

Keadby Next Generation Power Station

Environmental Permit Application

Appendix D - Carbon Capture Readiness Statement

The Environmental Permitting (England and Wales) Regulations 2016

Operator: Keadby Next Generation Limited

Date: December 2025

Document History

Document Ref	Carbon Capture Readiness Statement
Version	V0
Document Owner	Arup

Glossary

Abbreviation	Description
ALARP	As Low As Reasonably Practicable
CCGT	Combined Cycle Gas Turbine
CCP	Carbon capture plant
CCR	Carbon Capture Readiness
CCUS	Carbon Capture, Usage and Storage
COMAH	Control of Major Accident Hazards
DCO	Development Consent Order
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security and Net Zero
DR	Decarbonisation Readiness
EA	Environment Agency
EU	European Union
FEED	Front End Engineering Design
HSE	Health and Safety Executive
IED	Industrial Emissions Directive
LCP	Large Combustion Plants Directive
NGET	National Grid Electricity Transmission
NLC	North Lincolnshire Council
NPS	National Policy Statements
PPE	Personal Protective Equipment

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1. Introduction

1.1. Overview

This Carbon Capture Readiness ('CCR') Statement (has been prepared by Arup together with Keadby Next Generation Limited ('the Operator') which is a wholly owned subsidiary of SSE plc. It forms part of the application for an Environmental Permit, submitted to the Environment Agency under the Environmental Permitting Regulations (England and Wales) 2016 (as amended).

The Keadby Next Generation Power Station ('the Proposed Installation') is a new electricity generating station with a capacity of up to 910MW electrical output. The Proposed Installation consists of a combined cycle gas turbine (CCGT) electricity generating station designed to run on 100% hydrogen and capable of operating on 100% natural gas from the start of operations. When hydrogen becomes available and operation with hydrogen firing is commercially viable, the Proposed Installation will be upgraded to operate on a blend of natural gas and hydrogen or 100% hydrogen.

The Proposed Installation and will be located on land to the west of the existing Keadby 1 and Keadby 2 Power Stations. The Proposed Installation includes connections for cooling water, electricity, hydrogen and natural gas, and other associated development.

1.2. The Proposed Installation

The Proposed Installation would comprise a high efficiency gas fired power station with an electrical output capacity of up to 910MWe and associated buildings, structures and plant.

The Proposed Installation will include:

- a new-build CCGT electricity generating station fuelled by hydrogen and/or natural gas with a power output of up to 910MW including:
 - a CCGT plant;
 - cooling infrastructure;
 - natural gas and hydrogen blending equipment (for the Operator's infrastructure);
 - supporting facilities including administration and control buildings, workshops, storage buildings, effluent treatment facilities, fire water storage tank(s), demineralised water treatment plant including storage tank(s), and permanent laydown areas for operation and maintenance activities;

- a hydrogen supply pipeline, including a gas compound for the hydrogen supplier's apparatus and a hydrogen gas compound for the Operator's apparatus;
- a natural gas supply pipeline including a compound for the natural gas supplier's apparatus and a natural gas compound for the Operator's apparatus;
- electrical connection works for the export and import of electricity to and from the generating station to the existing 400kV National Grid Electricity Transmission (NGET) substation located adjacent to the Keadby Power Station site, including works within the substation (which would be undertaken by NGET);
- water supply connection works to provide cooling and make-up water to the generating station, including intake structures and an underground and/or overground water supply pipeline running between the generating station and the Stainforth and Keadby Canal;
- connections to and use of an existing outfall and associated pipework for the discharge of used cooling water, surface water and treated effluent to the River Trent;
- public water connection pipeline from a new connection on Chapel Lane to provide potable water to the generating station;
- an allocation of land to meet the requirements of the Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013.

The Operator will be responsible for the construction, operation (including maintenance) and eventual decommissioning of the Proposed Installation including the on-site connections to electricity, cooling water, natural gas and hydrogen supplies.

The Proposed Installation will be capable of operating 24 hours per day, 7 days per week with programmed offline periods for maintenance.

The route for the hydrogen supply pipeline to the Proposed Installation has not yet been confirmed. The supply pipeline is not included in the Proposed Installation and will be progressed by a third party under a separate consent. In line with Government policy, it is recognised that developments such as the Proposed Installation are needed to stimulate investment in the development of hydrogen production and supply infrastructure.

1.3. The Proposed Installation Site

The Site is located adjacent to the boundary of the existing Keadby Power Station site near Scunthorpe, Lincolnshire and lies within the administrative boundary of North Lincolnshire Council (NLC) ('the Site'). The Keadby Power Station site currently

encompasses the operational Keadby 1 and Keadby 2 Power Stations.

1.4. The Purpose and Structure of this Document

The purpose of this document is to comply with Section 4.7.10 of the 'Overarching National Policy Statement for Energy (EN-1)' (DESNZ, 2023a), which requires developers promoting thermal generating stations to demonstrate CCR.

As the output capacity of the Proposed Installation is greater than 300MWe, the generating station falls under the provisions of the Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013 (the 'CCR Regulations'), which transposed Article 36 of Directive on Industrial Emissions (Integrated Pollution Prevention and Control) (Directive 2010/75/EU) ('the Industrial Emissions Directive' (IED)) into UK legislation.

The CCR Regulations provide that no Development Consent Order (DCO) (in England and Wales) may be made in relation to a combustion plant with a capacity at or over 300MWe, unless the relevant authority has determined (on the basis of an assessment carried out by an applicant) whether it is technically and economically feasible to retrofit the equipment necessary to capture the carbon dioxide (CO₂) that would otherwise be emitted from the plant, and to transport and store such CO₂ from the site.

The Operator must therefore demonstrate that the Proposed Installation is CCR compliant under the regulatory requirements for an application for DCO.

The Proposed Installation will be designed to run on 100% hydrogen and able to run on 100% natural gas or a blend of natural gas and hydrogen and includes the capability to connect to third party hydrogen supply infrastructure. Therefore, a decarbonisation route via hydrogen firing is expected to be available. In order to comply with the CCR Regulations, sufficient space has been allocated for carbon capture and storage (CCS) infrastructure. This CCR Statement has been prepared in accordance with the Department of Energy and Climate Change (DECC) 2009 CCR Guidance (DECC, 2009) (see Section 2.3) to confirm that the specific requirements under the CCR Regulations have been met, noting that the basis of CCR demonstration is for retrofit to a generating station. The document also outlines the responsibilities and consenting route for any anticipated third party carbon dioxide gathering network.

The Environment Agency has recently published guidance on Decarbonisation Readiness, which will replace the current CCR guidance for Permit applications made after the 28th February 2026. In anticipation of this forthcoming change, this document also sets out the Operator's assessment of Hydrogen Readiness.

This report provides the Operator's evidence submitted in demonstration of CCR, and is structured as follows:

- Section 2 outlines policy context relating to CCR, summarises the guidance on the information required as part of a DCO application to demonstrate CCR, and describes the assessment methodology used;
- Section 3 provides a description of the Proposed Installation and outlines the responsibilities and consenting status of the anticipated third party hydrogen supply network.
- Section 4 outlines the technical assessment of Carbon Capture, Usage and Storage (CCUS);
- Section 5 outlines the economic assessment of CCUS;
- Section 6 outlines the health and safety considerations of a carbon capture plant (CCP);
- Section 7 presents the conclusions of the CCR assessment;
- Section 8 provides a list of references;
- Appendix A illustrates the CCR space allocation within the Site; and
- Appendix B sets out the assessment of Hydrogen Readiness.

2. Policy Context and Assessment Methodology

2.1. Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013

The CCR Regulations came into force on 25 November 2013 and set out the current requirements of the assessment. These regulations were made in transposition of Article 36 of the EU Industrial Emissions Directive (see box below).

