other regulatory requirements.	The Proposed Development requires no changes to the operational personnel profile of the existing development.

Characteristic	***Description for: The Existing Development***	***Description for: The Proposed Development***
Operational Personnel Health and Safety	The health and safety of the local population and operational personnel is of paramount importance in the operation of a CCGT generating station, and a developer's statutory responsibilities include the development of a safe design of equipment / plant, and the maintenance of healthy and safe working conditions, equipment / plant and systems. Therefore, considering the requirements of any authorities (such as the Health and Safety Executive (HSE)) / third parties, the potential health and safety risks presented by the CCGT generating station were considered during the detailed design and construction of Coryton and appropriate health and safety protocols were included with the operating procedures for CEP. During operation, activities are controlled and monitored in accordance with the Environmental Permit (EPR/EP3833LY, version V003).	The Proposed Development requires no material changes to the protocols included within the operating procedures for the existing CEP.
Pollution / Nuisances from expected emissions / Residues		
Energy Demand / Heat Used	Coryton operates in various running modes including (but not limited to) baseload and cycling. The performance is continuously recorded to ensure correct and efficient operation. Any significant deviations are alarmed, and corrections carried out on occurrence. Records are maintained of performance and deviation. Occasionally, Coryton is shut down for periods of essential maintenance and statutory inspections. Minor outages (of the order of 4 days) occur every year, and major outages (of the order of 4 weeks) occur every three years. Outages are planned on a long-term basis. Overall, the energy demand and heat used is typical of a CCGT generating station.	The Proposed Development does not have an energy demand or heat use profile which materially differs from that of the existing development.
Air Quality		
Flue Gas Emissions	Coryton burns natural gas only. The main by-products of combustion are carbon dioxide (CO_2), nitrogen dioxide (NO_2) / nitrogen oxides (NO_x) and water vapour (H_2O) emissions. Natural gas combustion does not produce the particulate matter (PM) or sulphur dioxide (SO_2) (emissions typically associated with coal or oil combustion). NO_x emissions control is accomplished by using dry low NO_x (DLN) combustors. As a result, all atmospheric emissions from CEP are controlled at source and no flue gas emissions cleaning equipment is required. During operation, activities (including flue gas emissions) are controlled and monitored in accordance with the Environmental Permit (EPR/EP3833LY, version V003). Schedule 3 of the Environmental Permit sets out emissions limits to air for NO, NO_2 and Carbon Monoxide (CO). Continuous monitoring is undertaken to check that the limits are not exceeded.	The Proposed Development will not result in a material change to the emissions from the plant which will continue to be in compliance with the existing Environmental Permit for the site. Emissions of NOx and CO from the existing plant are well within the limits set out in the environmental permit, and there would be no change to these limits proposed as part of, or following, the Proposed Development. The overall efficiency of the plant would improve by an estimated 2% and thereby reduce gas consumption and emissions on a per MWh basis.

Characteristic	***Description for: The Existing Development***	***Description for: The Proposed Development***
Infrequent Natural Gas Emissions during Safety Venting	In line with all existing gas fired generating stations, there are infrequent natural gas emissions to the atmosphere during safety venting. The safety venting system is designed to prevent explosions of air / gas accumulations, and all potential ignition sources are protected. Using remote activated relief values positioned at appropriate locations in the natural gas system, the infrequent safety venting is carried out in a controlled manner for maintenance activities and to support start-up / shut-down. A log of the safety venting is maintained for reporting to the relevant authorities. Based on the infrequent timing, venting height, and the fact that gas volumes dissipate quickly, the infrequent safety venting does not cause any danger in the vicinity of the site.	The Proposed Development requires no changes to the infrequent natural gas safety venting from that of the existing development.
Noise and Vibration		
Noise Emissions	The principal noise emission sources are: air inlets; gas turbines (and associated generators); HRSGs; steam turbine plant (and associated generator); exhaust stacks; ACC (and associated fin fan coolers); and, transformers. The noise emissions are of a steady nature. Implementation of BAT was addressed in the design of the existing development to ensure appropriate noise attenuation measures were employed. A noise monitoring programme was undertaken in 2016 to ensure that the operation of Coryton is compliant with the requirements of Regulation 5 of the Control of Noise at Work Regulations 2005. While noise levels inside generator rooms can exceed 100dBA and immediately outside generator rooms can exceed over 85dBA, all staff are required to wear hearing protection at all times across the site, unless working within offices, stores or other quiet indoor areas. There are no reasonably practical ways of providing significant reductions in noise levels by engineering or other means.	The Proposed Development comprises changes to the internals of the gas turbines only. There would be no change to external noise emissions associated with operation of Coryton which would impact upon any surrounding receptors. With regard to internal noise levels, monitoring will continue to be undertaken to ensure compliance with Control of Noise at Work Regulations 2005.
Ground Conditions		
Effluents / Emissions	Ground effluents / emissions are related to: • Accidental / unplanned releases and / or spills. Regarding accidental / unplanned releases and / or spills, a chemical or oil release / spill is recognised as being one of the principal environmental emergencies that could arise at the existing development. As such, the potential risks of major accidents and / or disasters presented by the CCGT generating station were considered during the detailed design and construction of Coryton and appropriate protocols are included within the operating procedures.	The Proposed Development produces no additional ground effluents / emissions to those of the existing development.

Characteristic	***Description for: The Existing Development***	***Description for: The Proposed Development***
Water Resources		
Effluents / Emissions	Water effluents / emissions are related to: • Blowdown; • Gas turbine blades washing; • Site Drainage; and, • Accidental / unplanned releases and / or spills. Regarding blowdown, water quality in the HRSG is of high purity, containing very small quantities of corrosion and scaling prevention chemicals. To control the build-up of impurities in the water, it is necessary to discharge some steam / water from the system as blowdown. The blowdown is discharged at HRSG temperature and pressure. Some of the blowdown flashes off to steam in the blowdown vessel, reducing the volume still further. Regarding gas turbine blade washing, occasionally is it necessary to wash the gas turbine (air compressor) blades remove debris that has penetrated the air inlet filters and become lodged on the blades. This is undertaken at times when the performance of the gas turbines has degraded and depends upon the air quality. Washing can be done in two ways, either by: on-line washing where a fine spray of water is allowed to pass through the gas turbine; or, off-line washing where the compressor blades are rotated slowly through a detergent solution. Regarding site drainage, there are four systems including those for: surface water; oily water; contaminated wastewater; and, sewerage. During operation, activities (including site drainage) are controlled and monitored in accordance with the Environmental Permit (EPR/EP3833LY, version V003). As described above (under Ground Conditions) the potential risks of major accidents and / or disasters were considered during the detailed design and construction of Coryton and appropriate protocols are included within the operating procedures.	The Proposed Development produces no additional water effluents / emissions to those of the existing development.
PRODUCTION OF WASTES		
Combustion Wastes	CCGT generating stations are recognised as one of the most efficient users of raw materials / natural resources for electricity generation, and an inherent characteristic of gas fired generating stations is that combustion wastes are typically small and are minimised by design. No solid combustion wastes are produced.	The Proposed Development produces no additional wastes (or change the waste characteristics) to those of the existing development.
Used Chemical / Oil Wastes	Used chemicals and oils, and chemical / oil containers, are either stored on the site for re-use, or are collected and disposed of offsite by an approved and licensed contractor.	
Other Site Wastes	Limited amounts of other solid site wastes are generated by general site operations (e.g. office wastes). These general site wastes are collected and disposed of offsite by an approved and licensed contractor.	

Characteristic	***Description for: The Existing Development***	***Description for: The Proposed Development***
LANDSCAPE		
Design / Size	Coryton was constructed in accordance with its original planning consent, which was granted on the basis of a number of conditions relating to the site, design and layout of the development. All conditions were discharged by the Local Authority.	The Proposed Development results in no external changes to any building / equipment / stack dimensions, elevations, footprints or locations. As such, the Proposed Development does not affect the design, size or shape of the existing development.
Lighting	Suitable low-level lighting is installed at Coryton to ensure that operational personnel can move safely around the site to facilitate normal operation and maintenance activities, as well as to ensure healthy and safe working conditions, and maintain security. Stand-by emergency lighting is also installed. The installed lighting scheme was approved by the Local Authority under Condition 10 of the existing consent.	The Proposed Development does not require any additional indoor / outdoor lighting (or stand-by emergency lighting) to that of the existing development.
TRANSPORT SERVICES AND INFRASTRUCTURE		
Operational Site Access	The site is accessed from The Manorway, a key route into the area and surrounding sites. For all operational personnel, visitors and deliveries, access is via the existing security controlled gate (illustrated in Figure 2, item 1).	The Proposed Development does not have an operational site access or operational traffic profile which differs from that of the existing development.
Operational Traffic	Of the 35 operational personnel, approximately 20 personnel work 'standard' hours (for example, 08:00 to 16:15). The remaining either work 'day-shift' hours (for example, 06:00 to 18:00) or 'night-shift' hours (18:00 to 06:00). Associated site access is via the existing security-controlled Gate on The Manorway.	
RISKS OF MAJOR ACCIDENTS AND / OR DISASTERS		
Compliance	During operation, risks of major accidents and / or disasters are controlled and managed in compliance with the relevant legislation, regulations, and codes and standards. Considering the requirements of any authorities / third parties, potential risks of major accidents and / or disasters presented by the CCGT generating station were considered during the detailed design and construction of Coryton and appropriate protocols are included within the operating procedures. Furthermore, there are no substances used or stored on site that will make the site notifiable to the HSE under the Control of Major Accident Hazards (COMAH) Regulations 2015, or require a Hazardous Substances Consent (HSC) under the Planning (Hazardous Substances) Regulations 2015. In particular, there is no natural gas storage on the site.	The Proposed Development requires no material changes to the protocols included within the operating procedures for the existing development. In addition, there will continue to be no substances used or stored on site that will make the site notifiable to the HSE or require a HSC.

Characteristic	***Description for: The Existing Development***	***Description for: The Proposed Development***
Control Systems	Coryton was designed with a view to a high degree of automatic operation. However, from time to time, a degree of intervention is required and facilities for interfacing information and systems are installed so that Coryton can be remotely operated from the Central Control Room. In addition, proprietary control systems are installed so that the gas turbine generators and steam turbine generator can be locally operated (and controlled / monitored). Furthermore, back-up control systems are installed to deal with emergency situations, including: compressed air failure; electrical power failure; lighting strikes; major equipment / plant failure; and, water supply failure. In terms of electrical power failure, emergency generators are installed to provide emergency back-up and enable Coryton to be shut down in a safe manner. Under normal circumstances, these emergency generators are only operated for testing purposes and short durations.	The Proposed Development requires no material changes to the control systems of the existing development.
Fire Alarm / Detection / Protection Systems	Fire alarm / detection / protection systems are installed throughout the site, covering all equipment / plant that could constitute a fire risk. The fire alarm / detection / protection system (which incorporates heat sensors) are used in conjunction with automatic spray nozzles, smoke detectors and typical portable appliances. For the protection of the majority of equipment / plant, an automatic high velocity water spray system is provided. Fire water is stored in a combined raw water / fire water tank on the site. The volume of water required for fire protection is reserved such that it can only be used for this purpose. For the protection of equipment / plant within each gas turbine, where water spray could cause damage, a total flood CO_2 system is provided. In addition, wherever possible, the buildings were constructed of non-combustible and fire-resistant materials. The testing of the fire alarm / detection / protection system is undertaken in accordance with an Emergency Response Plan.	the Proposed Development requires no material changes to the fire alarm / detection / protection systems of the existing development.

2.4 Location of the Site

2.4.1 Condition 2 of the existing consent for Coryton provides that: *"the construction of the Development shall only take place within the boundary of the Site"*. The Proposed Development requires no changes in the location of the existing site, which is shown in Figure 1.

2.4.2 The site is located in an industrial area on the north side of the Thames Estuary. The site is surrounded to the north and east by the now closed Coryton oil refinery. To the west is the Shell Haven fuel terminal and BPA oil pumping station, and to the south is Thames Enterprise Park, a new logistics and manufacturing hub which is currently under construction. Further to the west is the London Gateway Logistics Park.

2.4.3 The site is accessed directly from The Manorway (A1014), located along the north east boundary of the site. The road joins the A13, a dual carriageway, at the western edge of Stanford-le-Hope. The A13 is a strategic route that runs between London to the west and Chelmsford to the north.

2.4.4 The site is bound to the south and west by a small watercourse, Shellhaven Creek, which discharges into the River Thames located approximately 600m south of the site at its nearest point.

2.4.5 The site is not located in proximity to any residential receptors, with the nearest residential homes located on the outskirts of Corringham, approximately 3km to the west.

2.4.6 The site is not located within a designated Air Quality Management Area. Thurrock Council does not undertake any long term air quality monitoring in proximity to the site. Background mapping published by the DEFRA UK Air Information Resource (UK-AIR) shows that in 2022, NO_2 Annual Mean levels were between 11-20 µg m^{-3}. NO_2 levels at and around the site are therefore likely to be well below the Annual NO_2 limit of 40 µg m^{-3}, the relevant limit set by the Air Quality Standards Regulations 2010 for human health receptors.

2.4.7 The primary sources of noise at and around the site are the existing industrial and logistics operations and associated vehicle and HGV movements using the local road network (in particular The Manorway, the main access route into the area).

2.4.8 The site is not located in or adjacent to any statutory designated landscape areas.

2.4.9 The site is not located within or adjacent to any statutory designated sites for nature conservation. The nearest are Holehaven Creek Site of Special Scientific Interest (SSSI), approximately 950m east of the site and Vange and Fobbing Marshes SSSI, approximately 1km north of the site. The Thames Estuary and Marshes Ramsar site and Special Protection Area (SPA) are located on the south side of the River Thames, approximately 2km south of the site.

2.4.10 The site is not located adjacent to any statutory heritage designations (world heritage sites, scheduled monuments or listed buildings). The nearest designated asset is the World War II bombing decoy on Fobbing Marshes Schedule Monument, approximately 1.9km to the north west.

3. EIA SCREENING

3.1 Introduction

3.1.1 This Section presents the EIA screening designed to aid in the decision as to whether (or not) the Proposed Development comprises EIA Development.

3.2 EIA Screening Methodology

3.2.1 Regulation 5 of the EIA Regulations provides that: *"Within these Regulations, "EIA Development" means any of the following –*

(a) development of a description set out in Schedule 1;

(b) development of a description set out in Schedule 2 if –

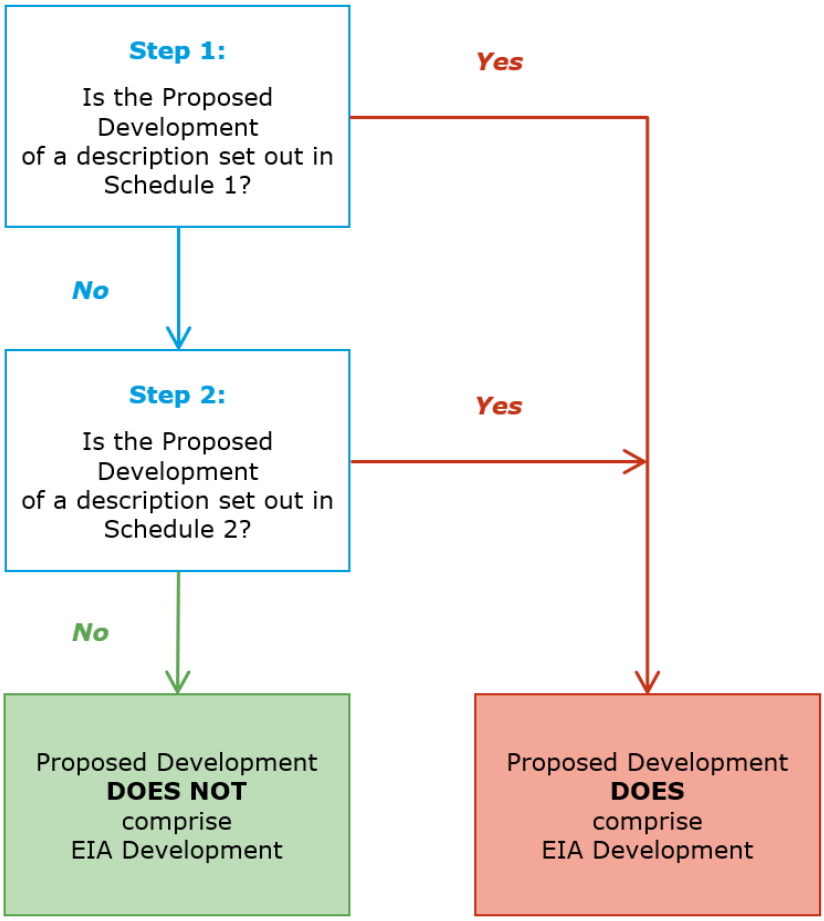
(i) an EIA Report is provided to the relevant authority in connection with an application for a section 36 or 37 consent, or a section 36 variation, for the development; or,

(ii) the relevant authority makes a screening decision that the development is EIA Development;

(c) development of any other description for which an application for a section 36 or 37 consent, or a section 36 variation, is made (or may be made) if the relevant authority makes a screening decision that the development is EIA development".

3.2.2 Accordingly, Insert 3.1 provides an overview of the EIA screening methodology adopted within this EIA Screening Report.

INSERT 3.1: OVERVIEW OF THE EIA SCREENING METHOLOGY



3.3 Is the Proposed Development a Schedule 1 Development?

3.3.1 Development cited in Schedule 1 of the EIA Regulations includes:

"*1. Development to provide* […] – […]

(b) a thermal generating station with a heat output of 300 megawatts or more"; and

"*2. Development to provide a change to or extension of a generating station* […] *of a description set out in paragraph 1 where the change or extension in itself meets the thresholds, if any, or description set out in that paragraph*".

3.3.2 The Proposed Development is not a new thermal generating station and the variation application would not increase output at Coryton by greater than 300 MW. Accordingly the Proposed Development is not considered to be a Schedule 1 Development as described in Paragraph 1 or 2.

3.4 Is the Proposed Development a Schedule 2 Development?

3.4.1 Development cited in Schedule 2 of the EIA Regulations includes:

"*1. Development to provide a generating station (other than a generating station of a description set out in paragraph 1 of Schedule 1)*"; and

"3. Development to provide a change to or extension of –

(a) a generating station (other than a change or extension set out in paragraph 2 of Schedule 1);

where the generating station […] *is already authorised, executed or in the process of being executed and the change or extension may have significant adverse effects on the environment".*

3.4.2 It is considered that the Proposed Development is development to provide a change to a generating station where the generating station is already authorised and executed. Therefore, it is considered the Proposed Development could comprise EIA Development if the change to the generating station is likely to have significant adverse effects on the environment.

3.5 Is the Proposed Development likely to have Significant Adverse Effects on the Environment?

3.5.1 Table 3.1 presents the series of questions designed to compare the likely effects on the environment to determine the main respects in which the likely effects of the Proposed Development on with environment will differ from those of the existing development, and whether the Proposed Development is likely to have significant adverse effects on the environment. In particular, Table 3.1 considers the types / characteristics of potential impacts due to / on:

- Use of natural resources;
- Population / human health;
- Pollution / nuisances from expected emissions / residues;
- Ground conditions / land use;
- Water resources;
- Production of wastes;
- Biodiversity;
- Landscape;
- Transport services and infrastructure;
- Cultural heritage;
- Risks of major accidents and / or disasters; and,

Cumulative interaction of impacts (with other existing and / or approved development).

