White Rose Carbon Capture and Storage (CCS) Project

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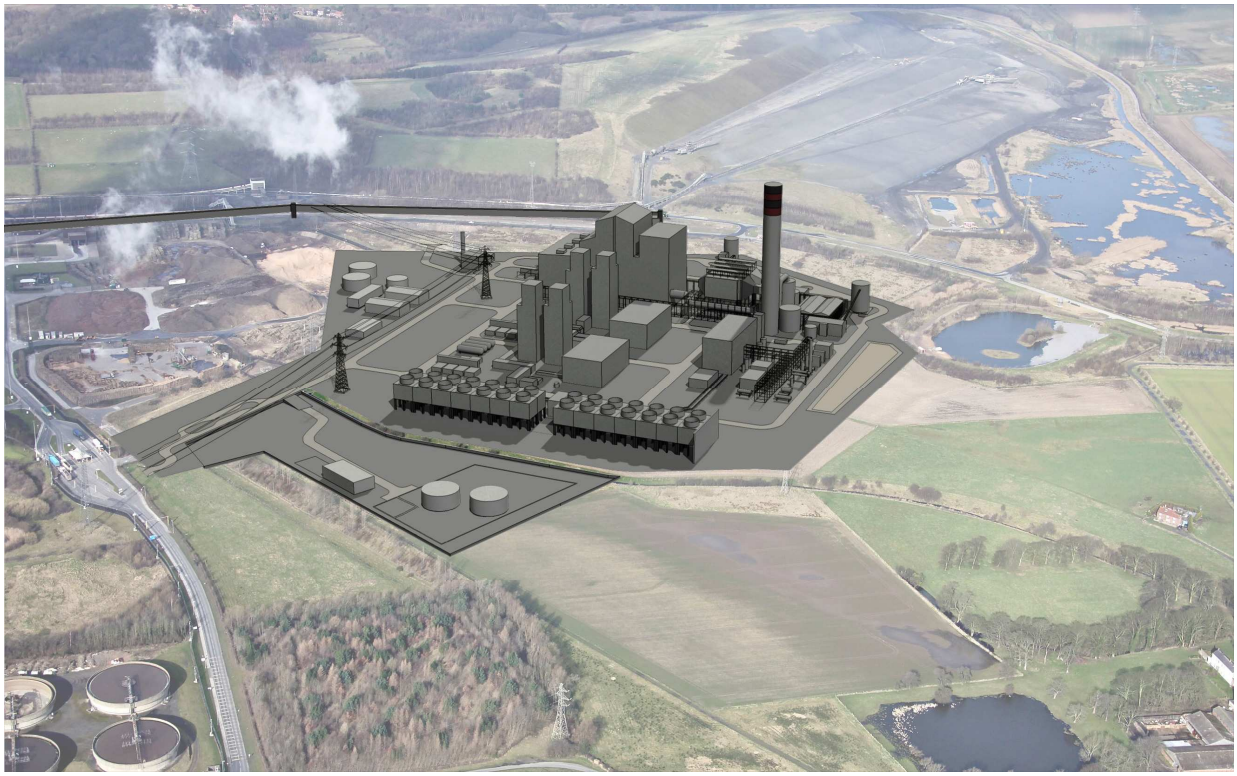
The White Rose CCS (Generating Station) Order

Land within and adjacent to the Drax Power Station site, Drax, near Selby, North Yorkshire

Carbon Capture and Storage (CCS) and Carbon Capture and Readiness (CCR) Statement

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(q)



Applicant: Capture Power Limited
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Glossary of Abbreviations and Definitions	
AQCS	Air Quality Control System.
ASU	Air Separation Unit.
CCS	Carbon Capture and Storage.
CCR	Carbon Capture Readiness.
CCR Regulations	Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013.
CCTV	Closed Circuit Television.
CfD	Contract for Difference.
CO_2	Carbon Dioxide.
DCC	Direct Contact Cooler.
DCO	Development Consent Order.
DECC	Department for Energy and Climate Change.
EP	Environmental Permit.
EPS	Environmental Performance Standard.
EU	European Union.
FEED	Front End Engineering and Design.
GPU	Gas Processing Unit.
H_2O	Water.
IED	Industrial Emissions Directive.
km	Kilometre.
LCPD	Large Combustion Plant Directive.
MW	Megawatt.
NER	New Entrant Reserve.
NGCL	National Grid Carbon Limited.
NPS	National Planning Statement.
NSIP	Nationally Significant Infrastructure Project.
PINS	The Planning Inspectorate.
R&D	Research and Development.
SoS	Secretary of State.
SO_X	Sulphur Oxides.

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SUMMARY

1. This Carbon Capture and Storage ('CCS') and Carbon Capture Readiness ('CCR') Statement has been undertaken to provide additional information to support the application for a DCO.

2. It is considered that the information provided in the Statement demonstrates that the Project would meet the following:

    1. Provide sufficient space to accommodate the proposed CO_2 capture technology.
    2. That there are suitable offshore CO_2 storage areas available.
    3. It would be technically feasible to transport the captured CO_2 to the offshore CO_2 storage areas.
    4. It is likely to be economically feasible.