EU Directives
<p>Some types of EU legislation, such as Directives, are indirectly applicable, meaning domestic legislation is required by EU member states to become law. In the UK this was often achieved via Statutory Instruments rather than passing primary legislation. The UK government has made the EU Withdrawal Act 2018 which maintains established environmental principles and ensures that existing EU environmental law will continue to have effect in UK law.</p> <p>The European Union (EU) published the Directive on the Geological Storage of Carbon Dioxide (Directive 2009/31/EC) (“the Directive”) in the Official Journal of the European Union on 5 June 2009, with the Directive coming into force on 25 June 2009.</p> <p>Article 21 of the Directive requires that necessary measures are taken to allow access to transport networks and storage sites for geological storage of produced and captured CO₂.</p> <p>Article 33 of the Directive requires an amendment to Directive 2001/80/EC (commonly known as the Large Combustion Plants Directive (“LCP”)), via Article 9a, such that operators of all combustion plants with an electrical output of 300 MW or more (and for which the construction / operating license was granted after the date of the Directive) are required to carry out a study to assess:</p> <ul style="list-style-type: none"> • Whether suitable storage sites for CO₂ are available; • Whether transport facilities to transport CO₂ are technically and economically feasible; and • Whether it is technically and economically feasible to retrofit for the capture of CO₂ emitted from the power station; • This may be known as a ‘CCR Feasibility Study’, to be determined by the competent authority. <p>The Industrial Emissions Directive (“IED”, Directive 2010/75/EU) entered into force in January 2011 and was to be transposed into national legislation by Member States</p>

by January 2013. The IED brought together seven existing directives, including the LCP. Article 36 of the IED replicates the requirements of Article 9a of Directive 2001/80/EC (LCP) and the above requirement for a CCR Feasibility Study

The CCR Regulations provide that no order for development consent (in England and Wales) may be made in relation to a combustion plant with a capacity at or over 300 MWe unless the relevant authority has determined (on the basis of an assessment carried out by the applicant) whether it is technically and economically feasible to retrofit the equipment necessary to capture the CO₂ that would otherwise be emitted from the plant, and to transport such CO₂ from the site to an appropriate long term geological store.

The CCR Regulations summarise the need for a CCR Feasibility Study and state (at Regulation 2(1)) that a: “CCR Assessment, in relation to a combustion plant, means an assessment as to whether the CCR Conditions are met in relation to that plant.” In terms of the ‘CCR Conditions’, CCR Regulation 2(2) states that:

“for the purposes of these Regulations, the CCR Conditions are met in relation to a combustion plant, if, in respect of all of its expected emissions of CO₂ –

- a) suitable storage sites are available;*
- b) it is technically and economically feasible to retrofit the plant with the equipment necessary to capture that CO₂; and*
- c) it is technically and economically feasible to transport such captured CO₂ to the storage sites”.*

CCR Regulation 3(3) states that:

“If the Secretary of State –

- a) determines that the CCR Conditions are met in relation to a combustion plant; and*
- b) decides to make a relevant consent order in respect of that plant, the Secretary of State must include a requirement in the relevant consent order that suitable space is set aside for the equipment necessary to capture and compress all of the CO₂ that would otherwise be emitted from the plant.”*

In October 2024, DESNZ published its response to a consultation for expanding and updating the carbon capture readiness requirements (further details are outlined in Section 2.5). The scope of the current ‘carbon capture readiness’ requirements is to be expanded to become Decarbonisation Readiness requirements and enforced through the Environmental Permitting (Electricity Generating Stations) (Amendment) Regulations 2024. Although the current CCR requirements are still in force, the proposed

Decarbonisation Readiness guidance is to come into effect in March 2026 and will replace the CCR requirements at that time. Under the proposed guidance, decarbonisation through hydrogen is recognised as an alternative route to carbon capture storage. The Proposed Installation is seeking to follow the hydrogen route to decarbonisation.

2.2. National Policy Statements

The National Policy Statements (NPS) for energy infrastructure form the policy framework for applications for new generating stations of greater than 50 MW capacity in England and Wales. The NPS of most relevance to the Proposed Installation (and this CCR Statement) are the 'Overarching National Policy Statement on Energy (EN-1)' (DESNZ, 2023a) and the 'National Policy Statement for Natural gas Electricity Generating Infrastructure (EN-2)' (DESNZ, 2023b). EN-1 The NPS EN-2 is designed for facilities fired on natural gas, however in Section 1.6.3 it is recognised that the guidance may also be important and relevant to hydrogen gas-fired electricity generating infrastructure.

Under Section 104(3) of the Planning Act 2008, DCO applications are required to be determined by the Secretary of State in accordance with policy set out in the relevant NPS. As stated in NPS EN-1:

“To ensure that no foreseeable barriers exist to retrofitting CCS equipment on combustion generating stations, all applications for new combustion plants which are of generating capacity at or over 300MW and of a type covered by The Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013141 should demonstrate that the plant is “Carbon Capture Ready” (CCR) before consent may be given.”

In this regard, NPS EN-1 in Section 4.9.29 also states that:

“In order to assure the Secretary of State that a proposed development is CCR, applicants must demonstrate that their proposal complies with guidance issued by the Secretary of State in November 2009 or any successor to it.”

The 2009 guidance referred to above is discussed in the Section 2.3 below.

In NPS EN-1, hydrogen is recognised as an alternative to natural gas for electricity generation. Section 3.3.49 states:

“Low carbon hydrogen could be capable of replicating the role of natural gas in the electricity system, including providing both firm, flexible capacity in the future and a decarbonisation route for unabated combustion power plants. The British Energy Security Strategy sets out our ambition for up to 10GW of low carbon hydrogen production capacity by 2030, subject to

affordability and value for money, at least half of which will come from electrolytic hydrogen, working with industry to develop a strong and enduring UK hydrogen economy.”

National Policy Statement for Energy for Natural Gas Electricity Generating Infrastructure (EN-2) (DESNZ, 2023b) (adopted January 2024) in Section 2.4.1 states:

“Natural gas generating stations have large land footprints and will therefore only be deliverable where the applicant is able to acquire a suitably-sized site. The site will also need to be big enough to conform to government policy on CCR, Decarbonisation Readiness (DR) and CCS, set out in Section 4.9 of EN-1.”

DESNZ published revised drafts of some of the energy NPS (including EN-1 but not EN-2) for consultation in late April 2025. Following public consultation revised drafts were issued in November 2025 and these are due to be adopted in late December 2025. Paragraph 2.4.10 of Draft NPS EN-1 (DESNZ, 2025) states *“From February 2026, new gas plants will need to be built ‘decarbonisation ready’, demonstrating they are compatible with carbon capture, utilisation and storage or able to convert to hydrogen powered generation.”* Paragraphs 4.9.26 and 4.9.27 of the 2025 EN-1 detail the move from Carbon Capture Readiness to Decarbonisation Readiness.

2.3. CCR Guidance

DECC published guidance on CCR in November 2009 entitled ‘Carbon Capture Readiness (CCR) – A Guidance Note for Section 36 Electricity Act 1989 consent applications’ (DECC, 2009). Though the Proposed Installation intends to decarbonise through the use of hydrogen rather than CCS, the Proposed Installation is still required to demonstrate accordance with the guidance, in the event that space is required for CCS plant and equipment. The guidance states that applicants are required to:

- demonstrate that sufficient space is available on or near the site to accommodate carbon capture equipment in the future;
- undertake an assessment into the technical feasibility of retrofitting CCP equipment;
- propose a suitable area of deep geological storage offshore for the storage of captured CO₂;
- undertake an assessment into the technical feasibility of transporting the captured CO₂ to the proposed storage area;
- assess the likelihood that it will be economically feasible within the power station’s lifetime to link it to a full CCUS chain, including retrofitting of capture equipment, transport and storage; and

- if necessary, apply for and obtain Hazardous Substance Consent (HSC) when applying for consent.