TABLE 3.1: IS THE PROPOSED DEVELOPMENT LIKELY TO HAVE SIGNIFICANT ADVERSE EFFECTS ON THE ENVIRONMENT

Question	***Yes (Y) / No (N)***		***Is this likely to result in a Significant Adverse Effect on the Environment?***	
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT DUE TO USE OF NATURAL RESOURCES				
Will the Proposed Development use natural resources above or below ground (such as: land; soil; materials / minerals; water; or, energy) which are non-renewable or in short supply in a way which differs from that of the existing development?	N	As described in Table 2.1, the Proposed Development requires no changes to the use of materials / natural resources from that of the existing CEP.	-	N / A
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON POPULATION / HUMAN HEALTH				
Will the Proposed Development present a risk to population (having regard to population density) and their human health in a way which differs from that of the existing development?	N	The Proposed Development requires no changes to the operational personnel profile of Coryton, and requires no material changes to the protocols included within the operating procedures. Therefore, the Proposed Development will not present risks to the operational personal or their Health and Safety which materially differ from those of the existing development. The nearest off site residential receptors are located approximately 3km from the site. The Proposed Development would not give rise to any material changes to pollution, air and noise emissions, as discussed further below in this table.	-	N / A
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT DUE TO POLLUTION / NUISANCES				
Will the Proposed Development have an energy demand / heat use profile which differs from that of the existing development?	N	The Proposed Development does not have an energy demand or heat use profile which materially differs from that of the existing development.	-	N / A
Air Quality				
Will the Proposed Development release pollutants or any hazardous, toxic or noxious substances to air in a way which differs from that of the existing development?	N	The Proposed Development does not materially alter the emissions, which will remain in compliance with existing Environmental Permit requirements.	-	N / A

Question	***Yes (Y) / No (N)***		***Is this likely to result in a Significant Adverse Effect on the Environment?***	
Regarding air quality, are there any areas on / around the site which: • Are already subject to pollution or environmental damage (such as: where existing legal environmental standards are exceeded); and / or, • Contain high quality, important or scarce natural resources; which could be affected by the Proposed Development in a way which differs from that of the existing development?	N	The Proposed Development will not release NO_2 / NO_x in a way which materially differs from that of the existing development. There are no areas on / around the site which could be affected by the Proposed Development in a way which materially differs from that of the existing development.	-	N / A
Noise and Vibration				
Will the Proposed Development release noise and vibration in a way which differs from that of the existing development?	N	The Proposed Development does not alter the noise emission parameters from those of the existing development. The Proposed Development will not release vibration in a way which materially differs from that of the existing development	-	N / A
Regarding noise and vibration, are there any areas on / around the site which: • Are already subject to pollution or environmental damage (such as: where existing legal environmental standards are exceeded); and / or, • Contain high quality, important or scarce natural resources; which could be affected by the Proposed Development in a way which differs from that of the existing development?	N	Operation of the Proposed Development will not release noise in a way which materially differs from that of the existing development. There are no areas on / around the site which could be affected by the Proposed Development in a way which materially differs from that of the existing development.	-	N / A
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON GROUND CONDITIONS / LAND USE				
Is the Proposed Development likely to lead to risks of contamination of ground conditions (such as: from releases of pollutants into the land / onto the ground) which differ from those of the existing development?	N	The Proposed Development produces no additional ground effluents / emissions to those of the existing development.	-	N / A
Regarding ground conditions / land use, are there any areas on / around the site which: • Are already subject to pollution or environmental damage (such as: where existing legal environmental standards are exceeded); and / or, • Contain high quality, important or scarce natural resources; which could be affected by the Proposed Development in a way which differs from that of the existing development?	N	The Proposed Development produces no additional ground effluents / emissions to those of the existing development.	-	N / A

Question	***Yes (Y) / No (N)***		***Is this likely to result in a Significant Adverse Effect on the Environment?***	
Is the site susceptible to earthquakes / subsidence / landslides or extreme / adverse climatic conditions (such as: temperature inversions; fogs; or, severe winds) which could cause the Proposed Development to present environmental problems which differ from those of the existing development?	N	The Proposed Development does not affect the design, size or shape of the existing development and accordingly not present environmental problems which materially differ from those of the existing development.	-	N / A
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON WATER RESOURCES				
Is the Proposed Development likely to lead to risks of contamination of water resources (such as: from releases of pollutants into surface waters, groundwaters, coastal waters or the sea) which differ from those of the existing development?	N	The Proposed Development produces no additional water effluents / emissions to those of the existing development.	-	N / A
Regarding water resources, are there any areas on / around the site which: • Are already subject to pollution or environmental damage (such as: where existing legal environmental standards are exceeded); and / or, • Contain high quality, important or scarce natural resources; which could be affected by the Proposed Development in a way which differs from that of the existing development?	N	The Proposed Development produces no additional water effluents / emissions to those of the existing development.	-	N / A
Is the site susceptible to flood risks (e.g. risks caused by climate change, in accordance with scientific knowledge) which could cause the Proposed Development to present environmental problems which differ from those of the existing development?	N	The Proposed Development does not affect the design, size or shape of the existing development.	-	N / A
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT DUE TO PRODUCTION OF WASTES				
Will the Proposed Development produce solid wastes in a way which differs from that of the existing development?	N	The Proposed Development produces no additional wastes (and does not materially change the associated waste characteristics) to those of the existing development (covering combustion wastes, oil wastes and general site wastes).	-	N / A

Question	***Yes (Y) / No (N)***		***Is this likely to result in a Significant Adverse Effect on the Environment?***	
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON BIODIVERSITY (HABITATS AND SPECIES)				
Are there any: • Designated / classified areas which are protected for their avian, marine or terrestrial ecological value; and / or • Non-designated / non-classified areas which area important or sensitive for their avian, marine or terrestrial ecological value; and / or, • Areas used by protected, important or sensitive species of flora or fauna (such as for: breeding; foraging; migration; nesting; overwintering; or, resting); on / around the site which could be affected by the Proposed Development in a way which differs from that of the existing development?	N	As described above, operation of the Proposed Development will not release NO_2 / NO_x or noise emissions in a way which materially differs from that of the existing development. Therefore, the impacts of the Proposed Development will not materially differ from those of the existing development.	-	N / A
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON LANDSCAPE				
Will the Proposed Development require design / size changes which will be visible in a way which differs from that of the existing development?	N	The Proposed Development results in no external changes to any building / equipment / stack dimensions, elevations, footprints or locations.	-	N / A
Will the Proposed Development involve actions which result in physical changes to the topography of the area which differ from those of the existing development?	N	The Proposed Development does not affect the design, size or shape of the existing site or development.	-	N / A
Will the Proposed Development release light in a way which differs from that of the existing development?	N	The Proposed Development does not require any additional indoor / outdoor lighting (or stand-by emergency lighting) to that of the existing development.	-	N / A
Are there any: • Designated / classified areas or features which are protected for their landscape or scenic value; and / or, • Non-designated / non-classified areas or features which are important or sensitive for their landscape or scenic value; on / around the site which could be affected by the Proposed Development in a way which differs from that of the existing development?	N	The Proposed Development does not affect the design, size or shape of the existing development.	-	N / A

Question	***Yes (Y) / No (N)***		***Is this likely to result in a Significant Adverse Effect on the Environment?***	
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON TRANSPORT SERVICES AND INFRASTRUCTURE				
Are there any: • Transport routes which are susceptible to congestion or which cause environmental problems; and / or, • Public access routes which are used for access to recreation or other facilities; on / around the site which could be affected by the Proposed Development in a way which differs from that of the existing development?	N	The Proposed Development does not have an operational traffic profile which materially differs from that of the existing development. The traffic generated during the construction period will be consistent with that currently accessing the site during a planned shut down event and is therefore not considered a material variation from current operational traffic. No abnormal load movements will be required for the HE upgrade. There are no transport routes and / or public access routes on / around the site which could be affected by the Proposed Development.	-	N / A
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON CULTURAL HERITAGE				
Are there any: • Designated / classified areas or features which are protected for their cultural heritage or archaeological value; and / or, • Non-designated / non-classified areas or features important or sensitive for their cultural heritage or archaeological value; on / around the site which could be affected by the Proposed Development in a way which differs from that of the existing development?	N	The Proposed Development does not affect the design, size or shape of the existing development and accordingly would have no impact on any designated or non-designated heritage assets.	-	N / A
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT DUE TO RISKS OF MAJOR ACCIDENTS AND / OR DISASTERS				
Is the Proposed Development likely to lead to risks of major accidents and / or disasters which differ from those of the existing development?	N	The Proposed Development requires no material changes to the protocols included within the operating procedures for the existing development.	-	N / A
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT DUE TO CUMULATIVE INTERACTION OF IMPACTS				
Is the Proposed Development together with other (existing / approved / proposed) developments likely to result in the cumulative interaction of impacts which differ from those of the existing development together with other developments?	N	Based on the above, the likely effects of the Proposed Development will not materially differ from those of the existing development. Therefore, the Proposed Development together with other developments is not likely to lead to result in the cumulative interaction of impacts which materially differ from those of the existing development together which other developments.	-	N / A

Question	***Yes (Y) / No (N)***		***Is this likely to result in a Significant Adverse Effect on the Environment?***	
POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT DUE TO TRANSBOUNDARY EFFECTS				
Is the Proposed Development likely to lead to transboundary effects which differ from those of the existing developments?	N	The Proposed Development is not likely to lead to transboundary effects which materially differ from those of the existing developments.	-	N / A

4. EIA SCREENING CONCLUSIONS

4.1.1 Insert 4.1 presents the EIA screening conclusions.

INSERT 4.1: EIA SCREENING CONCLUSIONS

Step 1:

Is the Proposed Development of a description set out in Schedule 1?

It is considered that the Proposed Development is not: development to provide a thermal generating station with heat output of 300 MW or more; or, development to provide a change to a generating station where the change in itself meets the threshold of a heat output of 300 MW or more.

It is considered that the Proposed Development is not of a description set out in Schedule 1.

Step 2:

Is the Proposed Development of a description set out in Schedule 2?

It is considered that the Proposed Development is not: development to provide a (thermal generating station). However, it is considered that the Proposed Development is development to provide a change to a generating station where the generating station is already authorised and executed.

It is considered that the Proposed Development could comprise EIA Development if the change to the generating station is likely to have significant adverse effects on the environment.

Is the Proposed Development likely to have Significant Adverse Effects on the Environment?

It is considered that the Proposed Development is not likely to have significant adverse effects on the environment.

It is considered that the Proposed Development does not comprise EIA Development.

FIGURES

Figure 1: Site Location Plan

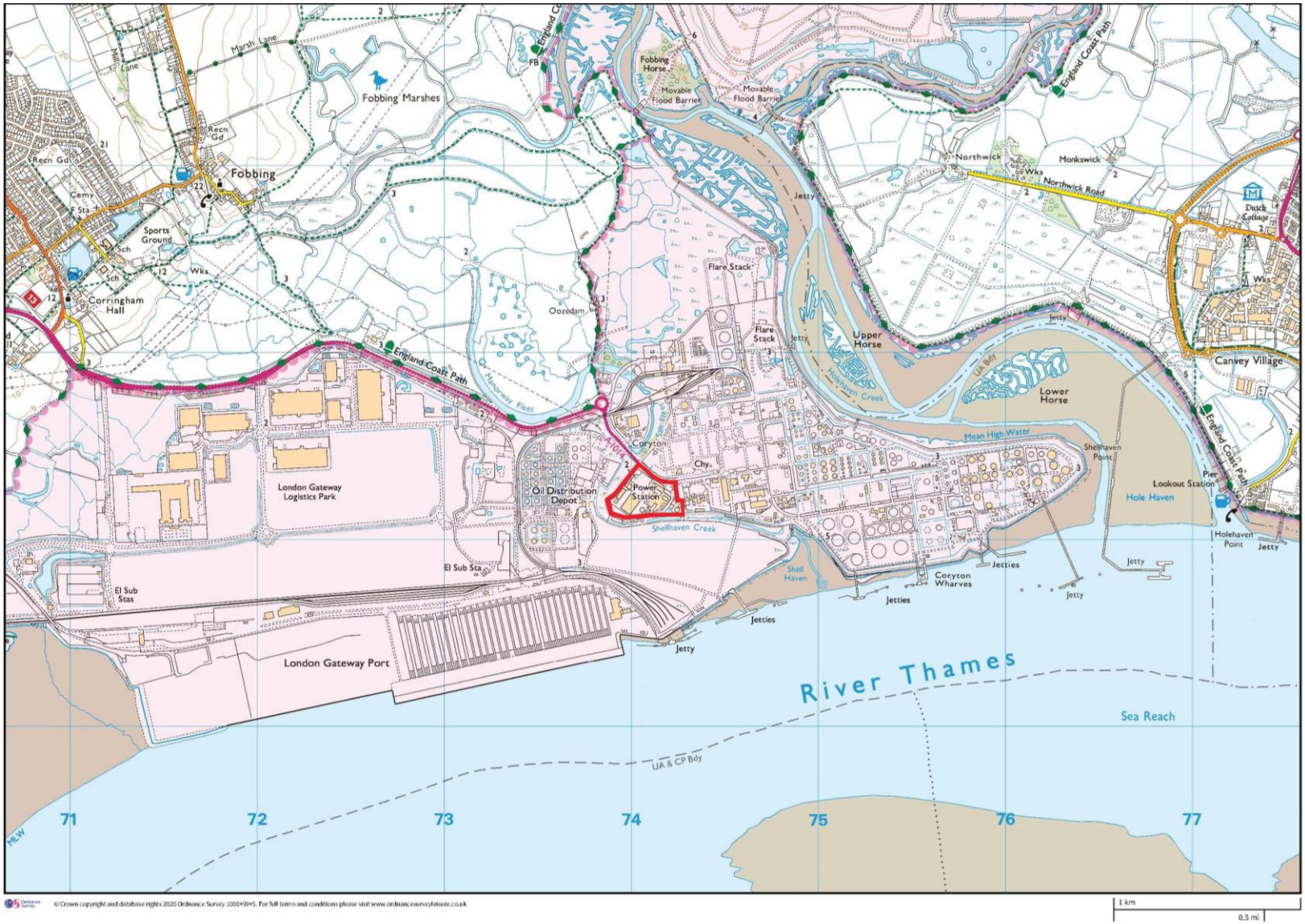


Figure 2: Site Layout Plan

APPENDIX A:
CONSENTING HISTORY

CONSENTING HISTORY

A.21 Coryton Power Station

In June 1996, InterGen submitted an application under Section 36 of the 1989 Electricity Act for the construction and operation of a combined heat and power combined cycle gas turbine generating station at Coryton, Essex.

The Development comprised the following:

a) One or more gas turbines, heat recovery steam generators and steam turbines;

b) Air cooled condensers;

c) One 400kV substation;

d) Ancillary plant and equipment; and

e) The necessary buildings (including administration buildings) and civil engineering works.

An Environmental Statement was submitted with this application in June 1996. Amendments were made to the application in January 1997, including an updated Environmental Statement entitled 'Assessment of Environmental Implications of Larger Plant'. On the 14 March 1997 InterGen was granted permission under Section 36 of the 1989 Electricity Act.

The consent was granted subject to 40 conditions, of these 10 required discharge prior to commencement and 4 required discharge prior to commissioning, the remainder were compliance conditions. All the pre-commencement conditions were confirmed to be discharged by a letter from Thurrock Council dated 21 May 1998.

A.2 Associated Authorisation: The Gas Connection

An application was made in August 1997 under the pipelines Act 1961 for a pipeline construction authorisation for a cross country pipeline for Coryton Power Station to the Department for Trade and Industry (application ref: AAC/2/75).

An application under the Town and Country Planning Act 1990 was submitted in January 1998 for 'Above ground gas installation. Fencing, ancillary buildings and lighting, improved access from Butts Lane. Associated landscaping' permission was granted on 12th March 1998 (application reference: 98/00069/FUL).

An application for the 'Vehicular access from Waltons Hall Road new access track (to serve above ground gas installation)' was submitted in April 1998 and approved on 5th June 1998 (application reference: 98/00334/FUL).

A.4 Associated Authorisation: The Electrical Connection

The electricity generated is dispatched to the National Grid Electricity Transmission System. An application was made for overhead line consents in September 1996 were granted under Section 37 of the Electricity Act 1989 on 4 December 1997.

An application for alterations to Eastern Electricity's 132 kV line to facilitate connection of the Coryton Power Station under Section 37 of the Electricity Act 1989 was submitted in October 1996 and consent was granted on 4 December 1997.

A.4 Associated Authorisation: Environmental Permit

During operation, activities on the site are undertaken in accordance with an Environmental Permit.

On the 16 September 1997 the original Environmental Permit was granted for the Coryton CHP/ CCGT Power Station under authorisation number AY3962 under the Environmental Protection Act 1990. A new permit was issued in February 2007 under reference: EPR/EP3833LY. In March 2020, the latest version (V003) was issued under the 2016 Environmental Permitting (England and Wales) Regulations.

APPENDIX B:
RELEVANT POLICY CONTEXT

RELEVANT POLICY CONTEXT (RELATED TO A VARIATION APPLICATION UNDER SECTION 36C OF THE ELECTRICITY ACT 1989)

B.1 Legislative Context

Section 36C[2] of the Electricity Act 1989 provides:

"(1) The person for the time being entitled to the benefit of a section 36 consent may make an application to the appropriate authority for the consent to be varied.

[…]

(4) On an application for a section 36 consent to be varied, the appropriate authority may make such variations to the consent as appear to the authority to be appropriate, having regard (in particular) to—

(a) the applicant's reasons for seeking the variation;

(b) the variations proposed;

(c) *any objections made to the proposed variations, the views of consultees and the outcome of any public inquiry*".

The 'appropriate authority' in this case is DESNZ (the Secretary of State) as provided by Section 36C(6) of the Electricity Act 1989.

Section 90(2ZA)[3] of the Town and Country Planning Act 1990 provides that: *"On varying a consent under section 36 or 37 of the Electricity Act 1989 in relation to a generating station or electric line in England or Wales, the Secretary of State may give one or more of the following directions (instead of, or as well as, a direction under subsection (2))—*

(a) a direction for an existing planning permission deemed to be granted by virtue of a direction under subsection (2) (whenever made) to be varied as specified in the direction;

(b) a direction for any conditions subject to which any such existing planning permission was deemed to be granted to be varied as specified in the direction;

(c) *a direction for any consent, agreement or approval given in respect of a condition subject to which any such existing planning permission was deemed to be granted to be treated as given in respect of a condition subject to which a new or varied planning permission is deemed to be granted".*

The Electricity Generating Stations (Variation of Consents) (England and Wales) Regulations 2013 (the Variation Regulations), as amended by the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 (the EIA Regulations), set out the procedures for handling applications to vary extant consents granted under Section 36 of the Electricity Act 1989 for the construction, extension and operation of electricity generating stations.

Government Guidance

The Variation Guidance[4] was published by the Department of Energy and Climate Change (DECC), (the predecessor to DESNZ) in July 2013.

Paragraph 21 states that: *"The power conferred on the Secretary of State … by section 36C of the 1989 Act is a broad and discretionary one to make "such variations … as appear to* [the Secretary of State …] *to be appropriate". Each application to vary section 36 consent will be considered on its merits on a case by case basis …".*

[2] Inserted by Section 20 of The Growth and Infrastructure Act 2013. Available at: http://www.legislation.gov.uk/ukpga/2013/27/section/20/enacted
[3] Inserted by Section 21 of The Growth and Infrastructure Act 2013. Available at: http://www.legislation.gov.uk/ukpga/2013/27/section/21/enacted
[4] 'Varying Consents granted under Section 36 of the Electricity Act 1989 for Generating Stations in England and Wales: A Guidance Note on the New Process'. Department of Energy and Climate Change, July 2013.

Paragraph 22 states that: *"… it should be noted that there are two broad categories of case in which it is likely that the Secretary of State … may consider it appropriate to exercise the power in section 36C – namely, to enable:*

(a) The construction or extension of a generating station (whose construction or extension has either not yet commenced or has not yet been completed) along different lines from those set out in the existing consent;

(b) the operation of a generating station (whether or not it is already operational) in a way that is different from that specified in the existing consent (this may sometimes involve making limited physical alterations to a generating station, but should not involve work that could be characterised as an "extension" of an existing generating station which has been granted section 36 consent [footnote]".

The footnote to paragraph 22 part (b) explains that: *"the extension of an existing* [onshore] *generating station which has been granted section 36 consent requires development consent under the* [Planning Act 2008] … [and] *Section 36(9) of the Electricity Act 1989 provides that "'extension', in relation to a generating station, includes the use by the person operating the station of any land … for a purpose directly related to the generation of electricity by that station and 'extend' shall be construed accordingly*".

Paragraph 23 states that: *"Determining that any given proposed variation is "appropriate" to be made under section 36C(4) potentially requires the Secretary of State … to exercise judgement on two distinct questions:*

(a) Whether the change proposed to the generating station (or proposed generating station) concerned is of a kind that it would be reasonable to authorise by means of the variation procedure (regardless of its merits in planning / energy policy terms);

(b) *If the answer to question (a) is positive, whether (from a planning / energy policy point of view) the variation should in fact be made, thereby authorising whatever development the making of the variation will permit to be carried out*".

Paragraph 24 goes on to state that detailed consideration of question (b) is largely beyond the scope of the Variation Guidance and it will be necessary for applicants to make the case for the changes in planning and energy policy terms.