3. In addition, there would be no need for any retrofitting of carbon capture technology as the Project would have the ability to capture carbon from the commencement of operations.

4. Accordingly, it is considered that the Project complies with the requirements of the CCS/CCR Regulations and relevant guidance.

1.0 INTRODUCTION

BACKGROUND TO THE PROJECT

1.1 This Carbon Capture and Storage ('CCS') and Carbon Capture Readiness ('CCR') Statement has been prepared in support of Capture Power Limited's (the 'Applicant') application (the 'Application') for a Development Consent Order (a 'DCO') that has been made to the Planning Inspectorate ('PINS') under Section 37 of the Planning Act 2008 (the '2008 Act').

1.2 The Applicant is seeking a DCO to authorise the construction, operation and maintenance of a new thermal generating station (an ultra-superciritical oxy-fuel coal-fired power plant of up to 448 megawatts 'MWe' gross with the ability to co-fire biomass) that will be fitted with CCS technology and associated development (together the 'Project') on land within and adjacent to the existing Drax Power Station site, Drax, near Selby, North Yorkshire, YO8 8PH, within the administrative areas of Selby District Council and North Yorkshire County Council.

1.3 A DCO is required as the Project falls from the definition and thresholds for a 'Nationally Significant Infrastructure Project' (a 'NSIP') under Sections 14 and 15 (2) of the 2008 Act. It is therefore necessary for CPL to apply to the Secretary of State ('SoS') for the Department of Energy and Climate Change ('DECC') for development consent for the Project under Section 31 of the 2008 Act.

1.4 The DCO, if made, would be known as the 'White Rose CCS (Generating Station) Order' ('the Order').

THE PURPOSE OF THIS DOCUMENT

1.5 The Statement sets out how the Project complies with policy contained within the 'Overarching National Policy Statement ('NPS') for Energy (EN-1)' at Paragraph 3.6.6 and Section 4.7 relating to CCS and CCR and also paragraphs 2.3.4 to 2.3.12 the 'NPS for Fossil Fuel electricity Generating Infrastructure (EN-2)'.

1.6 This policy states that new coal-fired generating stations, such as that proposed, or significant extensions to existing stations, must have CCS on at least 300 MWe net of the proposed generating capacity and secure arrangements for the transport and permanent storage of the carbon dioxide ('CO_2') that is captured. Furthermore, that all commercial scale fossil fuel generating stations must be CCR to ensure that there are no foreseeable barriers to retrofitting CCS equipment on generating stations above 300 MW (net).

1.7 The Statement also considers the requirements of the Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013 ('the CCR Regulations') and related European legislation. The CCR Regulations cover some of the same matters as the NPSs and require the SoS to consider the CCR of proposed generating stations and to impose 'requirements' on DCOs to secure CCR at those stations.

1.8 The requirements set out in the Regulations include demonstrating that:

- the developer retains control over sufficient space and the ability to build carbon capture equipment on this space;
- it is technically and economically feasible to retrofit the combustion plant for CO_2 capture;
- the transport facilities are technically and economically feasible;
- suitable storage sites for CO_2 available;
- this is a CO_2 storage permit/a valid contract with third party to provide CO_2 storage;
- there are CO_2 transportation arrangements/a valid contract with third party to provide CO_2 transportation;
- the Environmental Permit incorporates conditions for the operation of the carbon capture unit/CCS chain; and
- it would be economically feasible within the generating station's lifetime to link it to a full CCS chain, covering retrofitting of capture equipment, transport and storage.

2.0 CCS AND CCR POLICY AND LEGISLATION

2.1 This section provides an overview of policy and legislation relating to CCS and CCR.

EU DIRECTIVE ON GEOLOGICAL STORAGE OF CARBON DIOXIDE

2.2 The European Union (EU) agreed the text of the Directive on the geological storage of carbon dioxide (Directive 2009/31/EC) (the CCS Directive) on 17 December, 2008. This text was published in the Official Journal of the EU on 5 June, 2009 and the CCS Directive came into force on 25 June, 2009.

2.3 The CCS Directive requires an amendment to Directive 2001/80/EC on the limitation of emissions of certain pollutants from large combustion plants known as the Large Combustion Plant Directive or LCPD). Consequently, Member States are required to ensure that operators of all combustion plants with an electrical power generating capacity of 300 MWe or more (and for which the construction / operating licence was granted after the date of the CCS Directive) have assessed whether the following conditions are met in respect of each combustion plant:

a) that there are suitable storage sites for CO_2 available;

b) that transport facilities are technically and economically feasible; and,

c) it is technically and economically feasible to retrofit the combustion plant for CO_2 capture.

2.4 The assessment of whether these conditions are met is to be submitted to the relevant competent authority, who will use the assessment (and other available information) in their decision-making process in respect of consent for each combustion plant. If the conditions are met, the competent authority is to ensure that suitable space is set aside for the CO_2 capture technology necessary to capture and compress CO_2 from the combustion plant.