2.4. Assessment Methodology

This CCR report has been prepared to fulfil the requirements of the DECC November 2009 guidance as set out below:

- **Allocation of Space for CCP Equipment:** An assessment of appropriate space set aside to accommodate future carbon capture equipment is provided in Section 4.1 of this report. The space allocated for the CCP has been calculated to demonstrate compliance with the minimum footprint in the DECC guidance.
- **Technical Assessment of Feasibility of CCP Retrofit:** Annex C of the DECC guidance provides a detailed advisory checklist of the information to be included in a CCR Feasibility Study report on the technical assessment of the feasibility of retrofitting CCP equipment for a new natural gas combined cycle power station using post-combustion carbon capture. It is noted that a specific checklist for the technology intended for the Proposed Installation is not provided by the DECC guidance, however, for the purposes of this CCR Statement, Section 4.2 of this report deals with the technical response to the requirements of Annex C, as being of most relevance to the Proposed Installation.
- **Identification of Suitable Areas for Storage of Captured CO₂:** In accordance with the DECC guidance, at least two fields or aquifers with an appropriate CO₂ storage capacity, which have been listed in either the 'valid' or 'realistic' categories in the 2006 study of UK Storage Capacity (BGS, 2006) (which is provided in Annex D of the DECC Guidance), should be proposed as suitable CO₂ storage locations for the Proposed Installation. Such sites are identified in Section 4.3 of this report.
- **Technical Feasibility of Transport of Captured CO₂:** The DECC guidance states that the feasibility of any proposed site for a new combustion station will be influenced by the availability of transport routes to the proposed storage area. The technical feasibility of transporting the captured CO₂ to the storage area proposed for the Proposed Installation is assessed in Section 4.4 of this report.
- **Economic Assessment of the Feasibility of CCUS:** The DECC guidance states that the main aim of the economic assessment is to provide an indication of the future likelihood of a retrofit of CCP equipment, CO₂ transport and storage of CO₂ being economically feasible at some stage during the proposed combustion plant's operational lifetime. This is discussed in Section 5 of this report.

- **Health and Safety Analysis:** An analysis of health and safety issues associated with the CCP, including consideration of whether a Hazardous Substances Consent may be required for the Proposed Installation, is provided in Section 6 of this report.

3. Description of the Proposed Installation

3.1. Location

The Site comprises land adjacent to the boundary of the existing Keadby Power Station site near Scunthorpe, Lincolnshire and is located approximately 4.1km to the west of the town of Scunthorpe.

3.2. Plant Description

The Proposed Installation consists of a CCGT electricity generating station designed to run on 100% hydrogen and capable of operating on 100% natural gas from the start of operations. When hydrogen becomes available and operation with hydrogen firing is commercially viable, the Proposed Installation will be upgraded to operate on a blend of natural gas and hydrogen or 100% hydrogen.

This CCR Statement addresses the generating station and its readiness to address its own CO₂ emissions. The current CCR guidance (DECC, 2009) is based upon unabated plant capacity and therefore the largest gas turbine unit currently commercially available (H Class at c. 590-595 MW) has been assumed as the basis for approximate values for the various plant requirements.

The generating station is anticipated to operate dispatchably over its 25 year design lifetime.

The Proposed Installation will be designed to operate for up to 25 years, after which ongoing operation and market conditions will be reviewed. If it is not appropriate to continue operating after that time, the generating station will be decommissioned.

3.3. Carbon Capture and Storage Technology

The current Emissions Performance Standard (EPS) set by the UK Government for new electricity generating stations is 450 gCO₂/kWh (Energy Act 2013, Part 2, Chapter 8). This EPS is proposed by UK Government to be maintained for consented plants until 2045.

There are three carbon capture technologies available, namely:

- pre-combustion carbon capture;
- post-combustion carbon capture; and
- oxy-combustion carbon capture.

This CCR Statement has focused on the use of post-combustion carbon capture, as this

was the chosen technology included as part of the Keadby 3 CCS Power Station that was consented on the Site previously. No further discussion is presented in this report on the alternative technologies given that decision was evaluated and made to develop the Keadby 3 concept previously, based on the same H Class CCGT concept in the same location.

The feasibility of CCUS for the Proposed Installation has therefore been assessed on the basis of the best currently available post-combustion carbon capture technology which, for carbon capture from combustion flue gases, would use an amine-based solution as the absorption medium. For the purposes of concept design, Monoethanolamine (MEA) will be used as the base case. This is a non-proprietary and widely available solvent.

The conceptual design in this report has been based upon the post-combustion modelling developed using industry standard software and heat cycle data developed as part of the Keadby 3 CCS Power Station pre-FEED (Front End Engineering Design), together with CCGT design data from the adjacent operational Keadby 2 Power Station. In common with studies for other generating stations, a design target of 95% CO₂ capture efficiency has been used as the basis for the concept design.

This assessment has been developed for a single carbon capture train processing the mass flow rate of flue gas from the largest gas turbine unit currently commercially available.

The sizing and utility demand of the main CCP equipment required has been established using process modelling and experience from other design projects. The land allocated for CCR is shown in Appendix A.

3.4. Carbon Dioxide Gathering Network

It is recognised that the CCR Guidance states that an applicant may not assume, at the CCR stage, that they will be able to outsource onshore CO₂ transport and storage arrangements (such as to a cluster network). Whilst this is noted, the Operator considers that the greater certainty over the Government's Track 1 and Track 2 Cluster sequencing programme and the commitment from Government to supporting the establishment of CCUS in industrial clusters demonstrates that such links are justified within this Application.

The Humber Carbon Capture Pipeline is being developed by bp and its partners to connect industrial emitters in Humberside with the Track 1 expansion plans for Endurance saline aquifer. In addition, Harbour Energy have been granted development consent for the Viking CCS pipeline proposed to connect Immingham with the Viking depleted gas fields. Both carbon capture networks remain under development and could potentially connect to the Proposed Installation in the future.

The Operator continues to engage with the developers of both potential carbon capture

networks regarding potential future connections to Keadby Power Station.

4. Technical Assessment

4.1. Space

An indicative layout of the Installation has been developed, based on engineering studies conducted.

The CCP area calculation incorporates all the major equipment items described in the following subsection (Section 4.2) with appropriate areas for ductwork, piping, access and maintenance available.

Appendix A shows the space allocated on site for CCR purposes.

Footprint Comparison

The 2009 CCR Guidance (DECC, 2009) provides an indicative CCR space requirement based on a 500 MW (net) power plant. For a CCGT power plant with post-combustion carbon capture, the indicative CCR space requirement was initially provided at 3.75 ha for 500 MW, which equates to 75 m² /MW.

However, following the publication of the CCR Guidance, the indicative CCR space requirement was reviewed by Imperial College, London (Imperial College, 2010). The Imperial College review concluded that the footprint estimates presented in the 2009 CCR Guidance were overly conservative and recommended the reduction of the indicative CCR space requirement for a CCGT power plant with post-combustion capture by 36%. Therefore, the corrected indicative CCR space requirement is 2.4 ha for 500 MW. This equates to 48 m² /MW.

In addition, the review by Imperial College further detailed additional scope for a reduction in the indicative CCR space requirement by 50% to 1.875 ha (including the reduction of 36%) considering technology advances and layout optimisation. This equates to 37.5 m² /MW. However, the paper also states that such a reduction can only be justified following a detailed engineering design rather than only a linear scaling of this value.

For the purposes of this CCR Statement, a 'worst-case' concept design and footprint area calculation has been estimated using the following sources of information:

- initial engineering studies developed as part of the Pre-FEED for the Proposed Installation;
- DECC CCR Guidance (DECC, 2009); and
- Imperial College Paper on CCP Footprint Review (Imperial College, 2010).

On this basis, the indicative 'worst-case' total footprint has been estimated. A conservative design margin is applied to allow for ductwork, piping, access and

maintenance, and to allow for the potential challenges of installing and maintaining a 'First of a Kind' plant (for which technology maturation and design optimisation may not be as advanced as for an 'Nth of a Kind' project).