In relation to question (a), paragraph 25 states that the scope of what can be authorised under the variation procedure will depend on the provisions of the existing consent, the specific circumstances of the project, and the nature and extent of the proposed development and their environmental effects. Paragraph 25 also makes the point that given: *"…the potentially very large range of different cases that could arise, it is not possible to give definitive guidance in advance on the scope of the variation procedure*".

Paragraph 26 states that the key point to note is that the variation procedure is not intended as a way of authorising any variation in a developer's plans that would result in development that would be fundamentally different in character or scale from what is authorised by the existing consent. However, the Variation Guidance goes on to state a number of circumstances which would necessitate a variation under the procedure. Of particular relevance, paragraph 26 (third bullet point) states: "*Changes in the design of generating stations which have been consented but not constructed which would allow them to <u>generate an amount of power that would be inconsistent with the original consent</u> are likely to be appropriate subject matter for a variation application, provided there are no major changes in the environmental impact of the plant. <u>Similar changes to an existing plant could be appropriate subject matter for a variation application only if they did not involve physical extension of the generation station, relocation of generating plant, or the installation of new equipment that would amount to the construction of a new generating station</u>*" (emphasis added).

The Proposed Variation Application under Section 36C of the Electricity Act 1989

CECL, a wholly owned subsidiary of InterGen, is proposing to submit a variation application under Section 36C of the Electricity Act 1989 to the Secretary of State for DESNZ, to allow for an increase in the permitted electricity generation of Coryton to up to 850 MW capacity. The proposed variation application would also seek a direction to amend various conditions subject to which the planning permission was deemed to be granted under Section 90(2ZA) of the Town and Country

Planning Act 1990 that are no longer relevant (i.e. they relate to construction and, therefore, are not applicable to the Proposed Development, or they are in some other way out of date).

The Proposed Development does not affect the design, size or shape of the existing development and does not amount to an 'extension' of Coryton as defined in section 36(9) of the Electricity Act 1989. By the same logic, the Proposed Development is consistent with the Variation Guidance, most notably paragraph 22(b) and paragraph 26 in that there is no "*physical extension of the generating station, relocation of generating plant or the installation of new equipment that would amount to the construction of a new generating station*".

B.2 Energy Policy Context

The National Policy Statements for Energy Infrastructure

The Planning Act 2008 introduced a new system for the consenting of national significant infrastructure projects (NSIPs). This includes projects within the energy sector, including onshore generating stations with a capacity of more than 50 MW. Before such a NSIP can proceed, an application must be submitted to the Secretary of State for DESNZ for a Development Consent Order (DCO).

In July 2011, the Secretary of State for DESNZ (then DECC) designated a number of National Policy Statements (NPSs) relating to nationally significant energy infrastructure. These included an Overarching NPS for Energy (EN-1), which sets out the Government's overall policy for the delivery of nationally significant energy infrastructure, in addition to five technology-specific NPSs. Where relevant, the technology-specific NPSs should be read in conjunction with EN-1. The technology-specific NPS of most relevance to the 2019 Variation Application is the NPS for Fossil Fuel Electricity Generating Infrastructure (EN-2).

While the proposed variation application would not fall to be determined under the Planning Act 2008, paragraph 24 of the Variation Guidance indicates that the NPSs for energy are of relevance to the Secretary of State's consideration of such applications. This has been confirmed through a Secretary of State decision (16 September 2015) to grant a Section 36 consent for a new 1,800 MW CCGT generating station on land at Sutton Bridge. In considering the application the Secretary of State stated that the: "*…Overarching National Policy Statement for Energy (EN-1) and National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (EN-2)... sets out the national need for development of new nationally significant electricity generating infrastructure of the type proposed by the Applicant in order to maintain security of supply. Though made under the Planning Act 2008 regime, the National Policy Statements (NPSs) are material to the Secretary of State's consideration of the proposed development*" (emphasis added).

The Need for New Fossil Fuelled Electricity Generation

Part 3 of EN-1 on 'The need for new nationally significant energy infrastructure projects' confirms the need that exists in the UK for nationally significant energy infrastructure, and as such, increased capacity / efficiencies at existing generating stations.

With regards to the urgent need for further electricity infrastructure, Section 3.3 of Part 3 of EN-1 sets out various themes, or components, including:

- **Future increases in electricity demand**, with EN-1 stating that it is expected that electricity demand will increase as significant sectors (such as industry, heating and transport) switch from being powered by fossil fuels to using electricity. As a result of this, total electricity consumption could double by 2050 and, depending upon the choice of how electricity is supplied, total installed capacity may need to more than double for the overall system to be sufficiently robust to all weather conditions.
- **The urgency of the need for further electricity capacity**, with EN-1 stating that in order to secure energy supplies that enable us to meet our obligations for 2050, there is an urgent need for further generation efficiency improvements and new (particularly low carbon) energy NSIPs to be brought forward as soon as possible, and certainly in the next 10 to 15 years. To minimise risks to energy security and resilience, the Government believes it is prudent to plan for a minimum need of 59 GW of new electricity capacity by 2025, with 18 GW to come from new non-renewable capacity.

Therefore, when considering applications for electricity infrastructure, Paragraph 3.1.4 explains that the Secretary of State should give substantial weight to the contribution that all projects would make toward satisfying this urgent need.

With regards to the use of natural gas:

- Paragraph 3.6.1 states: "*Fossil fuel power stations play a vital role in providing reliable electricity supplies: they can be operated flexibly in response to changes in supply and demand, and provide diversity in our energy mix. They will continue to play an important role in our energy mix as the UK makes the transition to a low carbon economy, and Government policy is that they must be constructed, and operate, in line with increasingly demanding climate change goals*";
- Paragraph 3.6.2 notes that gas will continue to play an important role in the electricity sector, providing vital flexibility to support an increasing amount of low-carbon generation and to maintain security of supply;
- Paragraph 3.6.3 highlights that gas-fired generation, although not low-carbon, produces about half as much carbon dioxide as coal per unit of electricity generated; and,
- Paragraph 3.6.8 summarises the need for further efficient fossil fuel generation noting that: "*… a number of fossil fuel generating stations will have to close by the end of 2015. Although this capacity may be replaced by new nuclear and renewable generating capacity in due course, it is clear that there must be some fossil fuel generating capacity to provide back-up for when generation from intermittent renewable generating capacity is low and to help with the transition to low carbon electricity generation…*".

Therefore, when considering the use of the use of fossil fuels, EN-1 indicates that natural gas clearly provides a cleaner means by which to provide the required flexibility and resilience within the UK's generation fleet.

The Proposed Variation Application under Section 36C of the Electricity Act 1989

EN-1 is clear in establishing the need that exists for increases in electricity generation output and improvements in generation efficiency from natural gas fired generating stations, such as that of the proposed variation application, which would allow Coryton to provide a valuable contribution towards meeting this identified national need.

B.4 Planning Policy Context

National Planning Policy Framework and Planning Practice Guidance

The National Planning Policy Framework (NPPF) was first adopted in March 2012 and updated in February 2019 with a further update in June 2019). The policies contained within the NPPF are expanded upon and supported by the 'Planning Practice Guidance', which was first published online in March 2014 (also by the Ministry of HCLG) and has been updated periodically since.

The NPPF sets out the Government's planning policies for England and how these are to be applied. It is a material consideration in planning decisions.

Paragraph 5 of the NPPF makes it clear that the document does not contain specific policies for applications under the Planning Act 2008 for NSIPs because such applications are to be determined in accordance with the decision-making framework set out in the Planning Act 2008 and the relevant NPSs.

By the same logic, the NPPF does not contain specific policies for applications under the Electricity Act 1989 (such as the proposed variation application). Nevertheless, the NPPF is considered to form part of the overall framework of national policy against which such applications are to be considered.

Notwithstanding this, many of the NPPF policies would not be directly relevant to the proposed variation application as they apply more explicitly to new development, rather than an increase in permitted electricity generation output and associated improvement in generation efficiency of an existing development. Nevertheless, based on an initial assessment it is considered that the proposed variation application would be consistent with the following objectives of the NPPF:

- (Chapter 2) Contributing to achieving sustainable development most notably by supporting growth and innovation and the provision of infrastructure (the economic role in

paragraph 8) and contributing to protecting and enhancing the natural environment by using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy (the environmental role in paragraph 8);

- (Chapter 14) Meeting the challenge of climate change by supporting low-carbon energy; and,
- (Chapter 15) Conserving and enhancing the natural environment.

APPENDIX B:
EIA SCREENING OPINION

Department for
Energy Security
& Net Zero

3-8 Whitehall Place
London
SW1A 2EG

DWD
6 New Bridge Street
London
EC4V 6AB

22 November 2023

Dear Ms Thomas-Davies,

CORYTON ENERGY COMPANY LIMITED

UPGRADES TO TURBINE PLANT AT CORYTON POWER STATION, CORRINGHAM, STANFORD-LE-HOPE, SS17 9GN

THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (ENGLAND AND WALES) REGULATIONS 2017 – REGULATION 10 REQUEST FOR A SCREENING DECISION

Thank you for your letter dated 28 September 2023 on behalf of Coryton Energy Company Limit ("the Applicant") which requested a Screening Decision from the Secretary of State for Energy Security and Net Zero ("the Secretary of State") under Regulation 10 of the Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017 ("the 2017 Regulations") in anticipation of an application being submitted to vary the consent for the Coryton Power Station ("the Power Station") which was granted by the Secretary of State on 14 March 1997 under section 36 of the Electricity Act 1989. This email was supplemented with an Environmental Impact Assessment ("EIA") Screening Report which provides the information required under Regulations 6 and 12 of the 2017 Regulations, including a plan sufficient to identify the Proposed Development and information detailing the works to be undertaken and the predicted effects on the environment.

Proposed Development background

Department for Energy Security and Net Zero officials on behalf of the Secretary of State met with the Applicant online on 19 September 2023. The purpose of the meeting was to provide the Applicant with the opportunity to introduce the works to be undertaken prior to submitting a formal request for an environmental determination.

The Applicant is seeking to upgrade the turbine plant, proposing a number of internal changes to the existing gas turbines and associated systems, which it states will allow for an increase in the maximum electricity generating capacity by about 77MW to 850MW ("the Proposed Development"). The works involved include the installation of the General Electric HE Upgrade to two existing gas turbines within the Power Station. The upgrade comprises the retrofitting of the latest technology 'H-Class' parts of the turbines. The electricity generation efficiency is expected to improve by approximately 2%, with reduced emissions to air on a per MWh (megawatt-hour) basis. The Proposed Development involves no changes to any external infrastructure of the Power Station.

Local Planning Authority (LPA) consultation

Regulation 13 of the 2017 Regulations requires the Secretary of State to consult every LPA for the areas in which the Proposed Development will be carried out to seek its views as to whether an EIA should be undertaken in respect of the Proposed Development.

The Secretary of State consulted Thurrock Borough Council (the relevant LPA) by letter on 9 October 2023. The LPA responded on 30 October 2023 (ref. 23/01236/SCR). In its response, the LPA provides the outcomes of its Screening Assessment Process, which included a consideration of the Proposed Development against the criteria contained in Schedule 3 of the 2017 Regulations. The LPA confirmed its view that an EIA is not required for the Proposed Development as it is unlikely to have any significant environmental effects. With reference to mitigation, the LPA recommends that various assessments and mitigation plans would be required in any planning application to manage noise and air quality emissions arising from traffic generation during construction.

Screening Decision

The Secretary of State agrees that the Proposed Development does not represent Schedule 1 Development requiring a mandatory EIA as the Proposed Development would not increase the output by more than 300MW. The Secretary of State does consider that the Proposed Development represents Schedule 2 development requiring screening, as it is development to provide a change to a generating station where the generating station is already authorised and operational. Therefore, the Proposed Development could constitute EIA development if it is likely to have significant effects on the environment.

When considering the Applicant's request for screening under regulation 10 of the 2017 Regulations, the Secretary of State has taken account of information as required under Regulation 15 of the 2017 Regulations, including the selection criteria in Schedule 3 and the views of the LPA. The Secretary of State concludes that the documents provided with the Applicant's email of 28 September 2023 and the evidence supplied by the relevant LPA are sufficient and that she can conclude that the Proposed Development **is not EIA development** under these Regulations as it is unlikely to have any significant effects on the environment.

In coming to her decision, the Secretary of State particularly notes the following:

- there are no statutorily designated nature conservation sites within the limits of the Proposed Development. The nearest are Holehaven Creek Site of Special Scientific Interest (SSSI) 950m to the east, and Vange and Fobbing Marshes SSSI 1 km to the north;
- the nearest designated heritage asset is the World War II bombing decoy on Fobbing Marshes Scheduled Monument approximately 1.9km to the north west;
- the works area consists of existing hardstanding served by existing drainage systems and there would be no increase in the footprint of the Power Station;
- there will be no loss of vegetation or habitats resulting from the Proposed Development;
- the operational site access, traffic and operational personnel profiles, water and waste emissions do not differ to that of the existing Power Station;
- there is expected to be no changes to external noise emissions during operation of the Power Station and no requirement for any additional external lighting;
- the Proposed Development requires no external changes to any building, equipment, stack dimensions, elevations, footprints or locations;
- the Applicant stated that there is not expected to be any material change to the operational emissions from the Power Station, which must continue to be in compliance with the existing Environmental Permit (EP) administered by the Environment Agency (EA);
- the Secretary of State notes that the Applicant states that the Proposed Development would reduce emissions to air on a per MWh basis, but also that the maximum generation capacity would increase by approximately 77MW. Via email on 17 November 2023, Officials invited the Applicant to explain what it considered to be a material change in this context, and whether it considered a quantification of the change in the emissions profile of the operational Power Station in light of the Proposed Development would assist the Secretary of State in considering potential impacts on air quality. The Applicant responded on 20 November 2023, stating that the assessment of materiality with regard to air quality had been made based on the fact there would be no requirement to amend the existing EP as a result of the Proposed Development. The EP sets out hourly, daily, monthly and yearly limits for two monitoring points/locations on site and compliance with these existing limits will be maintained following the Proposed Development, therefore leading to the conclusion of no material change. The Applicant considered a material change to be one that would have necessitated the EP limits to change. The Applicant does not consider it necessary to provide any supporting quantitative assessment of this given the continued statement of compliance with the existing EP. The Applicant also noted that the approximate 77MW increase relates to maximum generation capacity only and the operating model of the Power Station as a peaking plant means this does not equate to an equivalent increase in total annual electricity output;
- the Secretary of State acknowledges the Applicant's assertion that the established EP limits will continue to be met although she notes that the

Applicant's assertion is not quantified in any way. Similarly, she recognises that the Power Station is a peaking plant and as such the approximate 77MW maximum increase in output does not equate to an equivalent increase in total annual output, although notes that this point is asserted with no quantification, for example, of how long the Power Station is likely to operate at the new maximum capacity and any quantification of the resultant emissions. Nevertheless, despite the lack of quantification noted above, the Secretary of State sees no reason to lose confidence in the EP regime as administered by the EA, which would include the EA requiring additional mitigation/abatement in the event that ongoing monitoring were to show non-compliance with the existing EP emission limits. She also notes that the EA will be consulted on the subsequent Section 36 Change Application to be made by the Applicant for the Proposed Development. She is therefore satisfied that significant effects due to changes in air quality are unlikely;

- as there are no new likely significant effects associated with the Proposed Development, no cumulative interactions of impacts are expected;
- the LPA does not consider the Proposed Development to be EIA development; and
- in the event that any request to vary the Power Station consent is submitted to and approved by the Secretary of State, the Secretary of State may require the Applicant and its contractors to implement relevant environmental management plans throughout the construction works associated with the Proposed Development, as recommended by the LPA.

This Screening Decision is provided without prejudice to the outcome of the Secretary of State's consideration and determination of any subsequent application that might be made to vary the Section 36 consent for the Power Station in respect of the Proposed Development.

A copy of this letter has been sent to Patricia Coyle at Thurrock Borough Council.

Yours faithfully,

John Wheadon

Head of Energy Infrastructure Planning Delivery
On behalf of the Secretary of State for Energy Security and Net Zero

APPENDIX C:
CARBON CAPTURE READINESS ASSESSMENT

Intended for

Coryton Energy Company, Ltd

Document Type

Report

Date

8 December 2023

CORYTON POWER STATION

CARBON CAPTURE READINESS ASSESSMENT

Variation Application under Section 36C of the 1989 Electricity Act

RAMBOLL

CORYTON POWER STATION

CARBON CAPTURE READINESS ASSESSMENT
Variation Application under Section 36C of the 1989 Electricity Act

Project Name:	**CORYTON POWER STATION** **CARBON CAPTURE READINESS ASSESSMENT**
Project No.:	**1620016114**
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Prepared By:	**P Raphael**
Approved By:	**Will Hazell**

CONTENTS

1. OVERVIEW

1.1 Coryton Power Station

1.1.1 Coryton Power Station (hereafter referred to as 'Coryton') is a combined cycle gas turbine (CCGT) generating station, located in the Thames Haven near Stanford Le Hope, Essex. Figure 1 presents the site location plan, and Figure 2 presents a layout plan of the existing Site.

1.1.2 On 14 March 1997, the original consent was granted for Coryton under Section 36 of the Electricity Act 1989. The original consent was accompanied by a direction that planning permission be deemed to be granted under Section 90 of the Town and Country Planning Act 1990. Together, these (the original consent and the direction that planning permission be deemed to be granted) comprise the existing consent for Coryton.

1.1.3 Paragraph 3 the existing consent provides that: "the Development shall be of about 750 MW capacity…".

1.2 The Proposed Development

1.2.1 Coryton Energy Company, Ltd (CECL) is proposing to submit a variation application under Section 36C of the Electricity Act 1989 to the Secretary of State (SoS) for the Department for Energy Security and Net Zero (DESNZ) to allow for an increase in the permitted electricity generation output of Coryton to up to 850 MW capacity.

1.2.2 The Proposed Development relates to the way in which Coryton is authorised to operate and comprises a High Efficiency (HE) upgrade to the existing two gas turbines at Coryton.

1.2.3 This upgrade consists of the retrofit of latest technology "H-class" parts to the internals of the gas turbines to increase the overall plant efficiency and allow for an increase in the electricity generation output to up to 850 MW capacity.

1.2.4 The variation application would also seek a direction to amend various conditions subject to which the planning permission was deemed to be granted under Section 90(2ZA) of the Town and Country Planning Act 1990 that are no longer relevant (i.e. they relate to construction of Coryton and, therefore, are not applicable to the Proposed Development, or they are in some other way out of date).

1.3 Purpose of this Report

1.3.1 The 2013 Carbon Dioxide (CO_2) Capture Readiness (CCR) Regulations[1] apply to certain variation applications. Specifically, Regulation 6(1) of the 2013 CCR Regulations requires that for a S36 variation to be granted (specifically one that enables a plant to increase its output), certain CCR conditions must be met and a CCR assessment, and any other relevant environmental information, must accompany the application. Further detail on CCR Regulations and associated requirements are provided in Section 2 of this report.

1.3.2 This is a CCR Assessment which:

a) Under Regulation 6(2)(a) of the 2013 CCR Regulations, presents the results of the CCR Assessment for the variation application; and,
b) Under Regulation 6(2)(b) of the 2013 CCR Regulations, presents other available information on the protection of the environment and human health relevant to the variation application.

1.3.3 Ramboll UK Limited (Ramboll) has been appointed by CECL to prepare this CCR Assessment.

[1] The Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013.

2. RELEVANT CONTEXT

2.1 Summary

2.1.1 In November 2009, UK Government published guidance on CCR for applications for new electricity generating stations with an electrical generating capacity at or over 300 MW and of a type covered by the EU Large Combustion Plant Directive (now superseded by the Industrial Emission Directive 2016). The guidance explains the level of information required by applicants to demonstrate CCR when applying for consent under a Development Consent Order (DCO) or under Section 36 of the Planning Act. Under the CCR Regulations 2013, this requirement has been extended to applications seeking consent to extend under Section 36C. There is continued reference to EU guidance as it was in force at the time, and those that are referenced have been carried over and continued in UK legislation following Brexit.

2.1.2 This legislation and guidance is detailed further in the subsequent sections below.

2.2 European Union Directives

2.2.1 Article 33 of the 2009 CO_2 Capture and Storage (CCS) Directive[2] inserted Article 9a into the 2001 Large Combustion Plant Directive[3] (LCPD) to provide, from 25 June 2009[4], that:

"(1) Member States shall ensure that operators of all combustion plants with a rated electrical output of 300 megawatts or more for which the original construction licence or, in the absence of such a procedure, the original operating licence is granted after entry into force of [the 2009 CCS Directive[5]] have assessed whether the following conditions are met:

- *suitable storage sites are available;*
- *transport facilities are technically and economically feasible; and,*
- *it is technically and economically feasible to retrofit for CO_2 capture".*

(2) If the conditions in paragraph 1 are met, the competent authority shall ensure that suitable space on the installation site for the equipment necessary to capture and compress CO_2 is set aside. The competent authority shall determine whether the conditions are met on the basis of the assessment referred to in paragraph 1 and other available information, particularly concerning the protection of the environment and human health".