2.5 The requirement for such an assessment is also included in the more recent Directive on industrial emissions (integrated pollution prevention and control) (Directive 2010/75/EU) (the Industrial Emissions Directive or IED).

OVERARCHING NATIONAL POLICY STATEMENT FOR ENERGY (EN-1)

2.6 The Overarching NPS for Energy (EN-1) sets out the policy requirements for fossil fuel generating stations, including coal-fired generating stations, in relation to CCS and CCR.

2.7 Paragraph 3.6.5 of EN-1 highlights that the Government is leading international efforts to develop CCS, including supporting commercial scale demonstration projects at UK power stations. The intention is that these projects will demonstrate the full chain of CCS, including the capture, transport and storage of CO_2 in the UK. It goes on to state that these demonstration projects are a priority for UK energy policy.

2.8 Paragraph 3.6.6 confirms that the Government has placed two conditions on the consenting of fossil fuel generating stations, including coal-fired and gas generating stations, to facilitate the adoption of CCS once it is available. These conditions are that:

- all commercial scale (at or over 300 MWe) combustion generating stations (including gas, coal, oil or biomass) have to be constructed Carbon Capture Ready (CCR); and
- new coal-fired generating stations are required to demonstrate CCS on at least 300 MWe of the proposed generating capacity.

2.9 Section 4.7 of EN-1 deals specifically with CCS and CCR.

2.10 Paragraph 4.7.1 highlights that CCS is an emerging technology that enables CO_2 that would otherwise be released into the atmosphere to be captured and permanently stored. It can be applied to any large point source of CO_2, such as fossil fuel generating stations or other industrial processes that are high emitters of CO_2. Furthermore, carbon capture technologies are able to remove up to 90% of the CO_2 that would otherwise be released to the atmosphere and offer the opportunity for fossil fuels to continue to be an important element of a secure and diverse low carbon energy mix.

2.11 Paragraph 4.7.2 describes the 'CCS chain', which has three links; the capture of carbon, its transport and ultimately its storage. It describes the three types of capture technology, including oxy-fuel combustion, which will be deployed by the Project. In this process, fuel is burnt in an oxygen/CO_2 mixture rather than air to produce a flue gas that is predominantly CO_2.

2.12 Once the CO_2 has been captured (EN-1, paragraph 4.7.3) it is then compressed and transported, before being permanently stored in geological formations, such as depleted oil and gas fields and saline formations. In the UK, the majority of locations thought to be best suited to the storage of CO_2 are located offshore. In the case of the Project, the CO_2 captured from the combustion process would be transported via the National Grid Carbon Limited ('NGCL') Yorkshire and Humber CCS cross-country CO_2 pipeline for storage beneath the North Sea. NGCL has made a separate application for a DCO for the construction and operation of the CO_2 pipeline[1].

2.13 Paragraph 4.7.5 confirms that in order to reduce CO_2 emissions, new coal-fired generating stations, or significant extensions to existing stations in England or Wales, must have CCS on at least 300 MWe net of the proposed generating capacity and secure arrangements for the transport and permanent storage of CO_2. It goes on to state that operators of fossil fuel generating stations will also be required to comply with any Emission Performance Standards ('EPS') that might be applicable, although this is not part of the development consent process.

2.14 Paragraph 4.7.6 of EN-1 recognises that it is unlikely that any coal-fired generating stations will be built in the foreseeable future without financial support for CCS demonstration. However, it is possible that developers may wish to submit applications in advance of securing funding and therefore, any decision on such applications by the SoS should be made independently of any decision on the allocation of funding. This could mean that consent may be given to more applications than will be able to secure financial support for CCS demonstration.

2.15 Paragraph 4.7.8 confirms that to construct a coal-fired generating station with the full CCS chain, applicants will need a range of consents from different bodies. These include a CO_2 storage licence and (if appropriate) consent for both on and offshore pipeline construction. An Environmental Permit would be required from the Environment Agency, which incorporates conditions for operation of the CCS chain. Paragraph 4.7.9 goes on to state that further information on the CCS obligations to be imposed on new coal-fired generating stations will be available in guidance issued by DECC. The SoS must follow this guidance, or any successor to it, when considering applications for combustion generating stations. This guidance comprises 'Draft Supplementary Guidance for Section 36 Electricity Act 1989 Consent Applications for Coal Power Stations: A Consultation, November 2009'.

2.16 In terms of the requirement to secure arrangements for the transport and permanent storage of CO_2, the CCS Guidance notes (at paragraph 11) that where consent is given for a generating station, it will be conditional on the developer, prior to commencement of construction, to provide clear evidence of:

"a) a valid CO_2 storage permit/valid contract with third party to provide CO_2 storage;

b) valid CO_2 transportation arrangements/valid contract with third party to provide CO_2 transportation; and

c) a valid Environmental Permit which incorporates conditions for the operation of the carbon capture unit/CCS chain."