An estimated CCR area of 43,800m² (4.38 ha) (50 m²/MW) was calculated for the proposed Keadby 3 CCS Power Station development on the same Site as the Proposed Installation. This figure is above the specific area target of 48 m²/MW (without technology/layout optimisation) and therefore indicates that the minimum required area has been allocated.

In addition, the land allocated for CCR is within the western part of the Installation and is 5.8 ha in area, further exceeding the 4.38 ha calculated to be required.

4.2. Indicative Process Description

Introduction

The Proposed Installation has been assessed based on a nominal unabated gross capacity of 910 MWe for the proposed generating station, against the criteria presented in Annex C of the DECC CCR guidance note (DECC, 2009).

Design, Planning Permissions and Approvals

The feasibility of CCUS for the Proposed Installation has been assessed on the basis of the best currently available technology, which for post-combustion carbon capture from flue gases, is captured using amine-based absorption. The area reserved for CCR within the Site is shown in Appendix A.

Plant Location

It is anticipated that the exit point for the captured CO₂ from the Proposed Installation would be located in the north part of the Installation.

Further information on the transport and storage of captured CO₂ off-site is provided in Sections 4.3 and 4.4.

Space Requirements

The footprint discussed in Section 4.1 allows space for the following:

- CO₂ capture equipment, including flue gas pre-treatment, and CO₂ drying and compression;
- routing flue gas duct to the CO₂ capture equipment;
- any extensions or additions to the balance of plant on the CCGT where necessary to cater for the additional requirements of the capture equipment;

- maintenance and operational vehicle movement;
- space for storage and handling of amines and handling of CO₂, including space for infrastructure to transport CO₂ to the plant boundary; and
- major plant deliveries and access around the Site.

Flue Gas Path and Pressure

The flue gas exiting the CCGT would be routed to the CCP via a diverter damper (or other suitable technique) during normal operation. During start-up, shutdown and fault conditions, the CCP damper would close and a similar damper on the HRSG stack would open.

The indicative design for the CCP accounts for any backpressure in the flue gas flow path by inclusion of a booster fan/ blower to compensate for the pressure drop through the CCP (primarily in the absorbers, direct contact cooler and dampers) which would be of the order of 50-90 mbar, depending on the design .

Based on the gas turbine flue gas flowrate of approx. 1,050 kg/s with a nominal pressure rise of 70 mbar, a booster fan with a power rating of approximately 10 MWe would be required. It would be imperative that in the event of a booster fan trip the HRSG damper opens sufficiently quickly to prevent a build-up in back-pressure in the HRSG ductwork and GT exhaust. This would be achieved by passive and active protection within the damper mechanism and other measures if deemed necessary, to be confirmed during design.

Flue Gas Cooling

The absorption process would require a flue gas cooler to lower the flue gas temperature to an acceptable temperature to enhance the CO₂ chemical absorption and to minimise amine degradation (using MEA as the base case as described in Section 3.3). The flue gas would be routed to a direct contact cooler (DCC), which would quench the flue gas to an acceptable temperature for absorption. A small slipstream of the circulating cooling water would be routed through the DCC water filter to remove particulate build-up. A portion of this particulate free stream would be returned to the DCC; the other portion would be directed to a wastewater treatment plant. Cool, saturated, flue gas from the DCC would be extracted through the booster fan as outlined above.

Carbon Dioxide Absorber

The cooled flue gas from the DCC would be fed to the bottom of the counter current absorber where CO₂ in the flue gas would be absorbed by the solvent. Flue gas would enter near the bottom of the absorber and flow upward through packed beds. CO₂ would react chemically with the solvent and be absorbed into the bulk solution. Rich solvent would leave the bottom of the absorber and be transferred to the stripper by the rich solvent pump.

Stripped flue gas, trace amounts of vaporised amine-based solution and other impurities travel would through a chimney tray and enter the next packed bed, known as the water wash section of the column, where water would be used to recover vaporised amine, trace degradation constituents and water. A wash water circulating pump would circulate the wash water between the absorber and wash water cooler.

The flue gas would then pass through a further chimney tray and into another packed bed, where, if required, a dilute acid solution would flow against the flue gas to provide a final stage of trace constituents' removal. This stage is therefore referred to as the acid wash. Similar to the water wash section, a pump would be employed to circulate the solution. In addition, a purge stream would be present for removal of impurities such as ammonia and amines.

Airborne emissions would be controlled to comply with any emission levels associated with the use of Best Available Techniques (BAT) as set out in the Environmental Permit that would be required for the operation of the carbon capture plant.

Treated flue gas would be vented to the atmosphere via the stack on top of the absorber at a temperature to be determined. The temperature of the flue gas leaving the acid wash section would be approximately 40-45 °C. If required on the basis of air dispersion modelling, the flue gas may be heated to c. 60-65°C by using low pressure steam condensate at c. 100-110 °C.

Carbon Dioxide Desorber (Stripper)

Rich solvent would leave the bottom of the absorber and be routed to the rich/ lean amine heat exchanger system, which would likely feature multiple parallel plate and frame units. This heat exchanger would increase the efficiency of the process by heating the rich amine to >100 °C using the heat in the lean amine stream from the stripper. The pre-heated rich amine would enter the stripper below the wash section of the column through a liquid distributor and flow down through the packed beds counter-current to the vapour from the reboiler system, releasing ('desorbing' or 'stripping') the absorbed CO₂. The lean amine from the bottom of the stripper would thence be pumped to the rich/ lean heat exchanger system, where it would be cooled against the rich amine from the absorber train. There may be scope for further heat optimisation within the desorption system, which would be evaluated during design.

The significant heat requirement for the desorption process, effected within the reboiler system, would be provided from the steam turbine within the CCGT; at a suitably low pressure to maximise the utilisation of steam within the power plant whilst providing adequate control of stripper column temperature. The quantity of steam required would depend on the solvent employed and the extent of heat optimisation within the CCP. For the proposed MEA solvent, it is anticipated that a 'specific reboiler duty' of c. 3.5-4.0 GJ/tonne of CO₂ removed would be required.

To remove impurities from the amine system, c. 10% of the cooled amine would be routed

to the amine filter package. This would remove suspended solids and high molecular weight amine degradation products.

Stripper Overhead Condenser

The overhead vapour from the stripper at ~100-105 °C and 1.5-2 bar(a) would be cooled to ~25-30 °C in the overhead condenser, condensing some of the water content. The two-phase flow would enter the separation drum (separating the product gas which would be routed to the CO₂ compression/ conditioning units).

Amine Reclaimer

The amine-based solution would degrade in the presence of oxygen, nitrogen oxides, high temperatures, and corrosion products, leading to the formation and accumulation of undesirable compounds such as heat stable salts. A purification stage known as a thermal reclaimer would therefore be necessary to prevent accumulation of these compounds. The concept design assumes the thermal reclaimer is a kettle-type reboiler. There would be a feed of steam, water and sodium hydroxide to feed the reactions and processes required to recover part of the degraded solvent. The thermal reclaimer would be expected to operate on an intermittent basis when the content of degradation products exceeds a predefined value.

Carbon Dioxide Compressor

The wet CO₂ from the stripper reflux drum would be routed to an intercooled CO₂ compressor. The captured CO₂ would be compressed and conditioned to meet the delivery pressure and specification required for the CO₂ export pipeline.

Dehydration and Deoxygenation Units

A dehydration package would be required to reduce the water content in the CO₂ stream to export specification level, to ensure condensation in the CO₂ pipeline does not occur.

The technology would likely be an adsorbent based system, with the specific vendor to be selected during detailed design. The system would feature various vessels and a regeneration system to remove water from the adsorbent media.

A deoxygenation unit is also required to meet export requirements. This may take the form of a catalytic technique (CATOX), where the CO₂ stream passes through a vessel containing a platinum or palladium based catalyst with an injection of hydrogen. The hydrogen reacts with the oxygen molecules to produce water which is then removed in the dehydration unit. The reaction also takes place at a moderately elevated temperature. To avoid the need for additional steam supply or other 'new' sources of energy, it is anticipated that the heat of compression will be utilised. This will be confirmed during detailed design.