2.2.2 Subsequently, Article 36 of the 2010 Industrial Emissions Directive[6] (IED) replaced these provisions from 7 January 2013.

2.2.3 The existing consent (i.e. the original construction licence) was granted for Coryton on 14 March 1997 and the original Environmental Permit (i.e. the original operational licence) was granted on 16 September 1997, prior to the entry into force of the 2009 CCS Directive. As such, the variation application is not subject to the 2009 CCS Directive or the 2010 IED (and their associated provisions), and a CCR Assessment is not required under the 2009 CCS Directive / 2010 IED.

2.3 UK Legislation and Policy

2.3.1 The 2013 CCR Regulations apply to certain variation applications under Section 36C of the 1989 Electricity Act.

2.3.2 Specifically, Regulation 6(1) provides that:

"The appropriate authority must not –

(b) vary a relevant section 36 consent in such a way as to enable a combustion plant to increase its rated electrical output, unless the appropriate authority has determined

[2] Directive 2009/31/EC on the geological storage of carbon dioxide.
[3] Directive 2001/80/EC on the limitation of certain pollutants into the air from large combustion plants.
[4] The 2009 CCS Directive (at Article 40) provides that: *"This Directive shall enter into force on the 20th day following its publication in the Official Journal of the European Union"*. The Directive was published on 5 June 2009. Therefore, the 2009 CCS Directive entered into force on 25 June 2009.
[5] See previous footnote.
[6] Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control).

whether the CCR conditions are met in relation to the combustion plant, as constructed or extended in accordance with the section 36 consent as so varied ('the modified plant')".

2.3.3 Regulation 6(2) provides that:

"The appropriate authority's determination under [Regulation 6(1)] must be made on the basis of –

a) a CCR assessment of the modified plant prepared by the person who applied for the section 36 consent to be varied; and
b) any other available information, particularly concerning the protection of the environment and human health".

2.3.4 A 'CCR assessment' in this respect means an assessment as to whether the CCR conditions are met in relation to the plant under consideration. As per Regulation 2(2), the CCR conditions are met, if, in respect of all of the plant's expected emissions of CO_2:

a) "suitable storage sites are available;
b) it is technically and economically feasible to retrofit the plant with the equipment necessary to capture that CO_2; and
c) it is technically and economically feasible to transport such captured CO_2 to the storage sites referred to in sub-paragraph (a)".

2.3.5 Regulation 6(3) provides that:

"If the appropriate authority —

a) determines that the CCR conditions are met in relation to a combustion plant; and
b) decides to —
I. vary a section 36 consent in respect of that plant in the way described in paragraph (1)(a); or
II. (ii) vary a relevant section 36 consent in respect of that plant in the way described in paragraph (1)(b),

it must ensure that the section 36 consent (as varied) includes a condition that suitable space is set aside for the equipment necessary to capture and compress all of the CO_2 that would otherwise be emitted from the plant".

2.3.6 As the variation application relates to an increase in Coryton's rated electrical output, the appropriate authority is required to determine whether the CCR conditions are met. As such, the variation application is subject to the 2013 CCR Regulations provisions, and, under Regulation 6(2), a CCR Assessment (and any other available information (in particular on the protection of the environment and human health)) is required.

2.3.7 However, regarding the 2013 CCR Regulations provisions (and of relevance to this document), it is understood that in cases where a section 36 consent issued under the Electricity Act has been granted before the 2009 CCR Guidance was issued, a CCR Assessment is only required to determine *whether* the CCR conditions are met, not that the CCR conditions *must be* met. Therefore, it is also understood that DESNZ, as the appropriate authority, can vary a relevant section 36 consent in such a way as to enable an existing combustion plant (with a rated electrical output of 300 MW or more) to increase its rated electrical output regardless of whether the CCR conditions are met or not.

2.3.8 In respect of UK Policy, DESNZ published the latest version of the Overarching National Policy Statement (NPS) for Energy (EN-1) in March 2023[7], which sets out the Government's overall policy for the delivery of nationally significant energy infrastructure.

2.3.9 Section 3.5 of EN-1 identifies the urgent need for new CCS infrastructure to support the transition to a net zero economy, noting that the UK has one of the largest potential carbon dioxide (CO_2) storage capacities in Europe, with an estimated 78 billion tonnes of CO_2 storage capacity under the seabed of the UKCS.

[7] Department for Energy Security and Net Zero, 2023. 'Overarching National Policy Statement for Energy (EN-1). March 2023.

2.3.10 EN-1 states that while "power CCUS has not been deployed in the UK to date and although the barriers to deployment are commercial rather than technical, it is reliant on the availability of infrastructure for the transportation and storage of CO_2."

2.3.11 The UK Government's aim, as also stated in the UK's Net Zero Strategy, is to use CCUS technology to capture and store 20-30MtCO_2 per year by 2030, which will require the timely development and deployment of CCS infrastructure.

2.4 UK Government Guidance

2.4.1 DECC published guidance in 2009[8] outlining how applicants should consider CCR in their applications. In July 2021, the UK government and Welsh government published a joint call for evidence seeking views on updates to the guidance and consultation closed in April 2023. Preparation of updated guidance and requirements for 'Decarbonisation Readiness' is underway, however in the meantime the 2009 document remains the most up to date and relevant guidance available. It is however understood that under the new CCR Requirements, the Proposed Development at Coryton would potentially not need to generate Decarbonisation Readiness as it would not constitute a 'substantial refurbishment' costing in excess of 50% of the investment cost for a new comparable energy plant)[9].

2.4.2 Page 4 of the 2009 CCR Guidance states that: "*This guidance applies to applicants:*

- *who submitted before 23 April 2009 an application for Section 36 consent for a new power station of the type described above[10] but on which a decision has not yet been taken by the Secretary of State; and*
- *submitting after 23 April 2009 an application for Section 36 consent for a new power station of the type described above[11]*".

2.4.3 In addition, paragraph 1 (page 7) of the 2009 CCR Guidance states that: "*CCR should be assessed during the consenting process for the construction and operation of new power stations under Section 36 and that no power station at or over 300 Mwe and of a type covered by the [2001] LCPD would be consented unless it could demonstrate it would be CCR*" (emphasis added). Similarly, paragraph 2 (page 7) of the 2009 CCR Guidance states that: "*This guidance implements both Article 33 of the [2009 CCS] Directive and the Government's further requirement that if a proposed power station is subject to the [2009 CCS] Directive requirement, it will only be granted development consent if it is assessed positively against the Article 33 [of the 2009 CCS Directive] criteria*" (emphasis added).

2.4.4 The variation application is not for a new generating station, nor is subject to the 2009 CCS Directive (or the 2010 IED) (and it associated provisions). As such, the variation application is not subject to the 2009 CCR Guidance (and its associated provisions), and a CCR Assessment is not required under the 2009 CCR Guidance.

2.4.5 Notwithstanding, within this document, the basis for the appraisals / assessment is taken from the 2009 CCR Guidance, as this is considered to provide a recognised framework and methodology to be adopted for a CCR Assessment.

2.4.6 The guidance states that as part of their application for Section 36 consent, applicants are required to demonstrate the following:

- that sufficient space is available on or near the site to accommodate carbon capture equipment in the future;
- the technical feasibility of retrofitting their chosen carbon capture technology;

[8] Department of Energy and Climate Change, 2009. Carbon Capture Readiness (CCR): a guidance note for Section 36 Electricity Act 1989 consent applications.
[9] Department for Energy Security and Net Zero, 2022. Decarbonisation Readiness Consultation on updates to the 2009 Carbon Capture Readiness requirements.
[10] With regards to "*of the type described above*", page 4 of the 2009 CCR Guidance states that: "*The CCR requirements (and therefore this guidance) apply to applications for power stations with an electrical generating capacity at or over 300 MW and of a type covered by the* [2001 LCPD]". The associated footnote explains that: "*energy from waste plants are not covered by the* [2001] *LCPD*".
[11] See previous footnote.

- that a suitable area of deep geological storage offshore exists for the storage of captured CO_2 from the proposed power station;
- the technical feasibility of transporting the captured CO_2 to the proposed storage area; and
- the likelihood that it will be economically feasible within the power station's lifetime, to link it to a full CCS chain, covering retrofitting of capture equipment, transport and storage.

2.4.7 Applicants must also make clear in their CCR assessments which CCS retrofit, transport and storage technology options are considered the most suitable for their proposed development.

3. THE EXISTING AND PROPOSED DEVELOPMENT

3.1 Introduction

3.1.1 This section provides a description and comparison of the existing Coryton Power Station and the Proposed Development.

3.2 The Existing Coryton Power Station

3.2.1 Coryton is a CCGT generating station, located in the Thames Haven near Stanford Le Hope, Thurrock, Essex. Figure 1 presents the location of the existing Site, and Figure 2 of the Environmental and Technical Schedule presents a layout plan of the existing site.

3.2.2 The existing consent for Coryton provides that: "*the Development shall be of about 750 MW capacity and comprise:*

(a) one or more gas turbines, a heat recovery steam generators and steam turbines;

(b) air cooled condensers;

(c) one 400kv sub-station;

(d) ancillary plant and equipment; and,

(e) *the necessary buildings (including administration buildings) and civil engineering works*".

3.2.3 Coryton burns natural gas, which is supplied to the site via a connection into the National Grid Gas National Transmission System (NTS) Feeder 5 Pipeline. Natural gas is the primary fuel, and no back-up fuel is required.

3.2.4 During operation, Coryton CCGT burns natural gas in the combustion chamber of the gas turbines from where the resulting hot gases expand and generate sufficient power to drive the air compressor sections and gas turbine generators to produce electrical power. The hot exhaust gases still contain recoverable energy and are used in heat recovery steam generators (HRSGs) to generate steam which is expanded in common steam turbine plant to drive the common steam turbine generator to produce additional electrical power. The steam exhausting the steam turbine plant is passed to an ACC where it is condensed. The resulting condensate is returned to the HRSGs to continue the steam cycle. Subsequently, the flue gases are discharged from the HRSGs via dedicated 59m high stacks.

3.2.5 Overall, the energy demand and heat used is typical of a CCGT generating station.

3.2.6 The gas turbine generators and common steam turbine generator produce electrical power at approximately 19 kV which is stepped up to 400 kV through the three main transformers, and the electricity generated is dispatched to the National Grid Electricity Transmission System.

3.2.7 The use of a combined gas and steam cycle configuration increases the overall fuel efficiency of the generating station compared to an open (gas) cycle configuration, where the hot exhaust gases are directly discharged.

3.2.8 During operation, activities on-site are undertaken in accordance with an Environmental Permit. The latest version, EPR/EP3833LY/V003 was issued in on 10th March 2020 (under the Environmental Permitting (England and Wales) Regulations 2010).

3.3 The Proposed Development

3.3.1 The Proposed Development relates to the way in which Coryton is authorised to operate and involves the installation of the General Electric HE Upgrade to two existing GT26 gas turbines within Coryton. The upgrade comprises the retrofitting of the latest technology 'H-Class' parts of the turbines to increase plant efficiency and increase output.

3.3.2 The HE upgrade improves both the environmental performance and electricity market competitiveness of Coryton by:

- Allowing for an increase in the electricity generation output by approximately 77MW, increasing the maximum generation capacity to up to 850 MW capacity;

- Allowing for an improvement in the electricity generation efficiency by approximately 2%; and
- Reducing emissions to air on a per MWh basis.

3.3.3 There would be no changes to any external infrastructure as part of the Proposed Development and therefore no change to the physical external appearance or building footprint. All works associated with the Proposed Development would be within the existing Site boundary.

4. CCR ASSESSMENT

4.1 Introduction

4.1.1 This section presents the results of the CCR Assessment for the variation application.

4.2 Methodology

4.2.1 In order to determine whether or not a development can be considered to be carbon capture ready the following key criteria need to be considered and met:

- that sufficient space is available on or near the site to accommodate carbon capture equipment in the future;
- that it is likely to be technically feasible to retrofit the applicant's chosen carbon capture technology;
- that a suitable area of deep geological storage offshore exists for the storage of captured CO_2 from the proposed power station;
- that it is likely to be technically feasible to transport the captured CO_2 to the proposed storage area; and
- that it is likely that it will be economically feasible within the power station's lifetime, to link it to a full CCS chain, covering retrofitting of capture equipment, transport and storage.

4.2.2 The methodology adopted for this CCR Assessment therefore comprises the following steps:

1. Setting out the CCR Assessment basis, in terms of the assumed CO_2 capture process; the estimated CO_2 capture and storage requirements; and, the Required CCR Space Allocations;
2. An appraisal of the technical retrofitting of CO_2 capture equipment requirements;
3. An appraisal of potential CO_2 storage areas / sites;
4. An appraisal of the technical CO_2 transport requirements; and, subsequently,
5. An economic assessment (considering the retrofitting of CO_2 capture equipment and CO_2 transport requirements).

4.3 STEP 1: CCR Assessment Basis

Assumed CO_2 Capture Process

4.3.1 At the time of writing (September 2023), a number of CO_2 capture processes / technologies exist, and it is highly probably that this number will increase. However, this document focuses on currently available CO_2 capture processes / technologies rather than speculating on future developments and, therefore, is based on the assumption of the best currently available CO_2 capture process / technology for CCGT units (which are existing at the time of CO_2 capture installation), which is post-combustion CO2 capture via chemical absorption.

4.3.2 Post-combustion CO_2 capture via chemical absorption (using amine-based solvents) generally comprises flue gas pre-treatment to treat the incoming emission stream to the required specification for the CO_2 capture process. The process comprises: a CO_2 capture section (including: flue gas cooling; and, CO_2 absorption); a CO_2 handling section (including: CO_2 stripping / desorption; and, CO_2 compression and discharge); and, a cooling system.

4.3.3 This technology has been deployed at scale at a small number of sites globally, but has not yet been commercially proven and deployed / retrofitted for large-scale combustion plant applications. However, it is the opinion of Ramboll that no technical barriers exist to extending existing experience to a scale appropriate for a CCGT generating station.

Estimated CO_2 Capture and Storage Requirements

4.3.4 Within the 2013 CCR Regulations, reference to "*all of the CO_2*" (at Regulation 6(3)) and "*all of its expected emissions of CO_2*" (at Regulation 2(2)) indicates that a CCR

Assessment should consider all of the expected CO_2 emissions (and similarly the highest possible CO_2 capture efficiency), rather than just a certain percentage (i.e. a 50%) of the expected CO_2 emissions.

4.3.5 Therefore, within this document, "*all of the CO_2*" and "*all of its expected emissions of CO_2*" is assumed to be all of the CO_2 emissions which can be captured in line with Best Available Techniques (BAT). This is considered to be in line with the 2009 CCR Guidance which (at paragraph 11) requires that: "*applicants should explain what percentage of these CO_2 emissions they consider will be captured by their proposed capture technology, in keeping with the principles of best practice*".

4.3.6 Table 4.1 presents the estimated CO_2 capture and storage requirements for the Proposed Development (i.e. Coryton Post HE Upgrade). Key assumptions are described in Table 4.1

Table 4.1: Estimated CO_2 Capture and Storage Requirements

Parameter		Estimated Requirements
CO_2 Generated	kg/MWh	361.1
	t/hr	304.0
CO_2 Capture Process Requirement *(Assuming 90% CO_2 Capture)*	t/hr	273.6
	t/day	6,567.4
Annual CO_2 Storage Requirement *(Assuming a 28% Load Factor)*[1]	Mt/yr	671.2
Total CO_2 Storage Requirement *(Assuming a Total of 6 Years of CO_2 Capture)*[2]	Gt	4.03

Assumptions:

[1] A load factor of 28% is considered to be in line with InterGen's internal market forecasts / models. Average load factors across all CCGT stations in the UK was 39.2% in 2021 and 40.4% in 2022[12]. However, it is projected that other projected CCGT load factors[13] will average between 10 to 12% between 2020 and 2050, and will drop to less than 10% by 2035 and to 0% by 2050 (i.e. no unabated gas capacity). It is also worth noting that the projected gas CCS load factor[14] will average 8% between 2020 and 2050, and will drop to 0% by 2050.

[2] Construction of any CCS equipment would commence in 2026 and be operational in 2031 assuming a five year construction period. Coryton was constructed in 2001 and is expected to have a 35 year operational life. Accordingly there would be a total of six years of CO2 capture (2031-2036 inclusive).

4.3.7 The economic assessment undertaken in Step 5 considers the impact of varying both the load factor and the operational lifetime of Coryton.

Required CCR Space Allocations

4.3.8 There must be sufficient footprint available and set-aside for the future installation of capture plant. Although this land does not need to be owned currently by the Operator, there is the need for some control to be held over it such that it remains available for future use. The amount of space required depends on several factors:

- the type of capture technology declared as likely to be chosen (the key variable);
- the size/number of the power generating units;
- the input fuel for the power units;
- decisions about whether the necessary CO_2 processing would be on or off-site;
- ensuring the safe storage of chemicals;
- avoiding congestion on site for safety both during construction and operation; and
- future progress in developing the capture technologies which may reduce the space required for the related equipment.

[12] DESNZ National Statistics publication Digest of UK Energy Statistics (DUKES) DUKES – Table 5.10B, 2023
[13] Based on National Grid's '2020 Future Energy Scenarios' System Transformation ('FES ST') Scenario
[14] Based on National Grid's '2020 Future Energy Scenarios' System Transformation ('FES ST Gas CCS') Scenario

4.3.9 The footprint requirement for carbon capture from the flue gas of a CCGT is considerable and would require separate areas for the following plant and processes:

- Flue gas cooling and absorption;
- Stripping, solvent reclaiming and CO_2 compression;
- Cooling system;
- Chemical storage and deminerlisation plant;
- Auxiliary systems; and
- Buildings.

4.3.10 Within the 2009 CCR Guidance, a summary of the capture plant land footprint for different types of gas and pulverised coal plant using various capture methods was presented in Table 1 ('Approximate minimum land footprint for some types of CO_2 capture plant'). This was based on a published International Energy Agency (IEA) report in 2006 and based on net plant capacities of around 500MW. The 2009 CCR Guidance footprint estimates were based on a defined plant size and subject to interpretation and review by Imperial College in 2010[15]. The 2010 Imperial College review concluded the 2009 CCR Guidance was based on an overly conservative estimate for the footprint of the capture plant and suggested alternative footprint estimates in Table A1 ('Approximate minimum land footprint for some types of CO_2 capture plant with correction for CCGT with post-combustion capture').

4.3.11 Table 4.2 provides a summary of the required CCR Space Allocations for Coryton based on CCGT units with post-combustion CO_2 capture as defined by:

- The Original Allocation, set via the 2009 CCR Guidance, as 3.75 ha for 500 MW (net) (or 75 m^2/MW);
- The Corrected Allocation, set via the 2010 Imperial College Review, as 2.4 ha for 500 MW (net) (or 48 m^2/MW); and
- The Reduced Allocation, set via the 2010 Imperial College Review, as 1.875 ha for 500 MW (net) (or 37.5 m^2/MW).

4.3.12 The space allocations are based on a maximum annual output of 850 MW.

Table 4.2: Required CCR Space Allocations for Coryton

	Required CCR Space Allocation	
	ha	**m^2/MW**
Original Allocation	7.13	75
Corrected Allocation	4.08	45
Reduced Allocation	3.19	37.5

4.3.13 Figure 2 of the Environmental and Technical Schedule presents a layout plan of the existing Site (and Proposed Development Site). The Site boundary covers a total area of approximately 7.0 ha. Within this, the CCGT generating station and substation cover over 80% of this area, with associated buildings and outfall ponds covering much of the remaining area. Any 'available' space predominantly comprises of internal access roads or small pockets of hardstanding surrounded by existing infrastructure and is not located in a single individual location.

4.3.14 Based on the required CCR Space Allocations identified in Table 4.2, even the reduced allocation would require almost half of the existing total site area to be allocated.

4.3.15 In light of the above, none of the required CCR Space Allocations can be met on the Site.

[15] 'Assessment of the Validity of 'Approximate Minimum Land Footprint for some types of CO_2 Capture Plant' (Imperial College London, October 2010).

4.3.16 It should also be noted that as the existing consent was granted prior to the entry into force of the 2009 CCS Directive, the existing consent contains no CCR condition which requires sufficient space for CCS to be retained on the Site.