2.17 Therefore, in order to be able to construct and operate a new coal-fired generating station, it is necessary to have the consents in place for the full CCS chain.

2.18 As part of an application for a DCO (in respect of a new coal-fired generating station) the CCS Guidance states (at Section 3.1) that applicants will be required to submit:

- *"technically feasible plans for a capture unit covering the minimum size requirement of at least 300 MWe net capacity of the power station….;*

(1) http://infrastructure.planningportal.gov.uk/projects/yorkshire-and-the-humber/yorkshire-and-humber-ccs-cross-country-pipeline/

- *an Environment Statement for the power station, including the impacts of the proposed capture facilities…;*
- *documentation to ensure compliance with all existing policy, including that the entire plant's capacity is CCR."*

2.19 CCR is dealt with at paragraphs 4.7.10 to 4.7.17 of EN-1.

2.20 Paragraph 4.7.10 states that to ensure that no foreseeable barriers exist to retrofitting CCS equipment on fossil fuel generating stations, all applications with a generating capacity at or over 300 MWe or of a type and covered by the EU's Large Combustion Plant Directive, should demonstrate that they are CCR before consent may be given. It goes on to state that the SoS must not grant consent unless this is the case. In order to assure the SoS that a project is CCR, developers will need to demonstrate that:

- there is sufficient space available on or near the site to accommodate carbon capture equipment in the future;
- the technical feasibility of retrofitting their chosen carbon capture technology;
- that a suitable area of deep geological storage offshore exists for the storage of captured CO_2;
- the technical feasibility of transporting the captured CO_2 to the proposed storage areas; and
- the economic feasibility within the generating station's lifetime of the full CCS chain, covering retrofitting, transport and storage.

2.21 The guidance therefore requires applicants to carry out a technical feasibility study for retrofitting CCS equipment, taking the form of a written report and accompanying plant designs.

NATIONAL POLICY STATEMENT FOR FOSSIL FUEL ELECTRICITY GENERATING INFRASTRUCTURE (EN-2)

2.22 EN-2 reiterates the policy and guidance contained in EN-1 and the CCS Guidance in respect of the requirements for coal-fired generating stations.

2.23 It confirms that applicants for DCOs should provide the same type of evidence as required by the CCS Guidance (see paragraph 3.16 above). It goes on to state (paragraph 2.3.8) the application must contain sufficient information on the plans for CCS to enable the SoS to determine whether the project meets the required criteria as set out in the CCS Guidance. If the SoS cannot be satisfied that the proposal meets the criteria relating to CCS set out in EN-1 and EN-2, consent should be refused (paragraph 2.3.9, EN-2).

2.24 Paragraph 2.3.10 of EN-2 states that the SoS should include requirements in any DCO for a coal-fired generating station that before construction can commence the applicant must have:

- *"evidenced all necessary consents, licences and permits are in place for construction of the CCS chain, including consent for any onshore and offshore pipelines used to transport CO_2;*
- *evidenced that CO_2 storage licence for the intended storage site is in place; and*
- *evidenced that an Environmental Permit (EP) from the EA which incorporates conditions around the operation of the CCS chain is in place."*

2.25 Paragraph 2.3.11 goes on to state that to avoid the possibility that, once built, a project becomes unsuitable for CCS, no construction, other than preliminary works, should be allowed to start until the SoS is satisfied that the above requirements have been fully met.

2.26 Paragraph 2.3.12 confirms that additionally, CCR requirements will continue to apply to the remaining capacity of the coal-fired generating station until such time as CCS equipment is retrofitted onto the remaining of the capacity of the plant.

2.27 With regard to CCR, paragraph 2.3.5 states that the SoS should impose requirements within any DCO for current operators to:

- *"retain control over sufficient additional space (whether on or near the Site) for the carbon capture equipment;*
- *retain their ability to build carbon capture equipment on this space (whether on or near the Site) in the future; and*
- *submit update reports on the technical aspects of it's CCR status to the SoS. These reports should be required within three months of the date in which a consented generating station first begins to supply electricity to the grid and every two years thereafter until the plant moves to retrofit CCS."*

CARBON CAPTURE READINESS (CCR) GUIDANCE

2.28 DECC's November 2009 Guidance Note on 'Carbon Capture Readiness' requires that it will be technically and economically feasible to retrofit CCS to a power station in the future, including linking it to an offshore site of deep geological storage as well as the retrofitting of carbon capture (and CO_2 compression) equipment to the power station itself. Specifically, applicants for power station consents will be required to demonstrate:

- *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;*
- *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.*

CARBON CAPTURE READINESS (ELECTRICITY GENERATING STATIONS) REGULATIONS 2013

2.29 The CCR Regulations came into force on 25 November 2013 and relate to orders for development consent under the Planning Act 2008 and to consents under section 36 of the Electricity Act 1989 for the construction of combustion plants with a rated electrical output of 300 megawatts or more (and for extensions to combustion plants which will have the effect of increasing the rated electrical output of the plant to 300 MWe or more).