The requirement or otherwise for further species removal such as ammonia and NO_x prior to or post carbon capture would be assessed during detailed design based on

expected maximum levels present in the flue gas. This would be used to determine BAT for emissions control from the plant.

Cooling System

An amine-based CCP process would have a significant cooling duty, which is estimated at c. 350-400 MWth. The CCP would be proposed to use hybrid cooling towers to address main cooling demands within the CCP process which comprise:

- flue gas DCC cooler;
- lean solution to absorber cooler;
- stripper overhead cooler; and
- CO₂ compression intercoolers.

Space has been allocated for the cooling towers that would be needed to meet the cooling demand of both the CCGT and CCP. The CCGT condenser heat duty would correspondingly decrease due to low pressure steam offtake, such that the overall site cooling duty would increase by c. 30-50% compared with CCGT operation alone. The precise level would again depend on the final design configuration and solvent selection. There may also be scope to partially utilise air coolers for certain CCP cooling duties. This would reduce cooling water flowrate and hence abstraction and discharge but would increase site footprint.

Water Treatment

Raw Water

The Proposed Installation would require a raw water abstraction of approximately 800 t/h if carbon capture was installed for the Proposed Installation (which is already allowed for in the canal water abstraction licence that was obtained for Keadby 3 CCS Power Station and will be used for the Proposed Installation). This is for the combined CCGT and CCP and at reference ambient temperature of 10°C and will vary with ambient temperature and humidity. This water will make up for evaporative losses within the hybrid cooling towers as well as the small losses in of the amine/ water solution loop caused by amine degradation or carry over.

Demineralised Water

Demineralised water will be required for supply to the CCGT steam cycle and would also be required for the CCP. During normal operation the CCP may not require demineralised make-up as the processes would be a net producer of water. This would be confirmed during detailed design.

Wastewater

The design of the CCP would include appropriate surface water drainage systems including oil interceptors as necessary, consistent with the surface water drainage

systems for the wider power station. Space provision for site drainage e.g. surface water and process water drains has been included in the space allocation for the CCP.

The cooling of the flue gas would result in partial condensation of water vapour within the DCC. This water may contain ammonia if selective catalytic reduction (SCR) NOx removal unit is installed within the CCGT. The technology employed to remove ammonia would be confirmed during design. Air stripping and membrane separation would be possible technologies. The remaining treated water would be utilised within the CCP processes as required with excess likely discharged with the cooling tower blowdown effluent.

Within the CCP absorption and desorption systems, two potential waste streams would be present. These are the absorber acid wash bleed and reclaimers waste. It is envisaged that both would be safely transferred to tankers and treated offsite by specialist waste contractor(s).

The estimated effluent and waste flowrates are identified below in **Table 1**.

Table 1: Indicative Wastewater Output

Wastewater Stream	Approx. Flowrate / Quantities
Hybrid Cooling Tower blowdown	200 t/h
DCC effluent	100 t/h (possible/likely to be discharged with cooling tower blowdown flow)
Acid wash bleed	200-300 kg/h to tanker.
Reclaimers waste	Intermittent, c. 1000 tonnes per year to tanker.

The amine solvent make-up rate would depend on various factors (see paragraph 4.2.19 above). Operational profile, flue gas constituents' concentrations, stripper temperatures, reclaiming campaigns and metallurgical considerations would all influence the mass balance of solvent and degradation products. For MEA, it is anticipated a range of 0.5-1.5 kg solvent make-up per tonne of CO₂ captured would be required.

Electrical

In addition to the utilities described previously, the CCP would require the following utilities.

- electrical power distribution system; and
- fire protection and monitoring system.

The total power requirement of the CCGT and CCP combined would be expected to total approximately 70 MW. Further detail of individual users is presented in **Table 2**.

Table 2: CCGT and CCP Electrical Power Consumption

Area/ Equipment Items	Estimated Consumption (MW)
CO ₂ compressor	25
Booster fan	10
Cooling water pumps	10
Water and solvent pumps	5
Hybrid cooling tower fans	5
CCP miscellaneous	5
CCGT power train and balance of plant	10 (excluding cooling tower fans and pumps)
Total	70

It is currently proposed that the electrical demand of the CCP would be taken directly from the output of the generating station, reducing the export capacity to National Grid accordingly.

Pipework

Space provision for plant pipe racks has been included in the CCR space allocation.

Control and Instrumentation

The control and instrumentation system for the CCP would be anticipated to be incorporated into the distributed control system of the Proposed Installation, i.e. the control room. However, space would be available in the CCR space allocation for standalone control equipment should this be required.

Plant Infrastructure

It is anticipated that major plant may be delivered by road; additionally, an existing Waterborne Transport Offloading Area is available and an additional Abnormal Indivisible Load (AIL) route that could accommodate the largest components of a CCP has been consented under the Town and Country Planning Act 1990 (North Lincolnshire Council application no. PA/2023/1915). There are not considered to be any access constraints that could impede any future construction activities.

The final provisions for plant infrastructure would be detailed in the design of the CCP.

4.3. Identification of Suitable Offshore Area for Carbon Dioxide Storage

The maximum theoretical volume of CO₂ that could be anticipated to be captured during the lifetime of the Proposed Installation (if it was to operate using 100% natural gas) is 50.7 million tonnes (assuming approximately 265-270 tCO₂/hour from the plant units, a maximum of 8,000 operating hours per year and a 25-year design lifetime).

The UK's major potential sites for the long-term geological storage of CO₂ are offshore depleted hydrocarbon (oil and gas) fields and offshore saline water-bearing reservoir rocks/ aquifers.

Oil and gas fields and saline aquifers are regarded as prime potential sites for CO₂ storage for the following reasons:

- they have a proven seal which has retained buoyant fluids, in many cases for millions of years.
- often a large body of knowledge and data regarding their geological and engineering characteristics has been acquired during the exploration and production phases of oil and gas development.

As shown in **Plate 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 Basin. The DECC CCR guidance (DECC, 2009) suggests that the simplest and most appropriate means of demonstrating there are 'no known barriers' to CO₂ 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, applicants are advised to identify at least two fields or aquifers, with an appropriate CO₂ storage capacity, which have been listed in either the 'valid' or 'realistic' categories in the DTI's 2006 study of UK Storage Capacity (BGS, 2006), which is provided in Annex D of the CCR Guidance.