4.4 STEP 2: Appraisal of the Technical Retrofitting of CO_2 Capture Equipment Requirements

4.4.1 The basis for this appraisal is taken from the 2009 CCR Guidance, in particular paragraphs 20 – 31 on the technical feasibility of retrofitting CO_2 capture equipment to the generating station.

4.4.2 Table 4.3 provides the appraisal of the technical retrofitting of CO_2 capture equipment. The appraisal is based on the requirements of Annex C of the 2009 CCR Guidance ('*Environment Agency Verification of CCS Readiness New Natural Gas Combined Cycle Power Station using Post-Combustion Solvent Scrubbing'*).

Table 4.3: Technical Appraisal of Retrofitting CO_2 Capture Equipment

Requirement of Annex C		**Appraisal**
C1: Design, Planning Permissions and Approvals	A pre-feasibility level conceptual study should be provided, which includes technical feasibility of retrofitting CO_2 capture equipment information alongside preliminary CO_2 capture equipment layouts.	This CCR Assessment has considered the Required CCR Space Allocations and whether there is suitable space on the existing Site. Given the limited available space on Site it is not considered feasible to provide preliminary CO_2 capture equipment layouts.
C2: Power Plant Location	The appraisal / assessment on technical CO_2 transport requirements should be provided, which includes the details of any flue gas terminal point from the generating station and any CO_2 terminal point from the CO_2 capture equipment / site.	As above, given the space limitations on-site, it is not considered feasible to provide details of the flue gas terminal point and the CO_2 terminal point from the CO_2 capture equipment / site.
C3: Space Requirements	A pre-feasibility level study should describe how space allocations were determined and how they would be met.	As above, given the space limitations on-site, it is not considered feasible to describe any space allocations.
C4: Gas Turbine Operation with Increased Exhaust Pressure	Increased back pressure on the gas turbine (including upstream ducting and HRSG) would be imposed by the CO_2 capture process, and that the pre-feasibility level study should describe the expected pressure drop for current commercial CO_2 capture equipment.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include any booster fan space allocations / provisions).
C5: Flue Gas System	Space will be required for any flue gas pre-treatment and for flue gas ducting from the generating station to the CO_2 capture equipment, and that the pre-feasibility level study should describe the required flue gas system modifications, including any space allocations / provisions.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include any flue gas system space allocations / provisions).
C6: Steam Cycle	A pre-feasibility level study should demonstrate that the steam cycle could be operated with CO_2 capture processes using solvent systems with a range of steam requirements and should estimate the steam extraction energy penalty, including any space allocations / provisions.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include the steam cycle space allocations / provisions)).
C7: Cooling System	Additional cooling will be required for the CO_2 capture process, and that the pre-feasibility level study should describe the expected requirements, including any space allocations / provisions.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include the additional cooling system space allocations / provisions).

Requirement of Annex C		Appraisal
C8: Compressed Air System	Additional compressed air (process and instrument / service air) may be required for the CO_2 capture process, and that the pre-feasibility level study should describe the expected requirements, including any space allocations / provisions.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include the additional compressed air system space allocations / provisions).
C9: Raw Water Pre-Treatment	Additional raw water pre-treatment may be required for the CO_2 capture process, and that the pre-feasibility level study should describe the expected requirements, including any space allocations / provisions.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include the additional raw water pre-treatment space allocations / provisions).
C10: Demineralisation / Desalination	Additional pure water may be required for the CO_2 capture process, and that the pre-feasibility level study should describe the expected requirements, including any space allocations / provisions.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include the additional demineralisation / desalination space allocations / provisions).
C11: Waste-Water Treatment	Additional waste-water treatment may be required for additional effluents generated by the CO_2 capture process, and that the pre-feasibility level study should describe the expected requirements, including any space allocations / provisions.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include the additional waste-water treatment space allocations / provisions).
C12: Electrical	Additional electrical loads may be introduced by the CO_2 capture process, and that the pre-feasibility level study should describe the expected requirements, including any space allocations / provisions.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include the additional electrical load space allocations / provisions).
C13: Plant Pipe Racks	Additional plant pipe racks would be required for the CO_2 capture process, and that the pre-feasibility level study should describe the expected requirements, including any space allocations / provisions.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include the additional plant pipe racks space allocations / provisions).
C14: Control and Instrumentation	Additional control and instrumentation may be required for the CO_2 capture equipment, and that the pre-feasibility level study should describe the expected requirements, including any space allocations / provisions.	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include the additional control and instrumentation space allocations / provisions).
C15: Plant Infrastructure	Additional access / space would be required in appropriate zones for the CO_2 capture equipment, and that the pre-feasibility level study should describe the expected requirements, including any access / space allocations / provisions	As above, given the space limitations on-site, it is not feasible to provide preliminary CO_2 capture equipment layouts (which would include the additional access / space allocations / provisions).

4.4.3 Based on the above, it is concluded that due to the highly space constrained nature of the Coryton site, it would not be possible to retrofit carbon capture infrastructure at the site. This is considered to be a significant technical impediment to the feasibility for Carbon Capture at Coryton.

4.5 STEP 3: Appraisal of Potential CO_2 Storage Areas / Sites

4.5.1 The basis for the appraisal of potential storage areas/sites is taken from the 2009 CCR Guidance, in particular paragraphs 32 – 42 on the demonstration that there are suitable deep geological off-shore CO_2 storage areas / sites.

4.5.2 The UK's major potential sites for the long-term geological storage of CO_2 are offshore depleted hydrocarbon (oil and gas) fields and offshore saline water-bearing reservoir rocks / aquifers.

4.5.3 As shown in Figure 4.1 most of the UK's large offshore oil fields are mainly in the Northern and Central North Sea Basin. The UK's offshore gas fields occur mainly in two areas: the Southern North Sea (SNS) Basin and the East Irish Sea (EIS) Basin. The DECC CCR guidance suggests that the simplest and most appropriate means of demonstrating there are "no known barriers" to CO_2 storage is by delineating on a map a suitable storage area in either the North Sea or Irish Sea (Morecambe Bay). Within this delineated area, there should be at least two fields or aquifers, with an appropriate CO_2 storage capacity, which have been listed in either the "valid" or "realistic" categories in the DTI's 2006 study of UK Storage Capacity[16], which is provided in Annex 1D of the CCR Guidance.

4.5.4 The DTI study defines "realistic" capacity as:

"*Realistic capacity applies to a range of technical (geological and engineering) cut-offs to elements of an assessment, e.g. quality of the reservoir (permeability, porosity, heterogeneity) and seal, depth of burial, pressure and stress regimes, size of pore volume of the reservoir and trap, nature of the boundaries of the trap and whether there may be other competing interests that could be compromised by injection of CO2 (e.g. existing subsurface resources such as oil and gas, coal, water or surface resources such as national parks). This is a much more pragmatic estimate that can have some degree of precision and gives important indications of technical viability of CO2 storage*."

4.5.5 Coryton is located in Thurrock, Essex, therefore the nearest hydrocarbon fields to the Site are located in the SNS Basin. A number of CCR studies have been completed by others, nominating storage locations in the North Sea. As carbon capture has not yet been deployed at these sites, with no immediate prospect that it will, these sites can be deemed to be available for Coryton also. Information taken from the Strategic UK CCS Storage Appraisal Project, funded by DECC, commissioned by the ETI (ETI, 2016) indicates that there are suitable locations in the SNS Basin with capacity as illustrated in Figure 4.1 and outlined in Table 4.4.

4.5.6 Based on the total storage requirements of the Proposed Development, as calculated above (see Table 4.1), Table 4.4 illustrates the percentage storage requirements on these four gas fields.

Table 4.4: Total CO_2 Storage Potential

		Hewett	Bunter 36	Viking A	Endurance
CO_2 Storage Capacity	Gt	206	280	130	530
CO_2 Storage Requirement	Gt	4.03	4.03	4.03	4.03
% CO_2 Storage Capacity Used	%	2.0	1.4	3.1	0.8

4.5.7 In accordance with the DECC guidance, the gas fields listed above are identified as 'realistic' storage locations in the DTI report. It is recognised that in the future there may be competing interest for the identified CO_2 storage sites, as other carbon capture and storage projects become operational. It is also recognised that other CCR applications may also have identified the same geological fields for CO_2 storage capacity.

4.5.8 Accordingly, while the gas fields identified above off potential storage opportunities for the Proposed Development, these will need to be reviewed as further applications come forward in the future.

4.5.9 In addition to the above, Figure 4.2 shows an extract (taken in October 2023) from the North Sea Transition Authority (NSTA) Interactive Map with the existing Carbon Dioxide Appraisal and Storage Licences, including those granted in the 2023 Licencing round. This shows a number of licenced CO_2 areas in the SNS which could potentially be

[16] UK Department of Trade and Industry, Industrial Carbon Dioxide Emissions and Carbon Dioxide Storage Potential in the UK, October 2006

accessed by Coryton. Equally, depending on transportation options such as shipping, all storage areas could be accessible.

4.5.10 Overall, the availability of storage is not an impediment to demonstrating CO_2 capture readiness for Coryton.

Figure 4.1: UK Storage Appraisal Project Selected Sites (ETI, 2016)

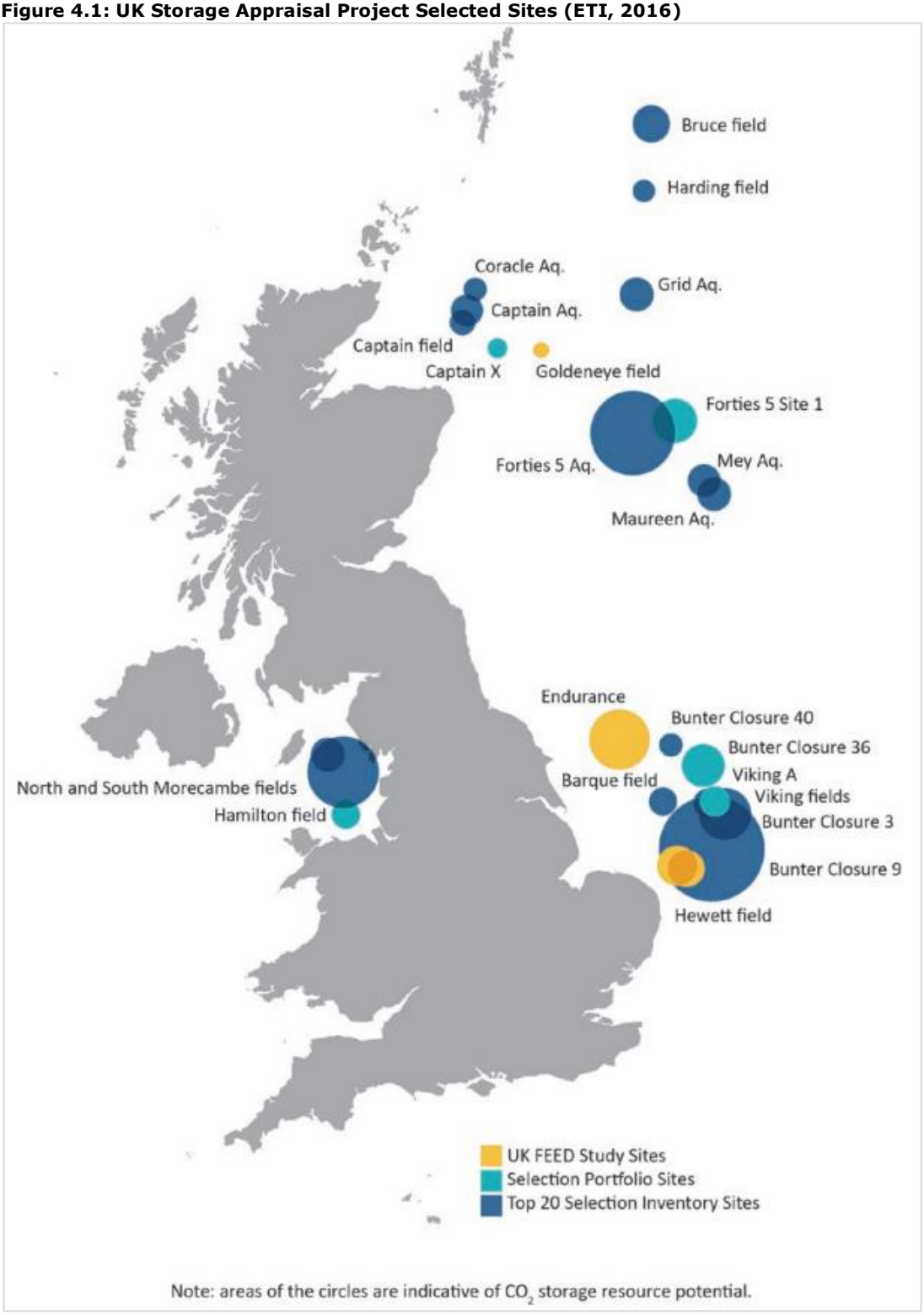


Figure 4.2: UK Carbon Dioxide Appraisal and Storage Licences (extracted from NSTA interactive Map, October 2023)

4.6 STEP 4: Appraisal of CO_2 Transport Requirements

4.6.1 The basis for this appraisal is taken from the 2009 CCR Guidance, in particular paragraphs 43 – 61 on the demonstration that is it technically feasible for CO_2 transport from the generating station site (with CO_2 capture) to the proposed CO_2 storage area.

4.6.2 There are various options available for transporting CO_2 from point of capture to final geological storage, including onshore and offshore transportation by pipeline, potentially use of rail or road tankers and offshore transportation by shipping.

4.6.3 It is considered that onshore transportation by road or rail is not likely to be economically feasible due to the volume of CO_2 required to be transported and the expectation that offshore storage is likely to be required. In addition, there are limited, if any, commercially available onshore road or rail CO_2 transport solutions at the time of writing. Both road and rail transport solutions would also require additional infrastructure for loadings of tanks which would increase the space demand beyond that available at Coryton.

4.6.4 The shipping of CO_2 requires: access to a Port; the ability to construct and operate suitable port side infrastructure to facilitate the safe buffer storage of CO_2 prior to export to the ship; and the construction of the CO_2 import infrastructure for the store (however, this is not considered further in this assessment as would be the responsibility of the CO_2 store operator). Whilst Coryton is in close proximity to the DP World London Gateway

Port, there are no published plans for the installation of CO_2 export infrastructure at this location and it is not the intended purpose of this facility, which is freight focused.

4.6.5 There have been some public disclosures relating to Project Cavendish[17][18] (at the Isle of Grain) which could facilitate CO_2 shipping. However, Project Cavendish was not selected as a Track 1 Phase 2 emitter project by the UK Government[19] meaning it is unlikely to be associated with a cluster being developed to commence operation before 2030. In order to connect with the port facilities associated with Project Cavendish a circa 12-15 mile near shore pipeline would also be required. Therefore, whilst shipping is becoming increasingly technically feasible (and is being actively developed on projects such as Longship in Norway and is under development for some UK Clusters, such as Acorn) and increases the number of accessible stores to include some within Track 1 and 2 of the Cluster Sequencing process (i.e. those likely to be operational stores prior to 2030), options for the export of CO_2 by shipping in close proximity to Coryton are considered to have significant lead times and are unlikely to provide a suitable solution that would be economically feasible for the remaining life of the Coryton Power Station upon completion.

4.6.6 For onshore or offshore pipeline transport, the nearest CCS industrial cluster with a licenced offshore storage area is the Bacton Energy Hub in Norfolk. The onshore access point for this cluster at the existing Bacton Gas Terminal is approximately 100 miles from Coryton and this cluster has not been selected in Track 1 or Track 2 of the Cluster Sequencing Process run by Government. This means it is unlikely that storage would be achieved prior to 2030. The requirement for an onshore pipeline connection to Bacton would have significant lead times relative to Development Consent Order planning and construction prior to operation, and would be reliant on the store being operational upon completion. The pipeline route would also have technical and safety related challenges traversing relatively densely populated urban areas away from Coryton and potential environmental challenges traversing the more rural areas on to Norfolk. There would also be the requirement for an offshore pipeline to connect Bacton to the offshore store. This means that whilst CO_2 transportation by pipeline is technically feasible, options relative to a suitable pipeline concept are considered to have a significant lead times and are unlikely to provide a suitable solution that would be economically feasible for the remaining life of the Coryton Power Station upon completion.

4.7 STEP 5: Economic Assessment

4.7.1 The principal economic driver currently available for CCS viability, without Government fiscal support, is the price of carbon. The price of carbon needs to have achieved a high enough monetary value to make CCS economically viable.

4.7.2 At the time of writing, only general guidance on the methodology to follow to demonstrate economic feasibility of a CCS scheme is available from DESNZ. Therefore, in order to develop the economic assessment, several assumptions such as anticipated infrastructure requirements, utilities usage, future carbon and gas prices etc. have been made. The methodology adopted and assumptions made are also consistent with those adopted for the S36C Variation Application for Spalding Energy Project (Ref 14278, consent granted 13 June 2022) and accepted by BEIS financial analysts.

4.7.3 The assessment considers the retrofitting of CO_2 capture equipment at Coryton and CO_2 transport and storage requirements. The results of the assessment are summarised below and detailed in Appendix A.

4.7.4 An economic model has been developed that takes into account capital expenditure, fuel price, carbon price, capture costs, and CO_2 transport and storage costs.

4.7.5 CAPEX and OPEX estimates for the carbon capture plant at the Proposed Development have been approximated, and the cost of electricity generation (£/MWh) for CCS abated

[17] Department for Energy Security and Net Zero, 2022. Cluster sequencing Phase-2: eligible projects (power CCUS, hydrogen and ICC), March 2022

[18] Online Ref: Acorn, Cavendish agreement could boost UK blue hydrogen capacity to 11.5GW | ICIS

[19] Department for Energy Security and Net Zero, 2023. Cluster sequencing Phase-2: Track-1 project negotiation list, March 2023

and unabated CCGT have been compared, against CO_2 price, to determine the price point at which CCS retrofit becomes viable.

4.7.6 The results of the economic assessment can be summarised as follows:

- The calculated (Central) Break-Even Carbon Price (where the levelised cost of electricity for the Do Nothing Scenario equals the levelised cost of electricity for the CCS Scenario is £460/t CO_2. However, utilising BEIS projections for carbon prices, this price would only be reached under the 'High' projections and not until after 2050, after the projected last year of operation of Coryton Power Station;
- The calculated (Low) Break-Even Carbon Price is £417/t CO_2, however as with the central case, this price would only be reached under the 'High' BEIS carbon price projections and not until after 2050, after the project last year of operation of Coryton; and
- The calculated (High) Break-Even Carbon Price is £504/t CO_2, however as with the central case, this price would only be reached under the 'High' BEIS carbon price projections and not until after 2050, after the project last year of operation of Coryton.

4.7.7 In light of the above, it is evident that retrofitting CCS at Coryton would be economically unviable and, therefore, it is considered that there are barriers to demonstrating economic feasibility.

4.7.8 The economic assessment provided in Appendix A includes additional sensitivity analysis varying the load factor and an economic assessment varying the economic lifetime. Both assessments conclude that retrofitting CCS is unlikely to be economically viable and there remain barriers to demonstrating economic feasibility.

5. CCR ASSESSMENT CONCLUSIONS

5.1.1 Based on the appraisals and assessments above, it is concluded that:

- Regarding the technical retrofitting of CO_2 capture equipment requirements, it is considered that there are barriers to demonstrating technical feasibility of retrofitting for CO_2 capture equipment due to space limitations on the Site;
- Regarding potential CO_2 storage areas / sites, it is considered that there are no major barriers demonstrating potential CO_2 storage sites are available;
- Regarding the technical CO_2 transport requirements, it is considered that there no barriers to a technically feasible solution for CO_2 transport, but there are barriers to delivering a transport solution that would be feasible and viable within the Project period to 2036; and
- Regarding the economic assessment, it is considered that there are barriers to demonstrating economic feasibility.

6. CONSIDERATION OF OTHER AVAILABLE INFORMATION

6.1 Introduction

6.1.1 This section presents the consideration of other available information on the protection of the environment and human health relevant to the proposed variation application.

6.2 The Protection of the Environment and Human Health

Environmental Assessment

6.2.1 With regards to the relevant environmental assessment requirements, the 2017 Environmental Impact Assessment (EIA) Regulations[20] apply to variation applications.

6.2.2 In particular, Regulation 10(1) of the 2017 EIA Regulations provides that: *"A person (the "developer") who intends to make an application for a section 36 or 37 consent, or a section 36 variation, for development may request the relevant authority to make a screening decision"*. Further regulations (within the 2017 EIA Regulations) provide the required content of a request for a screening decision (i.e. the required content of an EIA Screening Report).