2.30 Before making such an order (Regulation 3) or granting such a consent (Regulation 5) the SoS must determine whether the 'CCR conditions' are met relating to the feasibility of carbon capture and storage. The CCR conditions are that in respect of the plant's CO_2 emissions (regulation 2(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)."

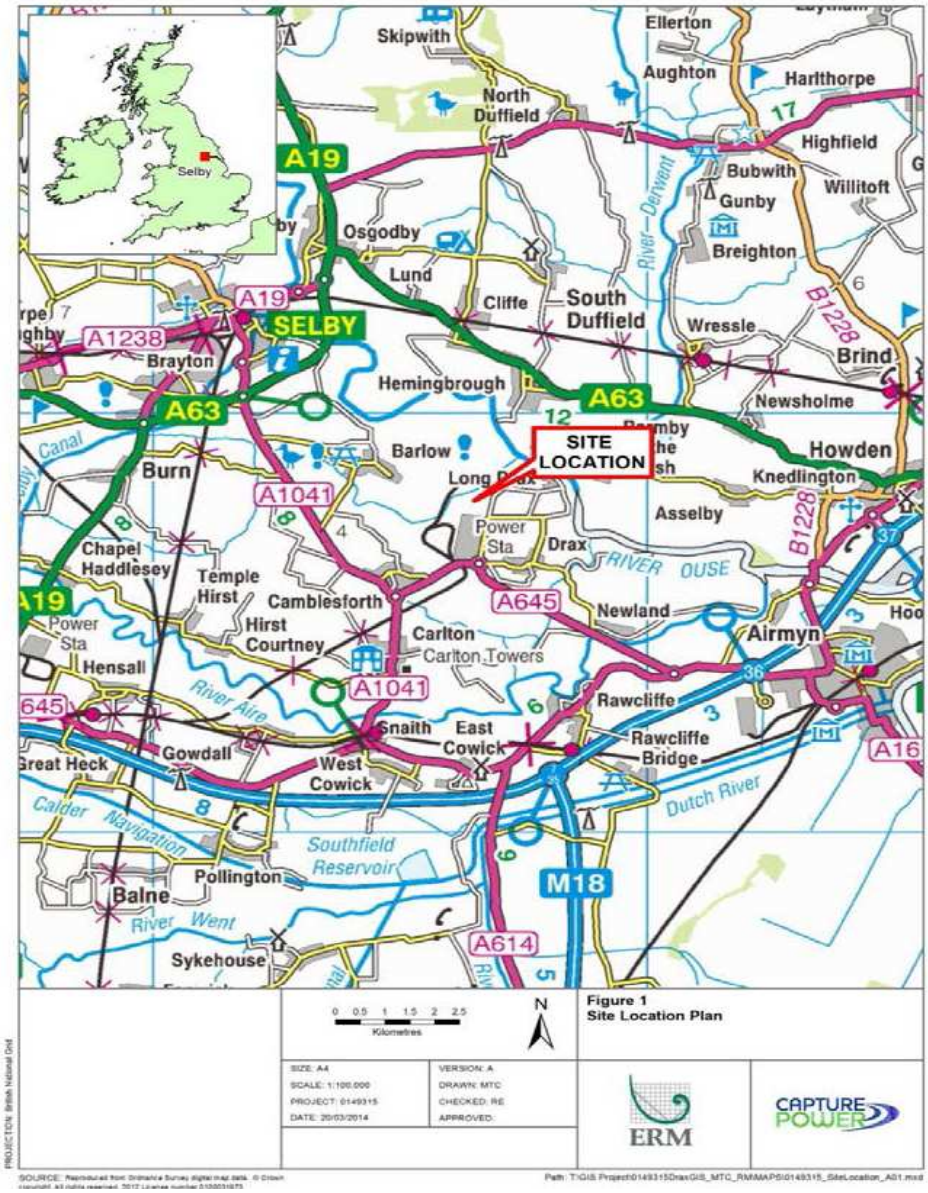
2.31 If the CCR conditions are met, the order or consent must include requirements or conditions for suitable space to be set aside for equipment necessary to capture and compress all the carbon dioxide that would otherwise be emitted from the plant.

3.0 COMPLIANCE WITH CCS/CCR POLICY

3.1 The Project comprises an ultra-super critical 'state-of-the-art' coal-fired power plant that is equipped with full carbon capture and storage technology. The plant would also have the potential to co-fire biomass. The Project is intended to prove CCS technology at a commercial scale and demonstrate it as a competitive form of low-carbon power generation and as an important technology in tackling climate change. It would also play an important role in establishing a CO_2 transportation and storage network in the Yorkshire and Humber area.

3.2 The power plant would be located next to the existing Drax Power Station site near Selby, North Yorkshire. Figure 1 below shows its location. The Project would be able to generate electricity for export to the electricity transmission network as well as capturing approximately 2 million tonnes of CO_2 per year, some 90% of all CO_2 emissions produced by the plant. The CO_2 would be transported through NGCL's proposed CO_2 pipeline, for permanent undersea storage in the North Sea.