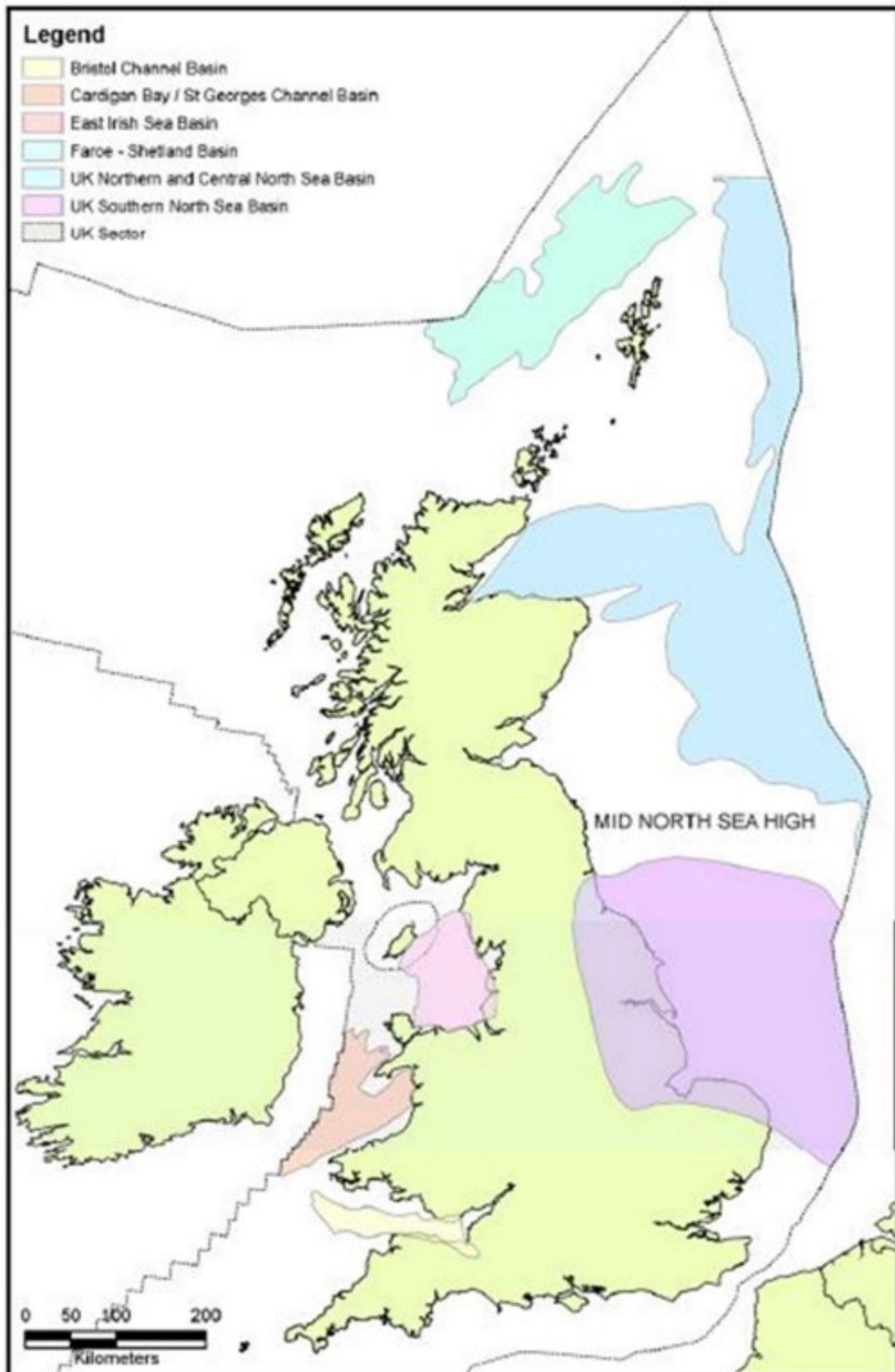


Plate 1: Major Sedimentary Basins of the UK Continental Shelf (BGS, 2006)

The Proposed Installation is located in Keadby, North Lincolnshire and therefore the nearest hydrocarbon fields and saline aquifers are located in the SNS Basin. The Viking CCS pipeline that has been consented by third party is proposed to connect to depleted gas fields in this basin.

The CO₂ storage location proposed to be connected to by the Humber Carbon Capture Pipeline (via the Northern Endurance Partnership (NEP)) is the Endurance saline aquifer within the Bunter Sandstone Formation in the SNS basin (formally identified as 5/42 – refer to Figure 2). The estimated total storage capacity of this storage location is approximately 2,700 million tonnes based on the examination as part of the Field Development Report for the White Rose CCS project (DECC, 2016).

Based on the total potential CO₂ storage requirements of the Proposed Installation (up to 50.7 million tonnes), the Proposed Installation would use approximately 2.0% of the overall capacity of the Endurance saline aquifer. However, any connection to Endurance would form part of the Track 1 expansion project to develop additional saline aquifers for geological storage of CO₂ adjacent to the initial proposed aquifer. The storage capacity of the expanded Endurance site would therefore be much larger than that of the initial reservoir.

The location of the Endurance saline aquifer is illustrated in **Plate 2**.

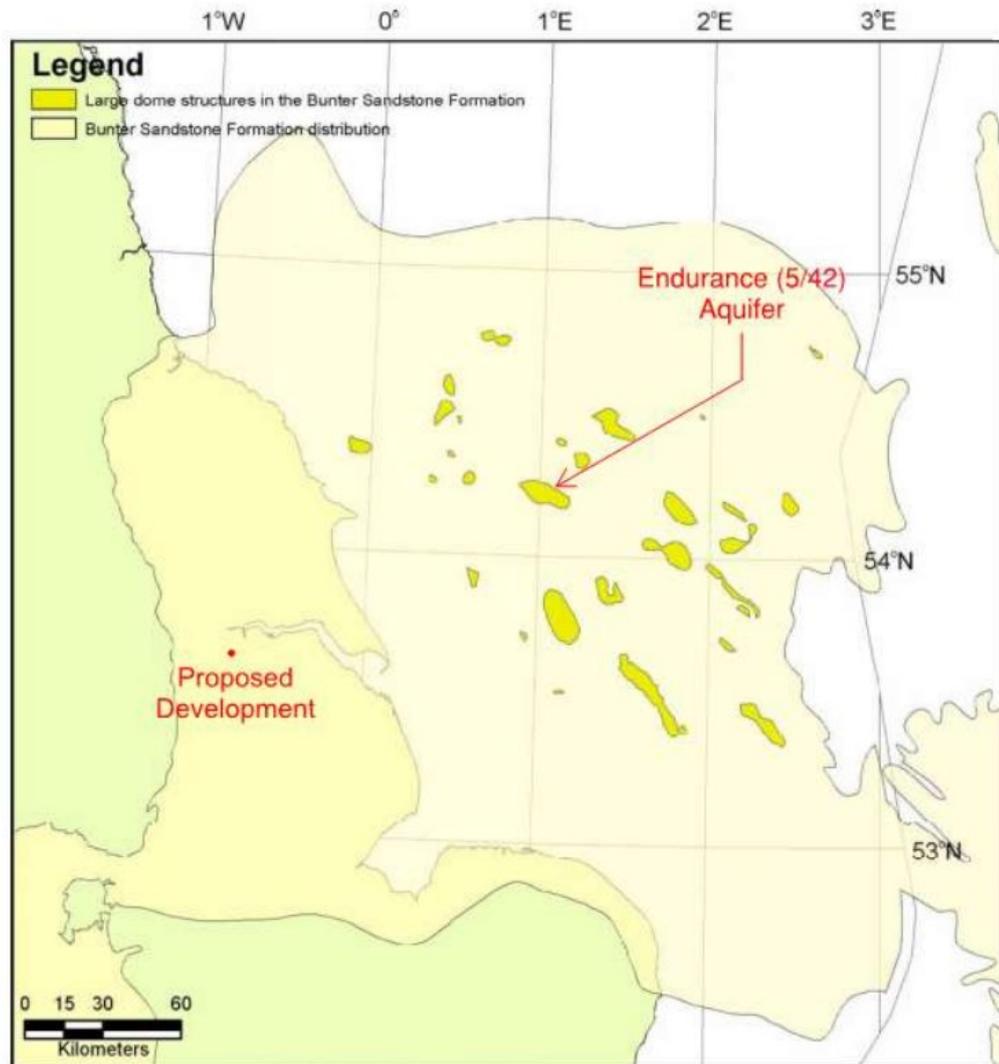


Plate 2: Map of storage sites within the Bunter Sandstone Formation with the location of the Endurance Aquifer (BGS, 2006)

In accordance with the CCR Guidance, the Bunter Sandstone Formation aquifer above is identified as having great potential as a CO₂ storage location in the DTI report (BGS, 2006).

Under the CCR Guidance, the storage assessment should be reviewed on an ongoing basis as part of the two-yearly Status Reports, with a view to incorporating developments in the design for the CCP. The Proposed Installation could become an early user of the expanded Endurance store.

4.4. Assessment of the Technical Feasibility of Carbon Dioxide Transport

Overall Route

There are various options available for transporting CO₂ from point of capture to final geological storage, including onshore and offshore transportation by pipeline, and offshore transportation by pipeline or shipping.