6.2.3 Accordingly, in September 2023, CECL submitted an EIA Screening Report to DESNZ. The EIA Screening Report supported CECL's request that DESNZ adopt a screening decision (i.e. an EIA Screening Opinion) to the effect that the Proposed Development is not EIA Development. The EIA Screening Report did not consider the construction or operation of any CO_2 capture equipment.

Best Available Techniques

6.2.4 In considering the application of Best Available Techniques (BAT) at Coryton, the principles of the BAT Conclusions for Large Combustion Plants[21] (LCP) (at BAT 12 and BAT 40) are that:

- BAT is to increase / maximise electrical (and energy) efficiency; and
- BAT is to prevent and / or reduce emissions, including CO_2 emissions.

6.2.5 The Proposed Development improves both the environmental performance and electricity market competitiveness of Coryton by, in particular, allowing for an improvement (increase) in the electrical generation efficiency, thus also reducing the specific CO_2 emissions (emissions on a per MW basis) associated with electricity generation.

6.2.6 Therefore, should it be the case that DESNZ cannot approve the variation application, the principles of the BAT Conclusions for LCP would not be achieved.

6.3 Previous UK Precedence: Consents under Section 36 and Section 36C of the 1989 Electricity Act

6.3.1 A review of recent, comparable applications in the UK (predominately England and Wales) under Section 36 and Section 36C of the 1989 Electricity Act (and under Section 37 of the 2008 Planning Act) has been undertake, in particular in respect of their consideration of CCR and the CCR conditions. There are now several case studies of developments where: there was consideration of CCR, but CCR conditions were not applied / the CCR conditions were not met; and there was consideration of CCR, but the CCR conditions were not updated.

6.3.2 A review of the most recent applications is provided in **Table 6.1**.

Table 6.1: Summary of Recent UK Consideration of CCR

Site	Decision Date	Application Type	Summary of CCR Consideration
Rye House Power Station	14/11/22	Variation to existing CCGT	The variation was not for an increase in permitted electricity generation output, and therefore was not subject to the 2009 CCR Directive or 2013 CCR Regulations. No CCR

[20] The Electricity Works (Environmental Impact Assessment) (England and Wales) Regulations 2017.
[21] Commissioning Implementing Decision 2017/1442 establishing best available techniques (BAT) conclusions, under Directive 2010/75/EU, for large combustion plants.

Site	Decision Date	Application Type	Summary of CCR Consideration
			Assessment was undertaken and no CCR conditions applied to the consent.
Little Barford Power Station	13/07/22	Variation to increase electrical generation capacity to 750 MW	The variation application was for an increase in permitted electricity generation output of an existing CCGT power station, and therefore was subject to the 2013 CCR Regulations and 2009 CCR Guidance. The application materials submitted (notably the CCR Assessment) outlined CCS proposals that could potentially be installed in the future, subject to removal of current economic barriers, and accordingly, standard CCS conditions were applied to the varied consent.
Staythorpe Power Station	13/07/22	Variation to increase electrical generation capacity to 1,850 MW	The variation application was for an increase in permitted electricity generation output of an existing CCGT power station, and therefore was subject to the 2013 CCR Regulations and 2009 CCR Guidance. The application materials submitted (notably the CCR Assessment) outlined CCS proposals that could potentially be installed in the future, subject to removal of current economic barriers, and accordingly, standard CCS conditions were applied to the varied consent.
Spalding Energy Project	13/06/22	Variation to increase electrical generation capacity to 950 MW	The variation application was for an increase in permitted electricity generation output of an existing CCGT power station, and therefore was subject to the 2013 CCR Regulations and 2009 CCR Guidance. The application materials submitted (notably the CCR Assessment) concluded that there were both technical and economic barriers to installing CCS on-site. Within the letter accompanying consent, the following was stated: *"the Secretary of State notes that the Environment Agency and the BEIS financial analysts agree with the Applicant's assessment of the technical and financial unviability of retro-fitting CCR infrastructure to the Varied Development."* CCS conditions were applied to the varied consent, including the requirement to submit an updated CCS Report in four years after consent being granted.
Enfield power station	28/01/21	Variation to increase electrical generation capacity to 450 MW	The variation application was for an increase in permitted electricity generation output of an existing CCGT power station, and therefore was subject to the 2013 CCR Regulations and 2009 CCR Guidance. The application materials submitted (notably the CCR Assessment) outlined CCS proposals that could potentially be installed in the future, subject to removal of current economic barriers, and accordingly, standard CCS conditions were applied to the consent.
Gateway Energy Centre	11/11/20	Variation to increase electrical generation capacity to 1,250 MW	The original application for the CCGT was subject to the 2013 CCR Regulations and 2009 CCR Guidance and CCR conditions applied to the original consent. The conditions were amended accordingly in the Variation of Consent, and within the letter accompanying consent, the following was noted: • (at paragraph 9.2) *"The Secretary of State has considered whether the proposed variation to the section 36 consent would have any impact on the previous conclusions in relation to CCR for the Development. The Application proposes that an alternative and smaller area of land be safeguarded for carbon capture equipment under Development Option (ii), compared to the original area of land associated with Development Option (ii). […]"* • (at paragraph 9.3) *"The Secretary of State notes that the Environment Agency has confirmed that sufficient space*

Site	Decision Date	Application Type	Summary of CCR Consideration
			is available to house the necessary carbon capture and storage infrastructure and that there are no foreseeable barriers to the […] retrofit for either [Development] Option (i) the 1250 MWe power station; or [Development] Option (ii), the 630 MWe power station".
Drax Re-Power	04/10/19	New 3800 MW CCGT and OCGT	The application was for a new generating station under the Planning Act 2008 and accordingly both the 2009 CCS Directive and 2013 CCS Regulations applied. The CCR conditions were met and CCR conditions applied to the consent.
Tees	05/04/19	New 1520 MW CCGT	The application was for a new generating station under the Planning Act 2008 and accordingly both the 2009 CCS Directive and 2013 CCS Regulations applied. The CCR conditions were met and CCR conditions applied to the consent.
Keadby II	01/03/19	Variation to CCGT (then under construction)	The original consent was granted prior to the entry into force of the 2009 CCR Directive (September 1993). The variation was not for an increase in permitted electricity generation output, and therefore would not be subject to the 2013 CCR Regulations. The variation could however be considered to be for a new generating station, and therefore could also be considered to be subject to the 2009 CCR Guidance. Within the letter accompanying the consent: • (at paragraph 7.1) "*The Secretary of State notes that the previous Variation Application (resulting in the 2017 variation) included a Carbon Capture Readiness ('CCR') report demonstrating that Keadby II would be carbon capture ready and that sufficient land has been set aside for any future carbon capture plant*". • (at paragraph 7.2) "*The Secretary of State is satisfied that the Application has no implications in terms of the ability for Keadby II to be CCR ready and therefore the CCR Report remains valid*".
King's Lynn B	10/12/18	Increase, to a 1700 MW CCGT	The original consent was granted prior to the entry into force of the 2009 CCR Directive. The variation could be considered to be for a new generating station, and therefore could also be considered to be subject to the 2009 CCR Guidance. The decision on the original S36 application identified land for carbon capture and export, and a condition was included to ensure that the necessary space remains available at the site to allow for the future installation of a carbon capture plant. The Conditions were updated to include the Standard CCR Conditions.

6.4 UK Government's Commitments: '2050 Net Zero' Target

6.4.1 The Committee on Climate Change's Sixth Carbon Budget[22] ('The UK's Path to Net Zero') states that: *"Following on from the 2024 coal phase out, gas-fired power without CCS should be phased out by 2035"*.

6.4.2 The UK Government's latest Energy White Paper[23] ('Powering our Net Zero Future') also states that:

[22] The Committee on Climate Change's proposed Sixth Carbon Budget ('The UK Path to Net Zero') (published 9 December 2020).
[23] UK Government's Energy White Paper 'Powering our Net Zero Future' (December 2020).

- "*We will consult on steps to ensure that new thermal plants can convert to low-carbon alternatives*"; noting that,
- "*Since 2009, our Carbon Capture and Readiness requirements have ensured that planning consent is only granted to thermal plants for which it will be technically and economically feasible to retrofit [CO2 Capture, Usage and / or Storage] CCUS*"; but that,
- "*The [CCR] requirements do not reflect recent technological advances, including alternative options for decarbonising gas plants, such as conversion to firing clean hydrogen.*"

6.4.3 Therefore, whilst this CCR Assessment has demonstrated that the CCR conditions are not met, this does not preclude a demonstration that an alternative decarbonisation option could be technically and economically feasible, such as Hydrogen firing or blended hydrogen natural gas firing. Indeed the Proposed Development increases the opportunity for Coryton to have a greater blend of hydrogen, with the potential future co-firing capability (by volume) increasing from circa 16% to circa 28% (according to manufacturer estimates). However, this is also subject to sufficient supplies of hydrogen becoming available in the local area during the remaining life of Coryton. This approach to decarbonisation would be more consistent with the proposed amendments to the CCR Regulations.

6.4.4 However, as the alternative decarbonisation options (and associated conditions to be met) are not known / set at the time of writing this report, such a demonstration cannot be provided.

7. CONCLUSIONS

7.1.1 This is a CCR Assessment which has:

a) Under Regulation 6(2)(a) of the 2013 CCR Regulations, presented the updated results of the CCR Assessment for the variation application; and,

b) Under Regulation 6(2)(b) of the 2013 CCR Regulations, presented updated other available information on the protection of the environment and human health relevant to the variation application.

7.1.2 Concerning the results of the CCR Assessment, it is concluded that:

- Regarding the technical retrofitting of CO_2 capture equipment requirements, it is considered that there are barriers to demonstrating technical feasibility of retrofitting for CO_2 capture equipment due to space limitations on the Site;
- Regarding potential CO_2 storage areas / sites, it is considered that there are no major barriers demonstrating potential CO_2 storage sites are available;
- Regarding the technical CO_2 transport requirements, it is considered that there no barriers to technically feasible solution for CO_2 transport, but there are barriers to delivering a transport solution that would be feasible and viable within the projected operational life of Coryton, up to 2036; and
- Regarding the economic assessment, it is considered that there are barriers to demonstrating economic feasibility.

7.1.3 Concerning the updated other available information, it is noted that:

- Regarding the protection of the environment and human health, it is considered that:
  - The Proposed Development is not EIA Development, and "the proposed development […] would not result in any materially new of materially different environmental impacts from those already assessed from the original development"; and,
  - Should it be the case that DESNZ cannot vary the existing consent for Coryton should it be determined that the CCR conditions are not met, the principles of the BAT Conclusions for LCP would not be achieved;
- Regarding previous UK precedence, this includes (in particular) specific consents / situations where there was consideration of CCR, but CCR conditions were not applied / the CCR conditions were not met; and
- Regarding the UK Government's commitments in respect of the '2050 Net Zero' target, whilst this document has demonstrated that the CCR conditions are not met, this does not preclude a demonstration that an alternative decarbonisation option would be technically and economically feasible.

APPENDIX A:
ECONOMIC ASSESSMENT

ECONOMIC ASSESSMENT

A.1 Introduction

This Appendix provides the economic assessment (considering the retrofitting of CO_2 capture equipment and CO_2 transport requirements). The basis for this economic assessment is taken from the 2009 CCR Guidance, in particular paragraphs 62 – 69, and the methodology adopted is consistent with other CCR Assessments for new CCGT generating stations. Notably, the economic model used and general assumptions made are consistent with those adopted for the S36C Variation Application for Spalding Energy Project (Ref 14278, consent granted 13 June 2022) and accepted by BEIS financial analysts.

A.2 Approach to the Assessment

A.2.1 Scenarios Considered

For the economic assessment, two scenarios have been considered:

- **Do Nothing Scenario:** Coryton (as amended by this variation application) continues to operate without CO_2 capture equipment; and
- **CCS Scenario:** Coryton (as amended by this variation application) is retrofitted with capture equipment (and associated CO_2 transport / storage). This scenario also assumes that:
    - The CCGT generating station will be one of the first to be retrofitted with CO_2 capture equipment and accordingly construction costs will be relatively high;
    - The on-shore and off-shore CO_2 transport and off-shore CO2 storage infrastructure will be new assets (again, this means that construction costs will be relatively high because of lack of experience); and,
    - Sizing will be for the CCGT generating station only; and,
    - The CO_2 capture equipment will be a dedicated asset.

Under both scenarios, the assessment assumes that the upgrades proposed to Coryton and being sought by this variation application will be implemented. The assessment does not consider a scenario in which Coryton continues to operate at its current capacity.

A.2.2 Methodology

An economic model has been developed to calculate the break even carbon price under a range of scenarios and sensitivity tests. The break even carbon price is the price of carbon at which the levelized cost of electricity under the Do Nothing Scenario equals the levelized cost of electricity under the CCS Scenario. This is the point at which CCS would become economically viable.

The levelised cost of generation is the lifetime cost including CAPEX and OPEX, discounted to determine the present value against future value (money available today assumed to be worth less in the future) and converted into the equivalent unit cost of generation as £/MWh.

The assessment uses the economic model to calculate the levelised cost of electricity (in p/kWh) for the Do Nothing Scenario and the CCS Scenario assuming that allowances (under the EU Emissions Trading Scheme (EU ETS) / UK Carbon Floor Price) must be purchased for 100% of the residual CO_2 emissions. The calculations assume constant fuel (gas) prices and carbon prices.

A.2.2.1 Varying the Carbon Price

The first economic assessment uses varying carbon prices to identify the break-even carbon price under a range of core assumptions and sensitivity tests. BEIS projections for future carbon prices are then used to determine the year at which the break-even carbon price is expected to be reached. The two sensitivity tests considered are as follows:

Sensitivity Test A: Capital Costs and Fuel Prices

- **Low:** Reduced capital costs (-10%) and reduced fuel prices (-30%) (decreases levelized costs of electricity)
- **High:** Increased capital costs (+10%) and higher fuel prices (+30%) (increases levelized costs of electricity)

Sensitivity Test B: Load Factor

The central case assumes a 28% load factor, as set out in the main assessment assumptions below. This assumed load factor impacts upon the lifetime cost of electricity. Accordingly, a sensitivity analysis has been undertaken by varying the load factor, based on projected CCGT and gas CCS load factors[24],:

- **High Load Factor**: 40%. This decreases the levelized costs of electricity which is an optimistic scenario and not currently projected.
- **Low Load Factor**: 10%. This will increase the levelized cost of electricity.

Sensitivity Test C: Operational Life

The central case assumes that Coryton has an expected operational life of 35 years, as set out in the main assessment assumptions below. Assuming that construction of any retrofitted CCS equipment would not be completed until 2031, there are a limited number of years during which CCS would be operational at Coryton. There is potential to extend the operational life at Coryton to 45 years with additional substantial capital investment. Accordingly, a sensitivity test has been undertaken which assumes an additional 10 years of operation.

A.2.2.2 Varying the Economic Life

A second economic assessment has been undertaken which varies the economic life of Coryton (as opposed to the carbon price, which was the case for the first assessment). The purpose of this assessment is to identify the break-even economic life, i.e. the number of years which CCS equipment would need to be operation for at Coryton to be economically viable. The assessment includes a sensitivity analysis which considers capital costs and BEIS projections[25] for fuel (gas) prices and carbon prices as follows:

Sensitivity Test D:

- **Low**: Reduced Capital Costs (-10%), low fuel prices (based on BEIS Low Projections) and high carbon prices (based on BEIS High carbon price projections). This scenario decreases levelized costs of electricity.
- **High**: Higher Capital Costs (+10%), higher fuel prices (based on BEIS High Projections) and lower carbon prices (based on BEIS Low carbon price projections). This scenario increases levelized costs of electricity.

A.2.3 Assumptions

Table A.1 sets out the main parameters considered, and the associated assumptions / estimations.

[24] National Grid, 2023. Future Energy Scenarios. July 2023.
[25] Department for Energy Security and Net Zero, 2023. Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal. Updated April 2023.

Table A.1: Main Parameters Considered

Parameter	*Unit*	*'Do Nothing Scenario'*	*'With CCS Scenario'*
First Year of Construction of CO_2 Capture Equipment	-	N / A	2026
First Year of Operation of CO_2 Capture Equipment	-	N / A	2031
(Projected) Last Year of Operation	-	2036[26]	2036
Economic Life of CO_2 Capture Equipment	-	N / A	6
Nominal Discount Rate (Hurdle Rate)[27]	%	7.5%	9%
Fuel (Gas) Price[28]	p/therm	60	
Net Plant Output	%	842	758[29]
(Remaining) Lifetime Load Factor	%	28	28
Annual Operating Hours	hr	2453	2453
CO_2 Capture Rate	%	0%	90%
CO_2 Emitted	kg/MWh	361	36

In addition to the above, the assessment also considers estimated CAPEX and OPEX costs of the permitting, construction and operation of the CO_2 capture equipment, on-shore and off-shore CO_2 transport, and off-shore CO_2 storage. Within this economic assessment, these estimated costs are based on the most recent data / studies available, and it is noted that these estimated costs are expected to reduce over time, bearing in mind the likely future development of CO_2 Transport and Storage hubs within industrial clusters.

In respect of CAPEX costs, the cost of retrofit of CCS is anticipated to attract a higher CAPEX than for CCS fitted as part of a new-build, in particular for sites that would be space constrained.

Costs associated with pipeline transport and geological storage of CO_2 are also uncertain, and highly dependent on the potential for network facilities. The costs associated with the T&S network have been consolidated into a single value, levied as a fee per tonne of CO_2 produced. This is consistent with the application of common networks operated and administered by a third party. This has been taken here to be £20/teCO_2[30]. However, by developing a transport asset for a network, considerable costs are shared, and financing is potentially more readily available, as a number of partners share the risk and the opportunity. Shared storage sites would also bring storage costs down.

The key CAPEX and OPEX metrics adopted for the assessment are summarised in Table A.2.

Table A.1: CAPEX and OPEX Assumptions

Parameter	*Unit*	*'Do Nothing Scenario'*	*'With CCS Scenario'*
CAPEX			
EPC / Capex Cost	£/kW	0	1,410
O&M Costs			
O&M Fixed Fee	£/kW/yr	11.7	16.3
O&M Variable Fee	£/kW/yr	7.4	12.3
CO_2 Transport / Storage	£/kW/yr	0	17.7
Othe Overhead Charges			
Connection and UoS Charges	£ '000/y	2,779	2,779
Insurance	£ '000/y	2,894	5,754
Total Standby Energy Cost (p/kWh)	p/kWh	4.59	5.76

[26] Coryton was commissioned in 2001. This projected last year of operation would allow for a circa 35 year economic lifetime.
[27] Department for Business, Energy and Industrial Strategy, 2020. Electricity Generation Costs 2020.
[28] Based on BEIS projections for fuel (gas prices). This fuel (gas) price is quoted for the 'Central Case' from 2031 to 2036.
[29] Includes the 'lost' output due to the CO_2 capture process steam extraction and the auxiliary power for the CO_2 capture equipment. A 10% reduction has been assumed.
[30] AECOM, 2022, Decarbonisation Readiness - Technical Studies, Prepared for the Department for Business, Energy and Industrial Strategy

A.3 Economic Assessment: Varying the Carbon Price

A.3.1 Central Assessment Case

Under the Central Assessment Case and for carbon prices between £0/t CO_2 to £500/t CO_2, the results can be summarised as follows:

- The levelised cost of electricity ranges between 5.2 p/kWh and 23.3 p/kWh in Do Nothing Scenario;
- The levelised cost of electricity ranges between 20.0 p/kWh and 22.0 p/kWh in the CCS Scenario; and
- The Calculated Break-Even Carbon Price is £460/t CO_2.

A.3.2 Sensitivity Test A: Capital Costs and Fuel Prices

Under the *Low* Sensitivity Case, the results are as follows:

- The levelised cost of electricity ranges between 4.0 p/kWh and 22.1 p/kWh in Do Nothing Scenario;
- The levelised cost of electricity ranges between 17.4 p/kWh and 19.4 p/kWh in the CCS Scenario; and
- The Calculated Break-Even Carbon Price is £417/t CO_2.

Under the *High* Sensitivity Case, the results are as follows:

- The levelised cost of electricity ranges between 6.4 p/kWh and 24.5 p/kWh in Do Nothing Scenario;
- The levelised cost of electricity ranges between 22.6 p/kWh and 24.6 p/kWh in the CCS Scenario; and
- The Calculated Break-Even Carbon Price is £504/t CO_2.