Figure 3.1: Site Location



THE TECHNOLOGY

3.3 The Project, although at a commercial scale, would serve to demonstrate oxy-fuel technology which allows the capture of CO_2 from power plant exhaust gases. The technology involves combustion of fuel in a boiler in a mixture of oxygen and re-circulated flue gas (largely CO_2 and H_2O (water)). The process eliminates the high volume of nitrogen that comes with the air during conventional combustion. This in turn considerably reduces the content of nitrogen oxides in the resulting CO_2 rich flue gas, which can be easily processed to purity levels required for transportation and storage. The resultant potential CO_2 capture rate is in excess of 90%. The oxygen for the combustion process is produced in an Air Separation Unit ('ASU'), which separates oxygen from air.

3.4 Other combustion by-products, including particulates and Sulphur Oxides (SO_x), are extracted through conventional air quality control system equipment ('AQCS') located downstream of the boiler. The flue gas is subsequently led to a direct contact cooler ('DCC') where the flue gas is cooled down and a large portion of the contained moisture is condensed and removed. The final CO_2 processing takes place in a gas processing unit ('GPU') where the CO_2 is further purified and compressed to transportation / storage specification for onward transmission and storage. Figure 2 shows the oxy fuel technology process.

3.5 In summary the concept involves:

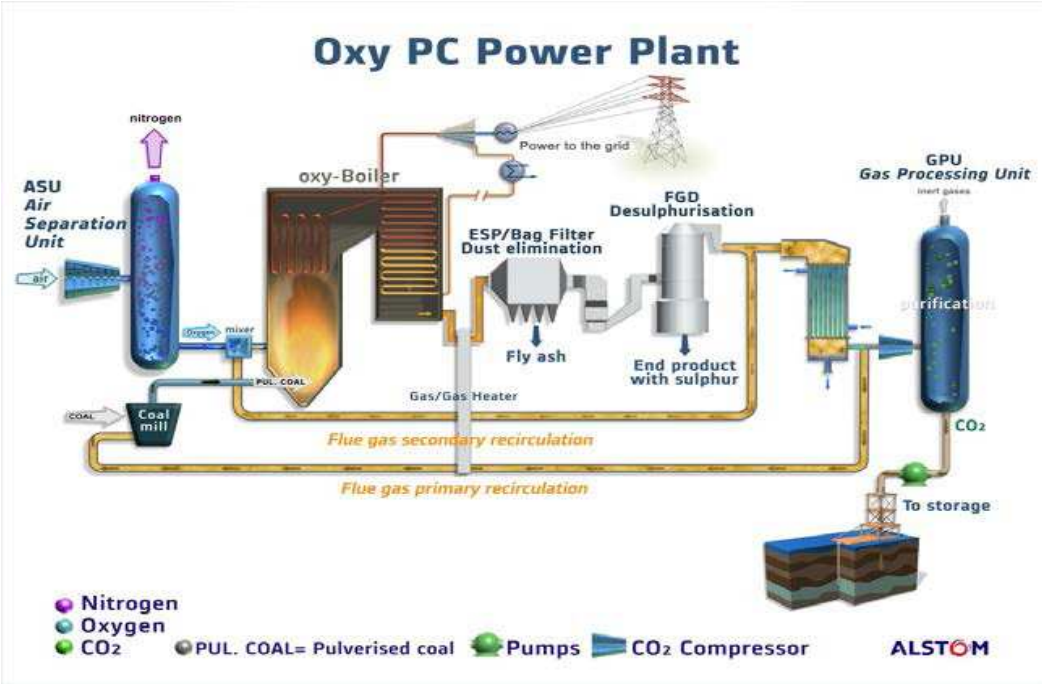
- using oxygen instead of air for the combustion process in order to obtain a CO_2 rich flue gas mainly composed of CO_2 + H_2O (and some inert gases) 'easily' cleaned and compressed; and
- technology to recover a CO_2 stream from the flue gas, at a specification suitable for transportation and storage.

3.6 This effectively adds two units to the conventional coal-fired power plant namely:

- an oxygen production unit: (ASUs); and
- a GPU to recover, clean and compress CO_2 from the flue gas.

3.7 Figure 3.2 provides an illustration of how the process works.

Figure 3.2: Oxy-fuel Technology Process



PROCESS OVERVIEW

3.8 The coal-fired power plant would consist mainly of dual air/oxygen fired pulverised coal boiler, turbine-generator unit and CO_2 capture system. The Project would be designed to burn coal and coal/biomass blends delivered via the existing Drax Power Station coal yard and imported to the yard via rail (although some road deliveries may occur).

3.9 The coal and biomass would be transferred from the existing Drax Power Station coal yard using a new conveying system that would be extended up to the coal silos located in the boiler house.

3.10 Emissions to air would meet the applicable standards and limits. The Project would include flue gas cleaning equipment to reduce the particulate air pollutants and SO_x created during combustion.