The CO₂ captured from the Proposed Installation would be transported to the storage site via onshore and offshore pipeline, and separate consents for the routing, construction and operation of the onshore and offshore pipelines are being progressed by third parties, notably NEP and Harbour Energy.

Predominantly Onshore Transport Prior to Transition

Developing networks where clusters of industrial emitters including power stations or other heavy industry adopting CCUS could use the same pipeline infrastructure is the most cost-effective solution for CCUS deployment compared to each installation building its own separate pipeline.

Which carbon capture pipeline network becomes available to the Proposed Installation will depend on Government decisions on Track 1 expansion and Track 2 and wider deployment plans for Humberside.

Appendix A shows there is sufficient space for the third party CO₂ pipeline operator to build a CO₂ AGI for the Proposed Installation's connection

Predominantly Offshore Transport

The offshore pipeline would be developed by third party operator (for example NEP or Harbour Energy) and various proposals are being developed and consented to reuse existing and/ or install new pipelines for the transport of captured CO₂ to permanent storage reservoirs.

It is therefore considered that a feasible route exists to remove the captured CO₂ from the Proposed Installation to the storage site identified, if required.

5. Economic Assessment

5.1. Overview

The CCR Regulations require the developer to assess the likelihood that it will be economically feasible to link any proposed power station to a full chain CCUS within the lifetime of the power station, considering the retrofit of capture equipment, CO₂ transport and storage. This Proposed Installation is an alternative design to the Keadby 3 CCS Power Station. This alternative design is for a power station to be fired on hydrogen. In order to enable Financial Investment Decisions to be made in a timely manner, permission for both Site options are required, which will enable SSE to pivot to whichever decarbonisation pathway (hydrogen or CCS) becomes technically and commercially viable at the Site first.

The DCO for the CCGT with carbon capture technology (Keadby 3 CCS Power Station) has already been granted, and through that process the Operator demonstrated that it is economically feasible to link any proposed power station to a full chain CCUS within the lifetime of the power station i.e. from the beginning of operations in that case.

Currently the Government support to CCS deployment covers the operational support to two Track 1 clusters plus in principle support to two Track 2 clusters. Power station emitters looking to connect to a cluster would negotiate a Dispatchable Power Agreement (DPA). The Net Zero Teesside CCGT project has reached agreement on a DPA and that sets out the fiscal mechanism and price support for low carbon power generated by that power station; it is envisaged a similar DPA would be agreed for the Proposed Installation if carbon capture was required to be fitted.

6. Health and Safety Assessment

6.1. Pipeline

If carbon capture technology is required, the CO₂ would need to be transported offsite to a dedicated storage facility. In this event it would be likely that the onshore and offshore CO₂ transport from the Site would be in a 'dense phase', i.e. at a pressure greater than 73.9 bar.

CO₂ pipelines are not currently widely deployed in the UK and only some pipeline design codes include CO₂ as a relevant fluid within their scope. European Standards implemented in the UK as British Normative Standards (BS EN series) and supported by published documents (such as the British Standards PD series) provide a sound basis for the design of pipelines.

The DECC CCR Guidance states that, until the health and safety requirements of pipelines conveying dense phase CO₂ have been considered in more depth, such pipelines should be considered as conveying 'dangerous fluids' under the Pipeline Safety Regulations 1996 (PSR) (HSE, 1996) and 'dangerous substances' under the Control of Major Accident Hazards Regulations 2015 (COMAH).

The 'Comparison of risks from CO₂ and natural gas pipelines' (Health and Safety Executive (HSE), 2009) concluded that a loss of containment event from a dense or supercritical phase CO₂ pipeline presents a similar level of risk to a release from a high-pressure natural gas pipeline. As such, designers of CO₂ pipelines should consider applying a similar fluid hazard categorisation (chosen from an established pipeline design code) to that applied to high pressure natural gas pipelines.

Any such pipeline would therefore be considered to be a Major Accident Hazard Pipeline (MAHP). The CO₂ networks being developed by third parties have routed and consented their proposed pipelines on this basis.

6.2. On-Site

If carbon capture technology is installed, dense phase CO₂ would be present in pipework on-site once it has been compressed beyond its critical point prior to transport. Whilst CO₂ is not currently classified as hazardous, HSE recognise that an accidental release of large quantities of CO₂ (particularly in dense-phase) could result in a major accident.

It is not anticipated that bulk storage of dense or gaseous phase CO₂ would be required for the Proposed Installation even if carbon capture technology is required to be installed. The only 'stored' CO₂ at the Site would therefore be the inventory in the CCP and on-site pipework. This would be envisaged to be less than ten tonnes.

It is envisaged that the CCP plant would require consent under the Planning (Hazardous Substances Consent) 2015 Regulations regime and may trigger the need for lower tier COMAH licensing, based on the inventory of amines and other substances stored on Site. This will be determined at the design stage.

The amine solvent would be stored in sufficient quantities for make-up with strategic reserve, and an additional solvent storage tank may be present for the purpose of 'dispatchability', i.e. to allow capture of CO₂ produced during start-up before the CO₂ desorber is fully operational. The total inventory would be established during design.

A Health and Safety Plan covering the works, commissioning and operation of the CCP would be prepared by the Operator. For design and construction, a competent and adequately resourced Construction (Design and Management) (CDM) Coordinator and Principal Contractor would be appointed. The Operator would monitor that its own staff, its designers and contractors follow the Approved Code of Practice (ACoP) laid down by the CDM Regulations 2015.

Written procedures clearly describing responsibilities, actions and communication channels would be available for operational personnel dealing with emergencies. Procedures would be externally audited, and contingency plans written in preparation for any unexpected complications.

The Proposed Installation is using 'safety in design' principles to take into consideration safety issues and risks within the ongoing design, to reduce risks from the installation, as a whole, to as low as reasonably practicable (ALARP). As part of the layout evolution, the following safety in design mitigation hierarchy has been adopted:

- eliminate a hazard; in preference to
- control the hazard; in preference to
- provide personal protective equipment (PPE).

Design mitigation at the current concept design stage includes consideration of potential gas releases and includes (but is not limited to):

- careful equipment and material selection;
- siting of high-pressure gas equipment considering areas of potential exposure and prevailing wind direction;
- incorporation of gas leak detection systems; and
- consideration of venting or flaring arrangements.

If the design of a CCP is required, further consideration would continue, potentially including additional dispersion modelling to confirm whether design mitigation is considered ALARP for the installation as a whole (i.e. future site users and general public). Further detailed evaluation and quantitative risk assessment would continue throughout the design stage.

7. CCR Conclusion and Review

The intention of the Proposed Installation in regard to decarbonising is to remove direct CO₂ emissions by using hydrogen as a fuel thereby negating the need for carbon capture. However, to meet current guidance, a CCR assessment is still required and this document demonstrates that suitable space remains available at the Site and that CCS is technically and economically feasible to be retrofitted to the Proposed Installation, in the eventuality that Carbon Capture and Storage (CCS) equipment is required.

As it is the intention to deliver low carbon energy through the combustion of hydrogen, and to demonstrate Decarbonisation Readiness by meeting the Hydrogen Conversion Readiness tests which are in development, it is considered that there will be no need to undertake regular reviews of CCR status in the future beyond the date of implementation of the Decarbonisation Readiness requirements in March 2026.