The parity point, at which the cost of CCS becomes viable for the price of carbon against Coryton as existing (i.e. the Do Nothing Scenario), is relatively high ranging between £417 and £504 per tonne of CO_2. The results of the Central Assessment Case and Sensitivity Test A for the Do Nothing Scenario and CCS Scenario are illustrated in **Figure A.1,** which shows the calculated levelised cost of electricity against carbon price**.** The break-even carbon price is illustrated by the red lines.

Figure A.1: Levelised Cost of Electricity Against Carbon Price

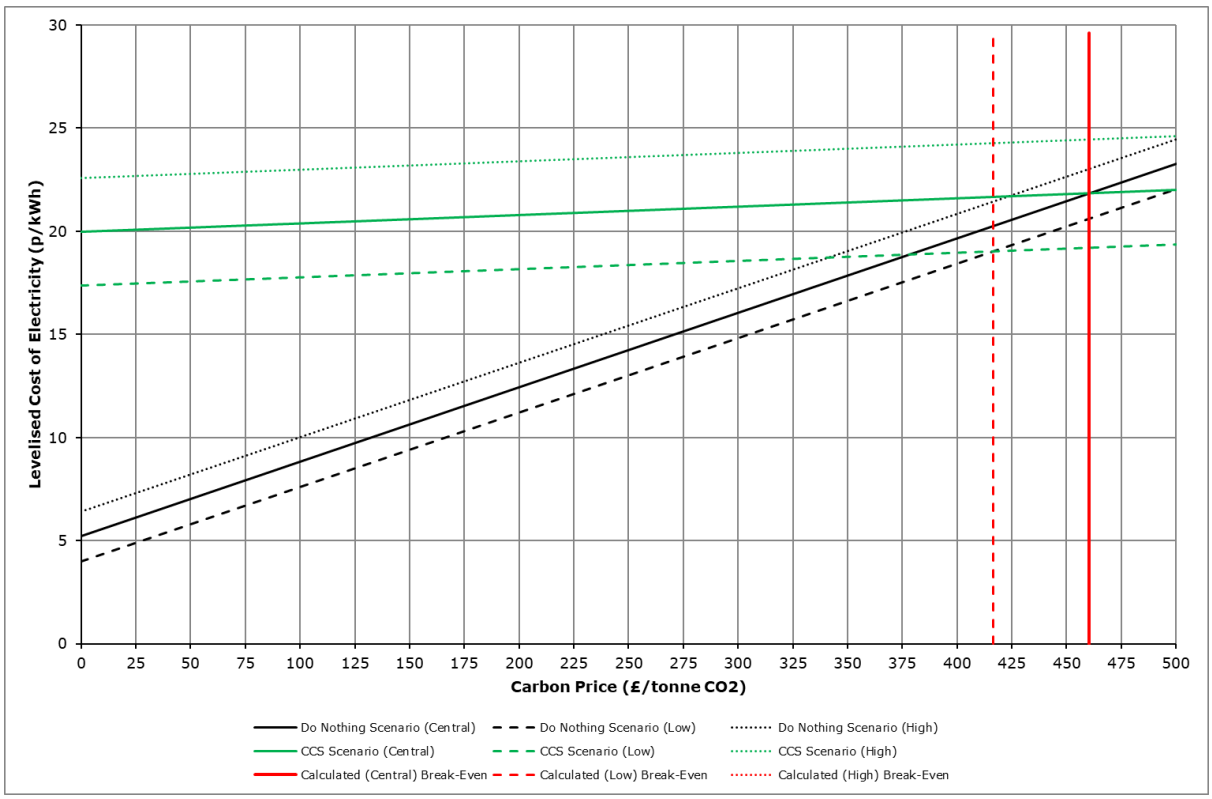
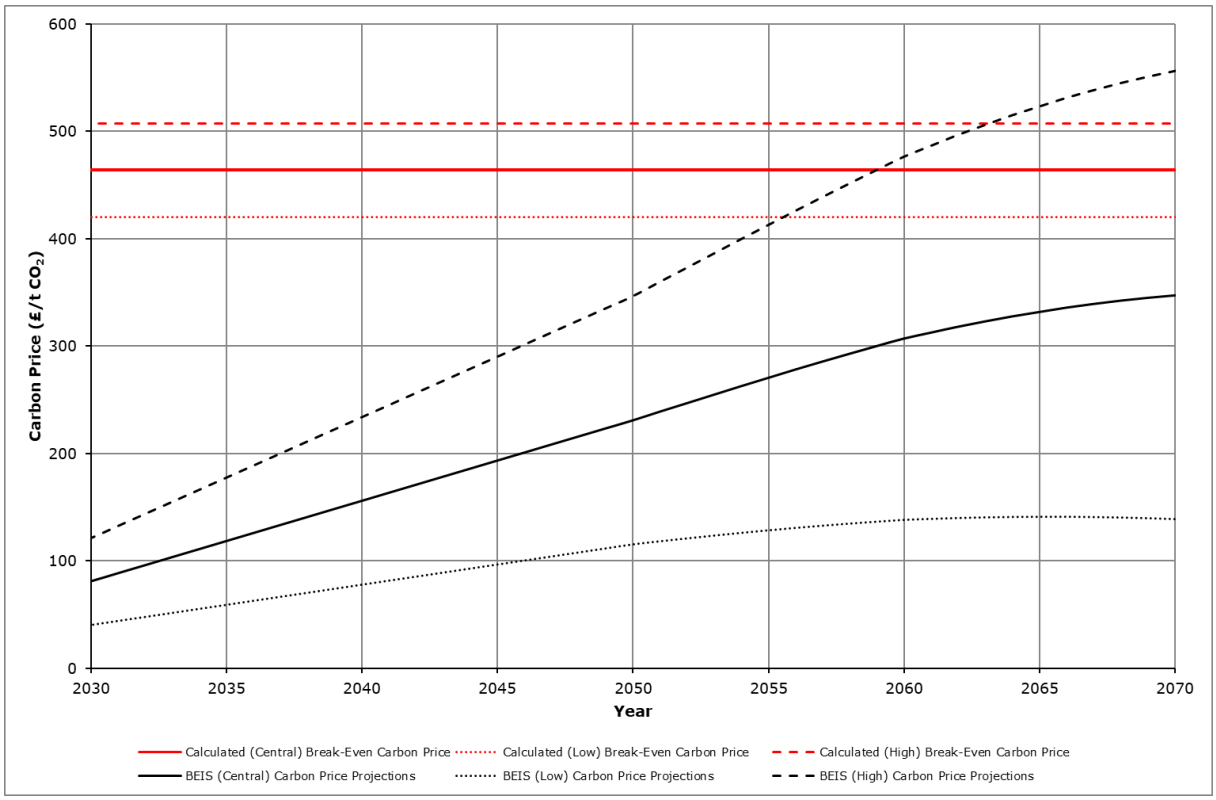


Figure A.2 shows the year at which the calculated break-even price is expected to be reached, using the BEIS carbon price projections (under Low, Central, High projections).

Figure A.2: Comparison of BEIS Projections For Carbon Prices with Calculated Break-Even Carbon Prices



The results of assessment under the different BEIS carbon price projections and calculation break-even carbon price is summarised in **Table A.3**.

Table A.3: Summary of when Break-Even Carbon Price is Reached Based on BEIS Carbon Price Projections

BEIS Carbon Price Projections	Calculated Break Even Carbon Price		
	Low	**Central**	**High**
Low	Not reached	Not reached	Not reached
Central	Not reached	Not reached	Not reached
High	Not reached within lifetime (2055)	Not reached within lifetime (2059)	Not reached within lifetime (2063)

Under all scenarios, it is evident that the necessary carbon price for the retrofitting of CCS equipment to be economically would not be reached within the likely operational lifetime of Coryton. It is therefore considered that there are barriers to demonstrating economic feasibility under this scenario and assessment.

A.3.2 Sensitivity Test B: Load Factor

Under the *Low* Sensitivity Case (10% LF), the results are as follows:

- The levelised cost of electricity ranges between 6.6 p/kWh and 24.6p/kWh in Do Nothing Scenario;
- The levelised cost of electricity ranges between 45.5 p/kWh and 47.5 p/kWh in the CCS Scenario; and
- The Calculated Break-Even Carbon Price is £1,213/t CO_2.

Under the *High* Sensitivity Case (40% LF), the results are as follows:

- The levelised cost of electricity ranges between 5.0 p/kWh and 23.0 p/kWh in Do Nothing Scenario;
- The levelised cost of electricity ranges between 15.7 p/kWh and 17.8 p/kWh in the CCS Scenario; and
- The Calculated Break-Even Carbon Price is £335/t CO_2.

Under this sensitivity test, the break-even carbon price decreases to £335/t CO_2 under the High LF, however increases to £1,213/t CO_2 under the Low LF. The results of this assessment under the different BEIS carbon price projections and calculation break-even carbon price is summarised in **Table A.4.**

Table A.4: Summary of when Break-Even Carbon Price is Reached Based on BEIS Carbon Price Projections

BEIS Carbon Price Projections	Calculated Break Even Carbon Price		
	Low LF	**Central**	**High LF**
Low	Not reached	Not reached	Not reached
Central	Not reached	Not reached	Not reached within lifetime (2064)
High	Not reached	Not reached within lifetime (2059)	Not reached within lifetime (2047)

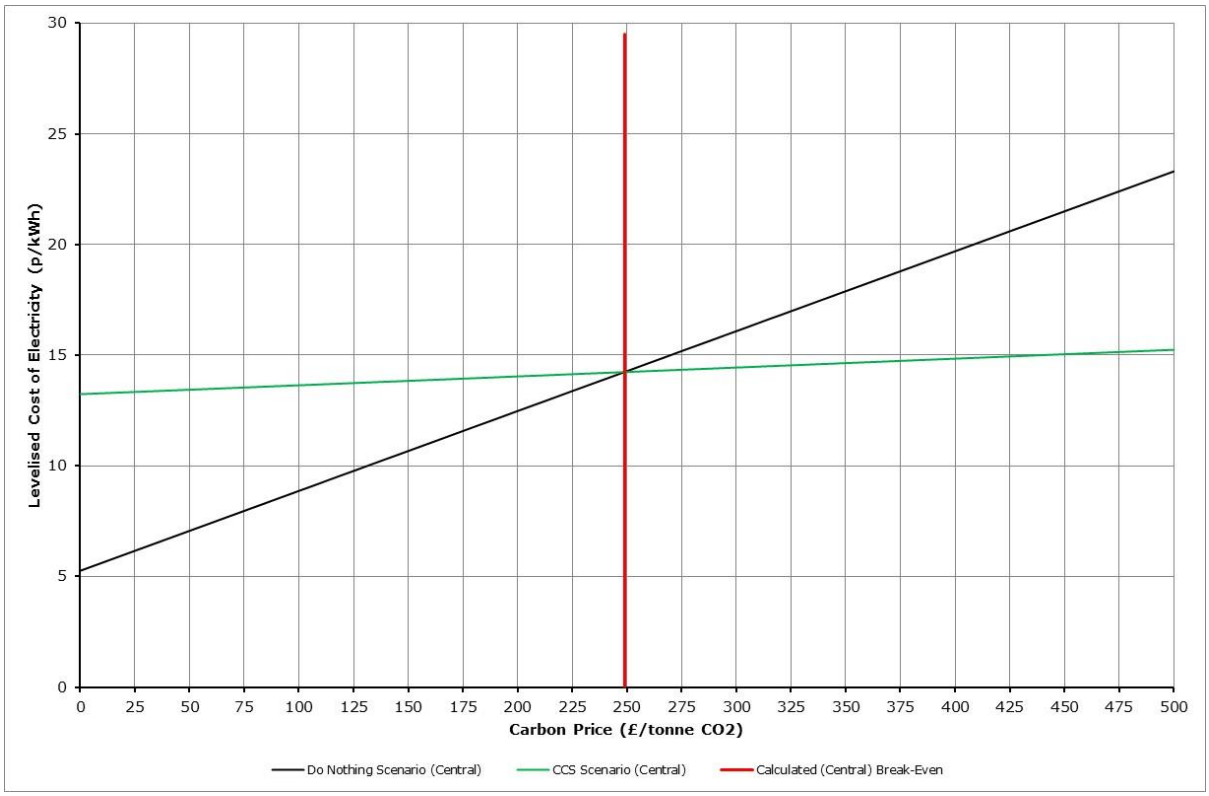
As with Sensitivity Test A, it is evident that there are also barriers to demonstrating economic feasibility under this Sensitivity Test and assessment.

A.3.4 Sensitivity Test C: Extended Operational Life

Assuming the operational life of Coryton can be extended by 10 years to 2046 (total 45 years), the results of the economic assessment are illustrated in Figure A.3 and summarised as follows:

- The levelised cost of electricity ranges between 5.3 p/kWh and 23.3 p/kWh in Do Nothing Scenario;
- The levelised cost of electricity ranges between 13.2 p/kWh and 15.3 p/kWh in the CCS Scenario; and
- The Calculated Break-Even Carbon Price is £249/t CO_2.

Figure A.3: Levelised Cost of Electricity Against Carbon Price (Extended Operational Life)

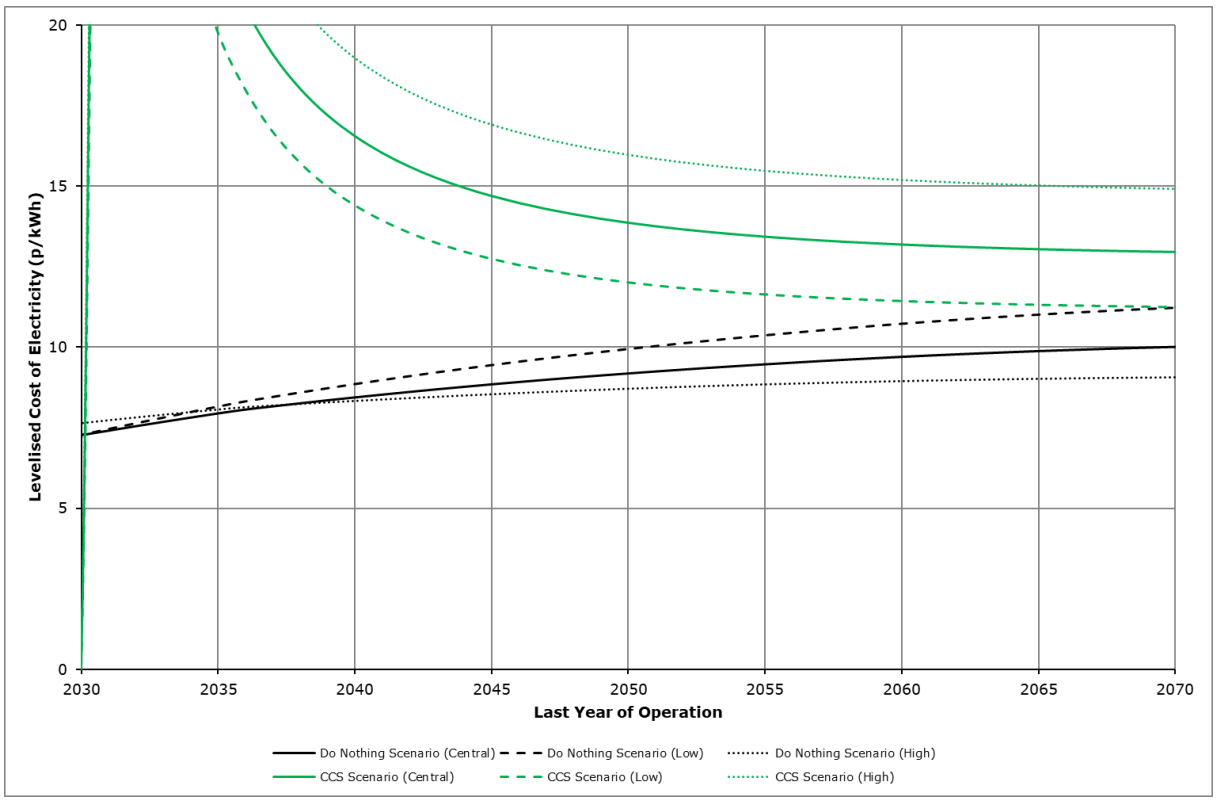


Using the BEIS carbon price projections, it is estimated that under the Central projections, this price would be reached in 2053, eight years following the end of operation. Under the High carbon price projections, the price would be reached in 2042 and under the Low projections, the price would not be reached at all.

A.4 Economic Assessment: Varying the Economic Lifetime

Figure A.4 plots the levelised cost of electricity against the economic lifetime for both the Do Nothing Scenario and CCS Scenario. The lifetime cost of electricity is shown on the y-axis and the economic lifetime (as last year of operation) is shown on the x-axis. The solid lines represent the central case for each Scenario and the dotted lines represent the sensitivity tests.

Figure A.4: Levelised Cost of Electricity Against Economic Life



Under the Central Assessment Case, the break-even last year of operation would be well beyond 2070, the last year utilised in the economic model.

Based on the sensitivity analysis and varied parameters (capital costs, fuel (gas) prices and carbon prices), it is evident that even with the cumulative effects of the factors decreasing the levelised cost of electricity (as illustrated under the 'Low' Sensitivity Test) the breakeven last year of operation would be 2069, well beyond the projected last year of operation.

Under the 'High' Sensitivity Test, as with the Central Assessment Case, the break-even last year of operation would be well beyond 2070.

This economic assessment therefore also shows that retrofitting Coryton with CCS equipment would likely be economically unviable and accordingly it is considered that there are barriers to demonstrating economic feasibility.

APPENDIX D:
COMBINED HEAT AND POWER ASSESSMENT

Intended for

Coryton Energy Company, Ltd

Document Type

Report

Date

7 November 2023

CORYTON POWER STATION

COMBINED HEAT AND POWER ASSESSMENT

Variation Application under Section 36C of the 1989 Electricity Act

RAMBOLL

CORYTON POWER STATION

COMBINED HEAT AND POWER ASSESSMENT
Variation Application under Section 36C of the 1989 Electricity Act

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CONTENTS

1. INTRODUCTION

1.1.1 This report is prepared on behalf of Coryton Energy Company, Ltd (CECL) to provide the supporting combined heat and power (CHP) assessment and information to demonstrate compliance with the requirement for Coryton Power Station to be 'CHP Ready'.

1.1.2 CHP, also known as cogeneration, is the generation of electrical power and usable heat in a single process. CHP is a well proven process for reducing primary energy consumption and total carbon dioxide (CO_2) emissions that would result from the generation of electrical power and usable heat in separate processes.

2. THE PROPOSED DEVELOPMENT

2.1.1 Coryton is a combined cycle gas turbine (CCGT) generating station, located in the Thames Haven in Stanford Le Hope, Essex. The original consent, was granted in 1997 for Coryton under Section 36 of the Electricity Act 1989 and the Power Station became operational in 2002.

2.1.2 As noted in the main Environmental and Technical Schedule, the Proposed Development relates to the way in which the Coryton Power Station is authorised to operate. In particular, the Proposed Development comprises the increase in the maximum electricity generation output of Coryton from "about 750 MW" to "up to 850 MW".

2.1.3 As such, CECL is submitting a variation application under Section 36C of the 1989 Electricity Act to the Secretary of State (SoS), via the Department for Energy Security and Net Zero (DESNZ), which primarily seeks to amend Paragraph 2 of the existing consent to allow for the increase in the permitted electricity generation output of Coryton to up to 850 MW capacity.

3. LEGISLATIVE AND POLICY CONTEXT

3.1 National Policy Statement for Energy (EN-1)

3.1.1 In July 2011, the Secretary of State for Energy and Climate Change (now DESNZ) designated a number of National Policy Statements (NPSs) relating to nationally significant energy infrastructure. These included an Overarching NPS for Energy (EN-1), which sets out the Government's overall policy for the delivery of nationally significant energy infrastructure. EN-1 was updated in March 2023[1].

3.1.2 EN-1 states (at paragraph 4.7.8) that:

"Applications for thermal stations must either include CHP proposals or contain evidence demonstrating that the possibilities for CHP have been fully explored to inform the Secretary of State's consideration of the application."