3.11 The GPU, which would capture approximately 90 % of the CO_2 produced by the facility, would first remove the water vapour from the exhaust stream, and then the remaining CO_2 would be further processed to meet the specifications required by NGCL for onwards transmission and storage. Purified CO_2 would be delivered to the CO_2 pipeline header (to be located adjacent to the generating station) of the CCS cluster in the Humber region.

3.12 The cooling water system would consist of mechanical draft low plume cooling towers. Make up water would be supplied from the existing Drax Power Station treatment facilities.

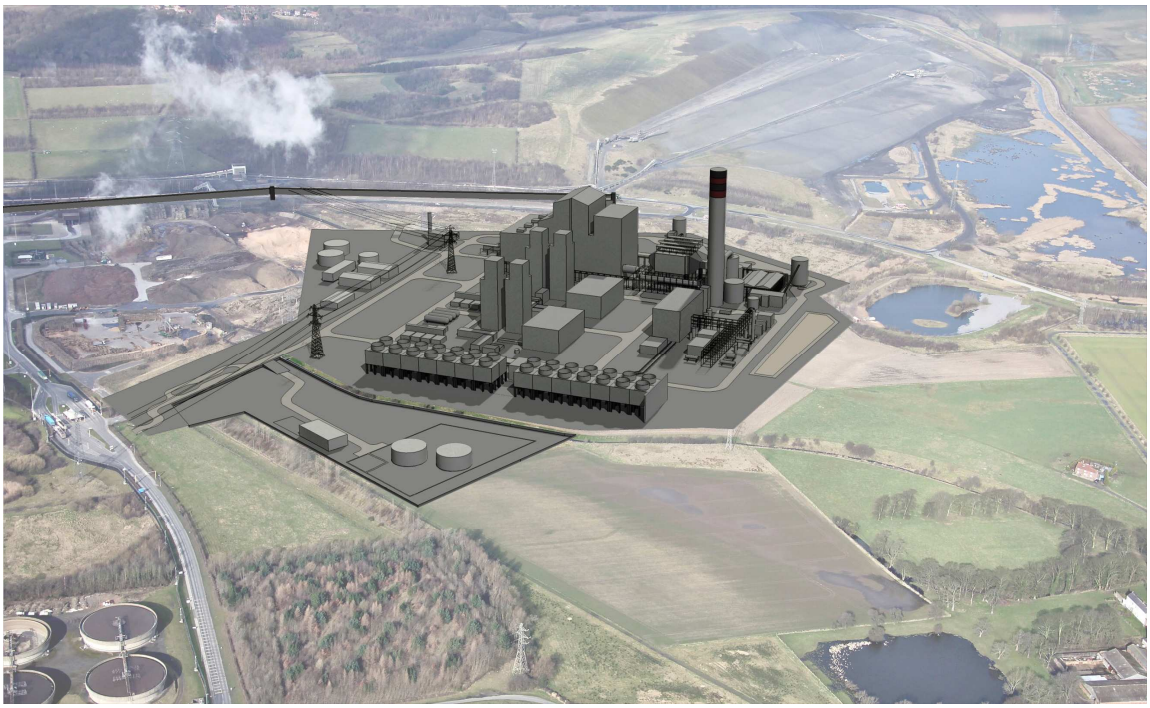
3.13 Industrial liquid effluents would be treated within the operational site before discharge to the River Ouse under Drax Power Station's existing plant consent (and not exceeding the constraints and discharge parameters established by it).

3.14 Due to the large quantity of high-purity oxygen typically required in oxyfuel combustion, cryogenic air separation is currently the preferred option for oxygen production and would be used for the Project. Hence, under normal operating conditions, coal would be combusted with pure oxygen mixed with recycled flue gas instead of atmospheric air. To produce this oxygen ASUs would be used.

SPACE

3.15 Figure 3.3 shows the Project as it may look when construction is complete.

Figure 3.3: Image of the Project



3.16 Table 3.1 below lists the main buildings, structures and plant for the Project, taken from Schedule 1 to the draft Order (Document Ref 2.1) with bold text indicating the main items which are required for the capture and compression of CO_2. The items in the list would be constructed within the Project site. There would be no need for any retrofitting of this equipment (including carbon capture and compression infrastructure) as it would all be constructed as an integral part of the initial construction, and not retro-fitted.

Table 3.1: Main Buildings, Structures and Plant

Description of White Rose Carbon Capture and Storage Project	
1.	Site raising and preparation.
2.	Boiler house including boiler, coal bunkers, coal mills, fans, air heaters, water and steam pipework.
3.	Air and gas fans and ducts.
4.	Flue gas treatment systems including flue gas desulphurisation, electrostatic precipitators, selective catalytic reduction.
5.	Flue gas desulphurisation including limestone mills, absorber tower, gypsum dewatering system and associated storage facilities.
6.	Stack / chimney including flue gas emissions monitors.
7.	Steam turbine hall including steam turbine and generator, condenser, steam and water pipework, pumping and heating equipment.
8.	Oxygen producing **air separation unit** comprising air compressors, distillation and heat exchange equipment.
9.	Molecular sieve adsorber units, cryogenic pumping systems and vaporisation units.
10.	Oxygen storage tanks and vessels.
11.	**CO_2 gas processing unit** comprising flue gas condenser, heat exchange equipment, molecular sieve adsorber units and CO_2 compressors.
12.	Cooling water towers, water storage basin, pump house and pipe work.
14.	Administration buildings including offices, canteen and welfare.
17.	Demineralised water production, storage tanks and laboratory.
19.	Light fuel oil storage tanks and pump house.
20.	Ash storage and handling equipment.
21.	Fire brigade station and first aid treatment.
26.	Rain water attenuation buffers.
27.	Bridges and crossings over Carr Dyke.