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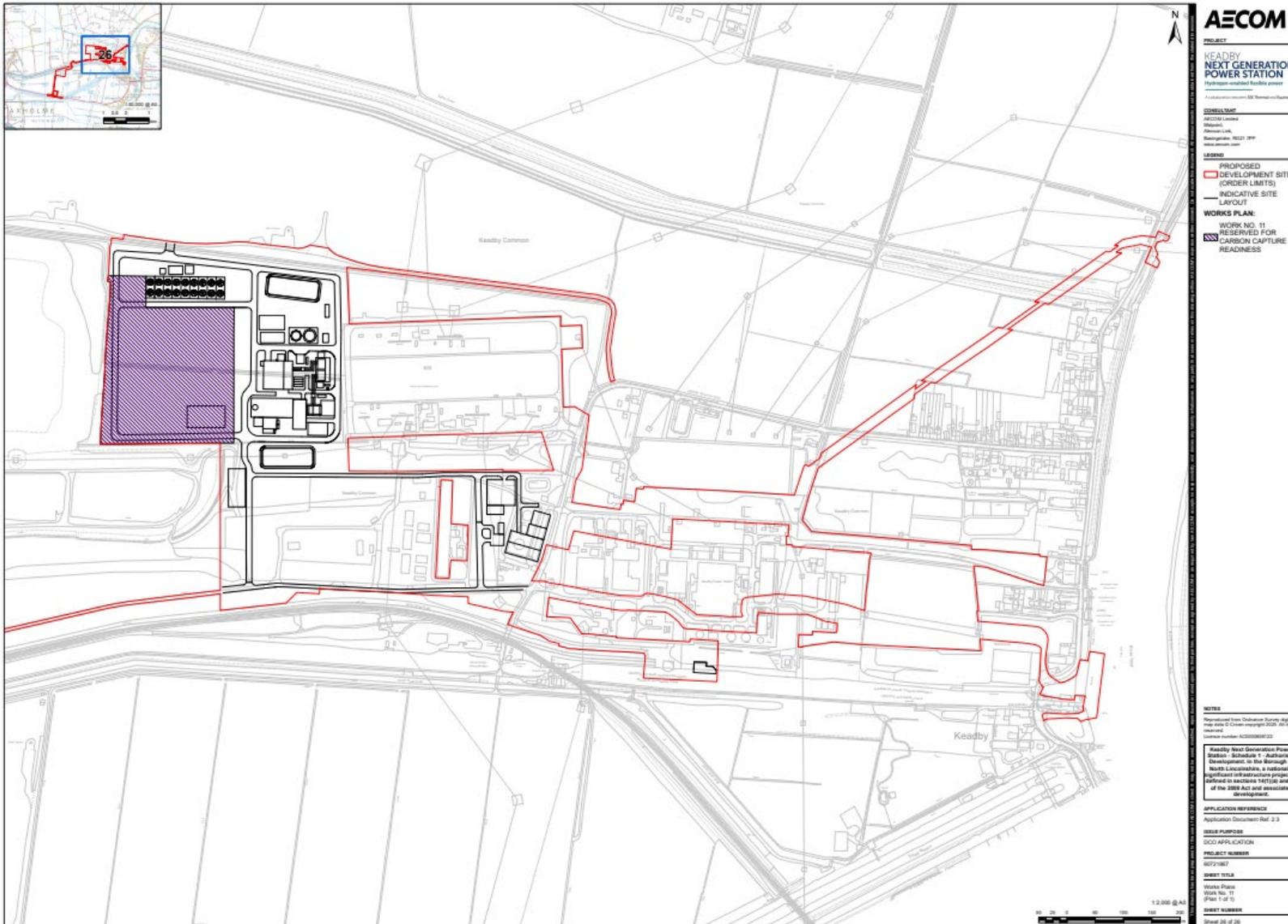
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Appendices

Appendix A: CCR Space Allocation



Appendix B: Hydrogen Readiness

9. Hydrogen Readiness

9.1. Introduction

In July 2021, the UK Government and Welsh Government published a joint call for evidence (DESNZ, Welsh Government & BEIS, 2021) seeking initial views on updating the 2009 Carbon Capture Readiness (CCR) requirements to ensure all new build combustion power plants have a viable route to decarbonisation. Low carbon hydrogen is recognised as a critical component of the UK strategy to deliver energy security and contribute to the National Net Zero Targets (DESNZ, 2022a).

The outcome of the consultation determined that the CCR Regulations will be expanded and updated to Decarbonisation Readiness (DR). In addition, the requirements will be moving from the planning consent process to the Environmental Permitting process. The new requirements, called 'decarbonisation readiness', will amend the Environmental Permitting (England and Wales) Regulations 2016 to the Environmental Permitting (Electricity Generating Stations) (Amendment) Regulations 2024. This will come into force for new Permit applications from the 28th February 2026.

The alternative route to decarbonisation to carbon capture that will be introduced as a result of these changes is through conversion to hydrogen.

The Environment Agency has released guidance on the requirements of the Hydrogen Decarbonisation Readiness Route (EA, 2025). In the guidance it states the following four tests must be addressed for a development to be considered decarbonisation ready through hydrogen conversion:

- that sufficient space is available on or near the site to accommodate the proposed hydrogen conversion equipment
- that it is technically feasible to convert the combustion power plant to hydrogen firing and detail what modifications will be required
- that there is a suitable plan for hydrogen fuel access
- that the plan is economically feasible.

Operators must be able to demonstrate that there are reasonable grounds to believe that all of the criteria can be met during the lifetime of the plant.

9.2. Assessment

Sufficient Space

Operators must be able to demonstrate that there are reasonable grounds to believe that all of the criteria can be met during the lifetime of the plant.

The design and layout of the Proposed Installation includes space and provision for any infrastructure required to enable the generating station to operate on hydrogen fuel.

In particular, space has been allocated and reserved for the installation of a hydrogen Above Ground Installation (AGI) to receive hydrogen fuel from a supply network, as well as space for blending of hydrogen and for any necessary supporting infrastructure to enable hydrogen-firing to be optimised.

The Operator has also considered hazard consultation zones and safety implications for any hydrogen fuel reception at the Site to ensure that the hydrogen infrastructure can be developed and operated while still complying with the necessary COMAH and Hazardous Substances Consent requirements.

Technical Feasibility

The Operator has worked with technology providers to demonstrate that a 100% hydrogen-fired CCGT can be delivered, installed and operated once a secure and stable supply of hydrogen fuel can be obtained. This includes design and optimisation of burners which can be undertaken when necessary to optimise combustion once the hydrogen fuel is commercially available.

Access to Hydrogen Fuel

The third test of Hydrogen Readiness requires operators to consider the commercial availability of hydrogen as a fuel.

The Operator has been working with third party hydrogen producers and suppliers as well as developing its own hydrogen production and storage infrastructure in order to help develop the commercial deployment of hydrogen fuel both nationally and in proximity to the Proposed Installation. The Operator retains close links with East Coast Hydrogen and Project Union both of which aim to develop a hydrogen supply network and infrastructure to enable industry and power generation sites to switch from natural gas to hydrogen. Indeed, the development of this project in part will help stimulate the required investment in hydrogen production, storage and supply infrastructure, since it will be a significant potential offtaker designed for that purpose. The Operator engages regularly with the UK Government on the development of the supportive policy frameworks which will be required to establish hydrogen production, transport and storage, including bilaterally as a developer of infrastructure and through industry working groups.

Any such switch will need Government pricing support through the Hydrogen to Power business model.

There are therefore reasonable grounds to consider that it will be possible to ensure access to a sufficient supply of hydrogen for use in the Proposed Installation.

Economic Assessment

As discussed above, any CCGT switching to hydrogen fuel will need a combination of support through a Capacity Market agreement or Availability Payment as part of a Hydrogen to Power business model (H2PBM) contract, and one of:

- Price support to enable hydrogen-fired plant to displace natural gas fired plant in the electricity market, as part of a H2PBM contract; or
- A high and stable carbon price which will incentivise the dispatch of low carbon electricity generation plant, such as hydrogen to power, relative to higher carbon alternatives such as natural gas fired plant.

SSE engages regularly with the UK Government Department for Energy Security and Net Zero (DESNZ) on policy development on the Capacity Market and the development of the H2PBM, including through DESNZ's Hydrogen to Power Industry Working Group.

9.3. Conclusion

Based on the assessment presented above, it is concluded that the Proposed Installation meets the Hydrogen Readiness tests and is therefore considered to be Hydrogen Ready.