3.1.3 EN-1 further states (at paragraph 4.6.8) that:

"If the proposal is for thermal generation without CHP, the applicant should:

- *Explain why CHP is not economically or practically feasible;*
- *provide details of any potential future heat requirements in the area that have been considered and the reasons the station could not meet them;*
- *detail the provisions in the proposed scheme for ensuring any potential heat demand in the future can be exploited; and*
- *provide an audit trail of dialogue between the applicant, prospective customers, the local area energy teams in local government and district heating energy supply."*

3.2 2006 CHP Guidance

3.2.1 Paragraph 4.7.14 of EN-1 states that CHP guidance issued in 2006[2] should apply to any application to develop a thermal generating station under the Planning Act 2008 and that

[1] Department for Energy Security and Net Zero, 2023. Overarching National Policy Statement for Energy (EN-1), March 2023.
[2] Department for Energy Security and Net Zero (then DTI), 2006. Guidance on Background Information to Accompany Notifications under Section 14 (1) of the Energy Act 1976 and Applications under Section 36 of the Electricity Act 1989, December 2006

the "*the Secretary of State should have regard to the 2006 CHP Guidance or any successor to it when considering the CHP aspects of applications for thermal generating stations*".

3.2.2 Whilst not specifically stated, it is understood that the 2006 CHP Guidance is also a material consideration for variation applications under Section 36C of the 1989 Electricity Act.

3.2.3 Paragraphs 11 and 12 of the 2006 CHP Guidance provide the relevant CHP requirements to be considered for this variation application. Paragraph 11 requires that for all generating stations, developers provide evidence to show the steps taken to assess viable CHP opportunities within a CHP search area, including:

- (a) Explanation of the location of the generating station;
- (b) Identification of potential CHP opportunities within the CHP search area;
- (c) Evaluation of potential CHP opportunities within the CHP search area, including description of how to maximise any associated CHP benefits; and
- (d) A list of any organisation(s) contacts.

3.2.4 In the case of non-CHP generating stations, Paragraph 12 requires developers to provide:

- Basis for the conclusion that it is not economically feasible to exploit existing regional heat markets;
- Identification of potential future CHP opportunities within the CHP search area; and,
- Proposed CHP provisions within the generating station to exploit any realised potential future CHP opportunity.

3.2.5 It should be noted that the application for the original consent (and the direction that planning permission be deemed to be granted) predated the issue of the 2006 CHP Guidance (consent was granted in March 1997), and therefore was not accompanied by a CHP Assessment. The existing consent contains no CHP Conditions or requirements.

4. CONSIDERATION OF CHP REQUIREMENTS

4.1 Explanation of the Location of the Generating Station

4.1.1 Coryton is a CCGT generating station, located near Stanford le Hope in the Thames Estuary, Essex. The 1997 Environmental Statement that accompanied the original planning application for Coryton provided an overview of the alternative sites considered at the time and reasons the existing site was selected.

4.1.2 The Proposed Development comprises modifications to the internal components of the plant and does not require any additional land take. All works associated with the Proposed Development would be within the existing site boundary. As the variation application relates to an existing, operational power station, no alternative sites have been considered and factors influencing the plant location are not considered relevant.

4.2 Identification of Potential CHP Opportunities within the CHP Search Area

4.2.1 The application for the original consent (and the direction that planning permission be deemed to be granted) predated the issue of the 2006 CHP Guidance, and therefore was not accompanied by a CHP Assessment. Nevertheless, during the selection of the location, consideration was given to the opportunities to integrate the generating station with local businesses / industries to provide commercial benefits, such as by offering competitively-priced power and heat. However, there were no viable CHP opportunities.

4.2.2 The existing consent contains no CHP Conditions or requirements.

4.2.3 The 2006 CHP Guidance requires that CHP Assessments examine the information available from the 'Online Industrial Heat Map'. Since the publication of the 2006 CHP guidance, the 'Online Industrial Heat Map' has been replaced with the 'UK CHP Development Map'3. Therefore, to assess any updated potential CHP opportunities, an examination of the UK CHP Development Map has been undertaken.

[3] UK CHP Development Map. Available at: http://chptools.decc.gov.uk/developmentmap/

4.2.4 Based on the examination of the UK CHP Development Map, covering a search area of 15 km[4] centred on the Site (the CHP search area), **Figure D.1** presents the location of the heat loads (i.e. potential CHP opportunities) and **Table D.1** presents the associated breakdown of the heat loads.

Figure D.1: Location of the Heat Loads within 15km of Coryton

Table D.1: Breakdown of Heat Loads

Sector	***MWh Heat Load***	***Share***
Communications and Transport	4,896	0.08%
Commercial Offices	55,531	0.87%
District Heating	0	0%
Domestic	3,868,467	60.28%
Education	97,074	1.51%
Government Buildings	17,665	0.28%
Hotels	15,592	0.24%
Large Industrial	2,020,148	31.48%
Health	78,195	1.22%
Other	10,598	0.17%
Small Industrial	178,625	2.78%
Prisons	0	0%
Retail	53,726	0.84%
Sport and Leisure	7,359	0.11%
Warehouses	9,156	0.14%
Total MW Heat Load in the CHP Search Area	**6,417,031**	-

4.2.5 There is a total existing heat load of 6,417,031 MWh within 15km of Coryton. The main heat load 'centres' are those relating to the surrounding settlements at Stanford le Hope, Basildon, Canvey Island, Leigh-on-Sea, Grays, Gravesend etc. The three largest identified potential heat loads within the CHP search area are:

[4] When identifying potential CHP opportunities, EN-1 states (at paragraph 4.6.5) that: "*to be economically viable as a CHP plant, a generating station needs to be located close to industrial or domestic customers with heat demands. The distance will vary according to the size of the generating station and the nature of the heat demand, but is likely to mean within a distance of 15 km*".

- 'Domestic' (60.28%);
- 'Large Industrial' (31.48%); and
- 'Small Industrial' (2.78%).

4.2.6 These heat loads are examined further in the subsequent sections. There are also eight large heat load sites within the search area which have a combined heat load of 2,064,462 MWh.

'Domestic' Heat Loads

4.2.7 **Figure D.2** presents the locations of the 'Domestic' heat loads within the CHP search area.

Figure D.2: Domestic Heat Loads within 15km of Coryton

4.2.8 The breakdown presented in Table D.1 indicates that the 'Domestic' heat load within the CHP search area is 3,868,467 MWh, approximately 60.28% of the total heat load. The domestic heat load is spread across the CHP search area, in particular around the existing residential settlements to the north and east (including Basildon, Benfleet, Leigh-on-Sea and Southend-on-Sea) and southwest at Grays and Gravesend.

4.2.9 The heat load is made up of existing domestic housing and is not representative of a new heat load. The provision of CHP is most likely to be cost-effective and practical where it is included as part of the initial design of any development and is part of a mixed-use development. Retrofitting a district heating network to an existing housing estate is unlikely to be cost effective or efficient.

4.2.10 Except in the case of large scale high-density new developments, the installation of a new heat distribution network is likely to be cost prohibitive in comparison with established conventional means of domestic heating. There are no proposals for any new large-scale residential settlements within the CHP search area.

4.2.11 Furthermore, generally speaking, CHP is more attractive in cases where the heat load is constant (and large) throughout the year. Typically, this is the case with chemical plants, factories and refineries which depend upon continuous processes and use large amounts of heat (usually supplied as steam). CHP is less attractive in cases where the heat load is seasonal and / or intermittent. Typically, this is the case with 'Domestic' / district heating schemes in countries which have a relatively short winter heating seasons (such as the UK, when compared to Eastern European and Scandinavian countries). As such, there is a general absence of significant 'Domestic' / district heating schemes in the UK and, where these are developed, these schemes are generally associated with new-build

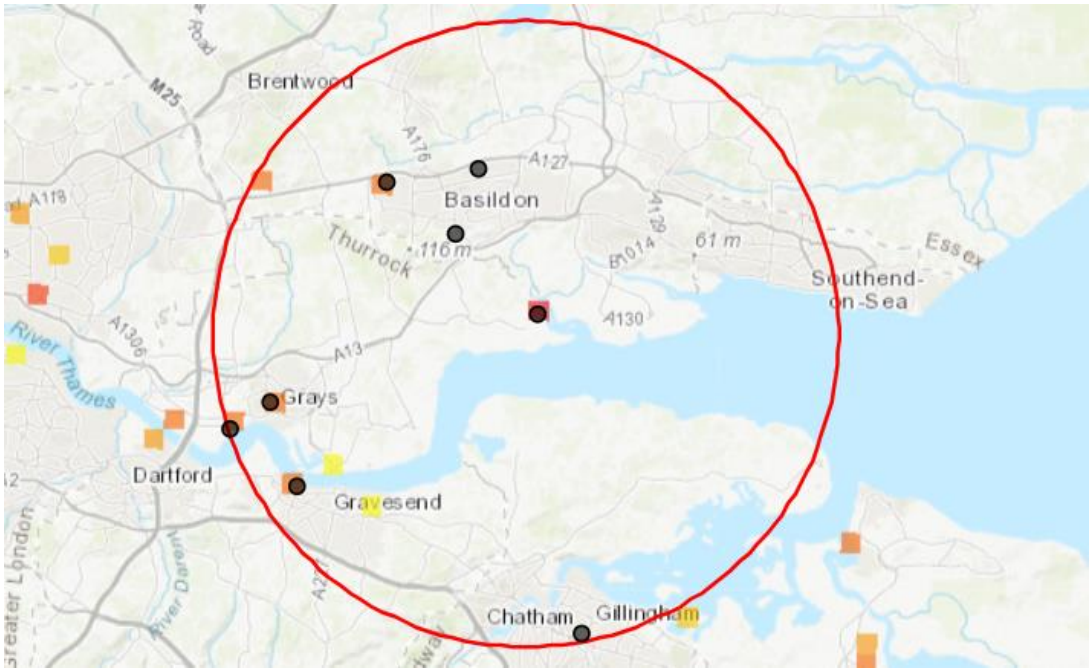
publicly funded and often high-rise housing where the heat loads can be readily combined and the heat distribution piping is compact.

4.2.12 In light of the above, district heating is not considered to represent a heat demand that presents a viable current CHP opportunity.

'Large Industrial' Loads

4.2.13 **Figure D.3** presents the locations of the 'Large Industrial' heat loads within the CHP search area.

Figure D.3: Large Industrial Heat Loads within 15km of Coryton



4.2.14 The breakdown presented in **Table D.1** indicates that the 'Large Industrial' heat load within the CHP search area is 2,020,148 MWh, and **Figure D.3** indicates that there is a single large potential heat load in proximity to Coryton, to the northeast.

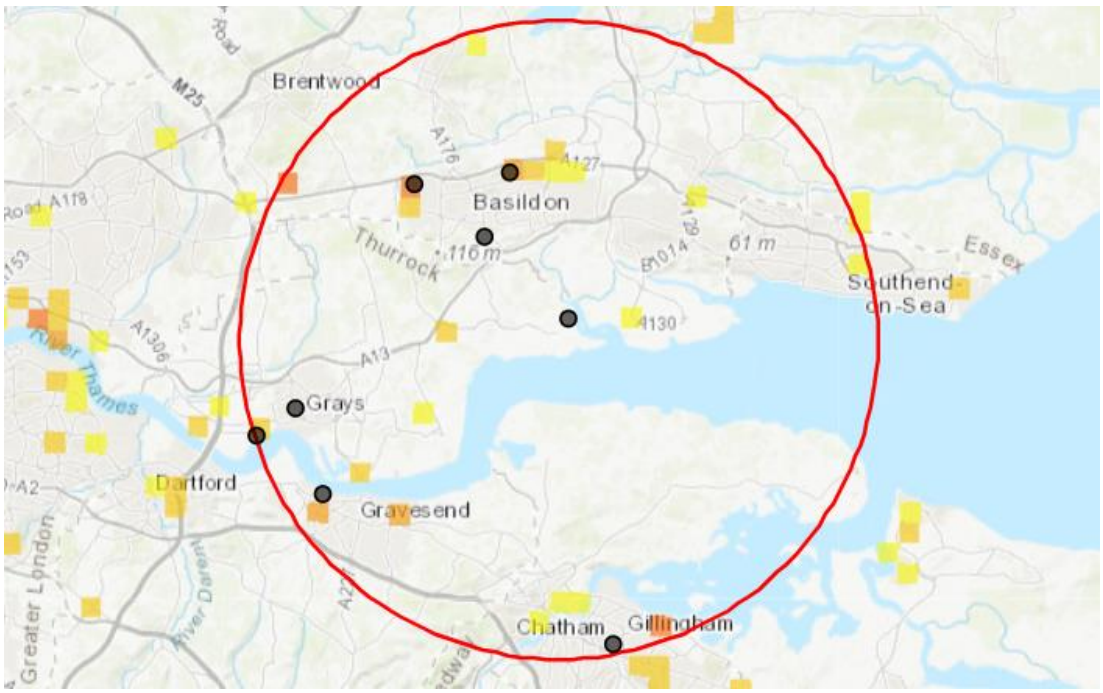
4.2.15 This is likely to be associated with the Thames Oliport import terminal, a fuel storage and supply facility operated by Greenergy. The site became operational in 2017 following closure of the Coryton Oil Refinery and its development is being carried out in phases, alongside the development of the wider Thames Enterprise Park (discussed further below). Currently the site is being used for diesel storage and road-loading of diesel and heating oil.

4.2.16 As above, this heat load is made up of existing industrial heat demand and is not representative of a new heat load and the provision of CHP is most likely to be cost-effective and practical where it is included as part of the initial design of such a facility. Accordingly, this industrial site is also unlikely to present a viable current CHP opportunity.

'Small Industrial' Heat Loads

4.2.17 **Figure D.4** presents the locations of the 'Small Industrial' heat loads within the CHP search area.

Figure D.4: Small Industrial Heat Loads within 15km of Coryton



4.2.18 The breakdown presented in Table D.1 indicates that the 'Small Industrial' heat load within the CHP search area is 178,625 MWh, approximately 2.78% of the total heat load.

4.2.19 The 'Small Industrial' heat load is distributed across the CHP search area and, similar to the 'Domestic' heat load, is associated with existing heat loads and is not representative of a new heat load. The distributed nature of the heat loads, with multiple smaller loads spread across the area means that it would not be cost efficient to supply heat to these centres.

4.2.20 The small industrial heat load centres would also likely be incompatible with a heat supply from Coryton. Small industrial customers would likely require a constant supply of heat, however the intermittent nature of operation at Coryton would mean that supplementary back-up generators would be required, which would come with additional associated costs and potential environmental impacts.

4.2.21 Therefore, the 'Small Industrial' heat load is also not considered to present a viable current CHP opportunity.

Evaluation of Potential CHP Opportunities within the CHP Search Area / Basis for the Conclusion

4.2.22 Based on the examination of the UK CHP Development Map, while there is a number potential heat demand customers within 15km of Coryton, no viable current CHP opportunities have been identified and there are therefore no existing heat loads to be further assessed.

4.3 Identification of Potential Future CHP Opportunities within the CHP Search Area

4.3.1 During operation, activities on the Site are undertaken in accordance with an Environmental Permit. The latest version, EPR/EP3833LY/V003 was issued in on 10th March 2020 (under the Environmental Permitting (England and Wales) Regulations 2010).

4.3.2 Condition 1.2.1 of the Permit requires that the operator:

"(a) take appropriate measures to ensure that energy is used efficiently in the activities;

(b) take appropriate measures to ensure the efficiency of energy generation at the permitted installation is maximised;

(c) review and record at least every four years whether there are suitable opportunities to improve the energy efficiency of the activities; and

(d) take any further appropriate measures identified by a review."

4.3.3 Notwithstanding, should there be identification of a potential future CHP opportunity, ultimate implementation of CHP will be depending on a number of factors. These factors include:

- Economic feasibility;
- Compatibility between the operating regime of Coryton with the requirements of the Heat Load; and,
- Compatibility with any specific Energy Policies associated with the Heat Load.

4.3.4 The area of land to the south, east and north of Coryton, the former Coryton Oil Refinery, is subject to an Outline Planning Application (Thurrock Council Planning Reference: 18/01404/OUT) for comprehensive redevelopment to provide 3.7 million sq.ft of development with a range of energy generation, manufacturing, storage, distribution and logistics uses. The development is known as Thames Enterprise Park (TEP). According to the Environmental Statement that accompanied the outline application, construction was provisionally scheduled to commence in 2022 and finish in 2035, however the application is still under review. An Energy from Waste facility is currently proposed in Plot D of TEP, immediately to the south of Coryton. According to the EIA Scoping Report submitted for this Plot (Planning Ref: 20/01532/SCO) the facility would be designed to enable heat to be extracted from the generation process for use by local heat users, likely occupiers of other plots within the wider TEP site.

4.3.5 In light of the above, it is considered unlikely that the TEP development would be brought forward within a future timeline that would present an appropriate future CHP opportunity for Coryton. Coryton is currently anticipated to be operational until 2036 (assuming 35 year operational life). Accordingly, Coryton would be unable to provide a long-term source of heat to any future customers within TEP and any potential customers would need an alternative source of heat following the decommissioning of Coryton.

4.3.6 Although unknown at this time, it is also anticipated that energy generation facilities would be delivered within the TEP site itself which would provide more cost effect sources of heat, based on the assumption that CHP network can be installed through development rather than retrofitted, to other future occupiers of the development.

4.4 CHP Provisions within the Generating Station

4.4.1 As noted above, the application for the original consent predated the issue of the 2006 CHP Guidance, and therefore was not accompanied by a CHP Assessment. Accordingly, Coryton was not required to be 'CHP-Ready', and the detailed design of the CCGT generating station did not include any specific CHP-Ready design provisions.

4.4.2 Nevertheless, should there be identification of economically feasible future CHP opportunities, it is necessary to consider possible sources of heat or steam from Coryton that could serve any future customer.

4.4.3 The main sources of heat within Coryton are low-grade heat (i.e. waste heat) and high-grade heat which is used in the CCGT process (i.e. process heat).

4.4.4 Waste heat is available in two main forms, hot flue gases (at around 90^{O}C) and cooling water (around 25^{O}C). There is no economically feasible technology for recovery and/or use of either in generating additional power, and to make use of the heat it is necessary to identify a heat demand suited to the temperature and medium (i.e. gas or water).

4.4.5 There are limitations to the extent that heat can be extracted from flue gases as it needs to be of a minimum temperature to disperse sufficiently and avoid condensing. Extracting heat from the flue gases would reduce dispersion of the emissions meaning that further consideration would need to be given to the impact of the CCGT on ambient air quality. Transmission of heat from flue gases over long distances would also be less efficient and economical, and use of heat would therefore likely need to be limited to on-site uses.

4.4.6 With regard to cooling water, the feasibility of using waste heat is limited by the relatively low temperature (25^{O}C) for which there are very few uses. Similarly, due to the large quantities of cooling water produced, transmission of this heat over long distances would be uneconomic and use of heat would therefore be limited to on-site uses.

4.4.7 Under normal circumstances, the majority of process heat is converted into electricity via the heat recovery steam generator and steam turbine, which is the optimal and generally standard design of a CCGT plant like Coryton. It is anticipated that some modifications could be made to the CCGT generating station for CHP provisions to allow for the export of steam and / or hot water, however there are limited options. These modifications could include:

- Tie-in locations in either:
  - For higher pressure steam (between 20 to 40 bar), the cold re-heat line from the High Pressure (HP) steam turbine exhaust; or,
  - For lower pressure steam (less than 10 bar), the crossover between the Intermediate Pressure (IP) steam turbine exhaust and the Low Pressure (LP) steam turbine inlet; and,
- Additional control systems.

4.4.8 However, the optimised design of the operational plant makes any available retrofitting options for extracting process heat from the electricity generating process very costly and complex.

4.4.9 In addition to the above, consideration needs to be given to the arrangements for dealing with CCGT produced surplus heat when there is no external heat demand. Vice versa, as the power station is not operational for 100% of the time (noting that the capacity factor for Coryton is projected to be circa 10-20% from the mid to late 2020s), consideration needs to be given to providing sources of back up heat for any external heat customer which has demand during periods the plant is not operational.

5. CONCLUSIONS

5.1.1 This report presents an assessment of potential current and future heat customers for CHP at Coryton using the UK CHP Development map to identify existing heat loads with the study area and a search of local planning records for potential future heat loads.

5.1.2 While there are a number of potential heat demand customers within the study area, most of the demand is from existing heat loads and do not represent future heat demand. It is not considered practical or cost effective to retrofit the existing Coryton Power Station with CHP technology to meet this demand.

5.1.3 In addition, the intermittent nature of operation of Coryton, and the limited remaining operational lifetime of Coryton, means that it cannot supply a continuous and long-term source of heat to any heat customers.

5.1.4 It is not considered that there are any current or future viable CHP opportunities for Coryton.

5.1.5 Potential sources of heat at Coryton have however been identified should any technically and economically feasible opportunities arise that align with future operations.