CO_2 TRANSPORTATION AND STORAGE INFRASTRUCTURE

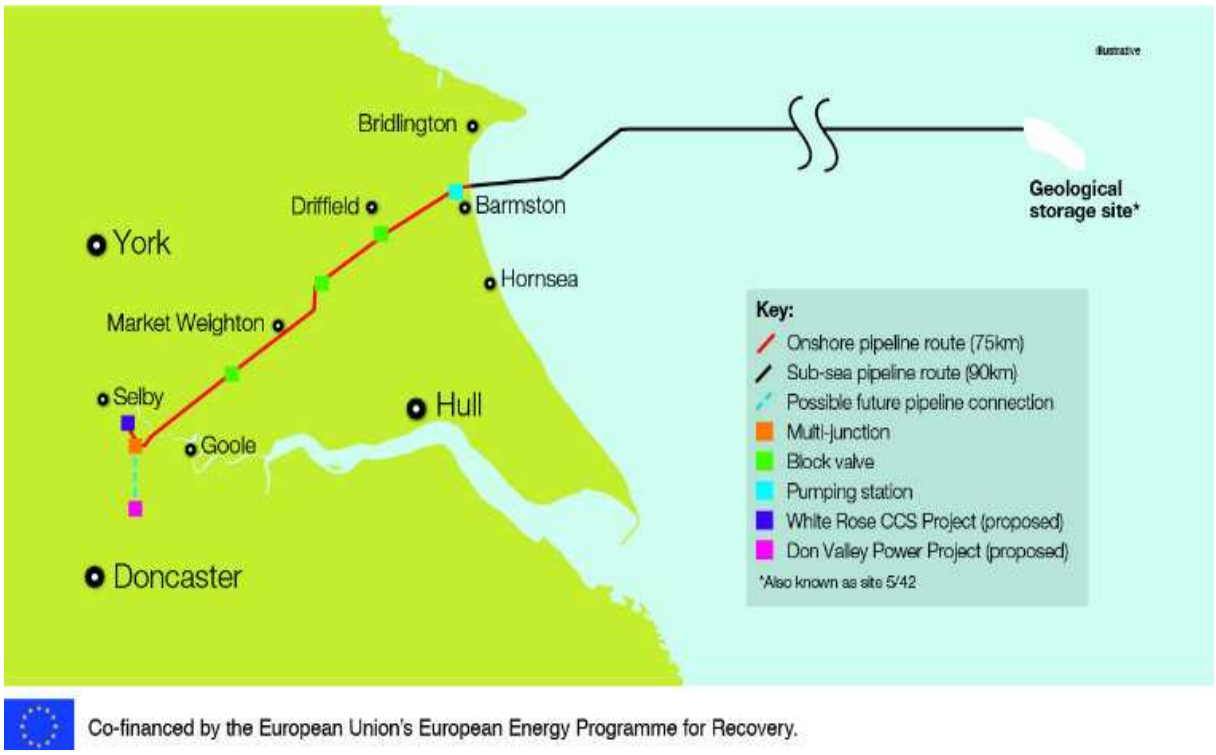
3.17 The Project would be completely CCR to the point of producing export specification CO_2 following commissioning. However, the Project does not include any CO_2 transport or storage infrastructure, since this would be constructed and operated by NGCL. The NGCL CO_2 pipeline is the subject of a separate DCO application which was submitted to the SoS earlier in 2014. Nonetheless the following text is provided as an overview of this related development.

3.18 NGCL was created as a subsidiary of National Grid to develop CCS transportation and storage infrastructure in the UK. It is currently working with industry, universities and the government on ways to deliver the necessary infrastructure.

3.19 The first aspect of the CCS infrastructure is planned to be in the Humber region where the highest concentration of CO_2 emitters are located with approximately 10 % of total UK emissions. The aim is to create the necessary infrastructure which would allow CO_2 to be captured from industry and taken by pipeline to be sequestered permanently under the North Sea.

3.20 The NGCL CCS project is currently envisaged to involve the construction of a cross-country and undersea pipeline to transport the captured CO_2 from the Project site to a storage location in the North Sea within saline geological formations. Figure 3.4 below shows the route of the proposed transportation infrastructure. In the longer term, it is hoped that the infrastructure would serve as a regional network for the wider Yorkshire and Humber region.

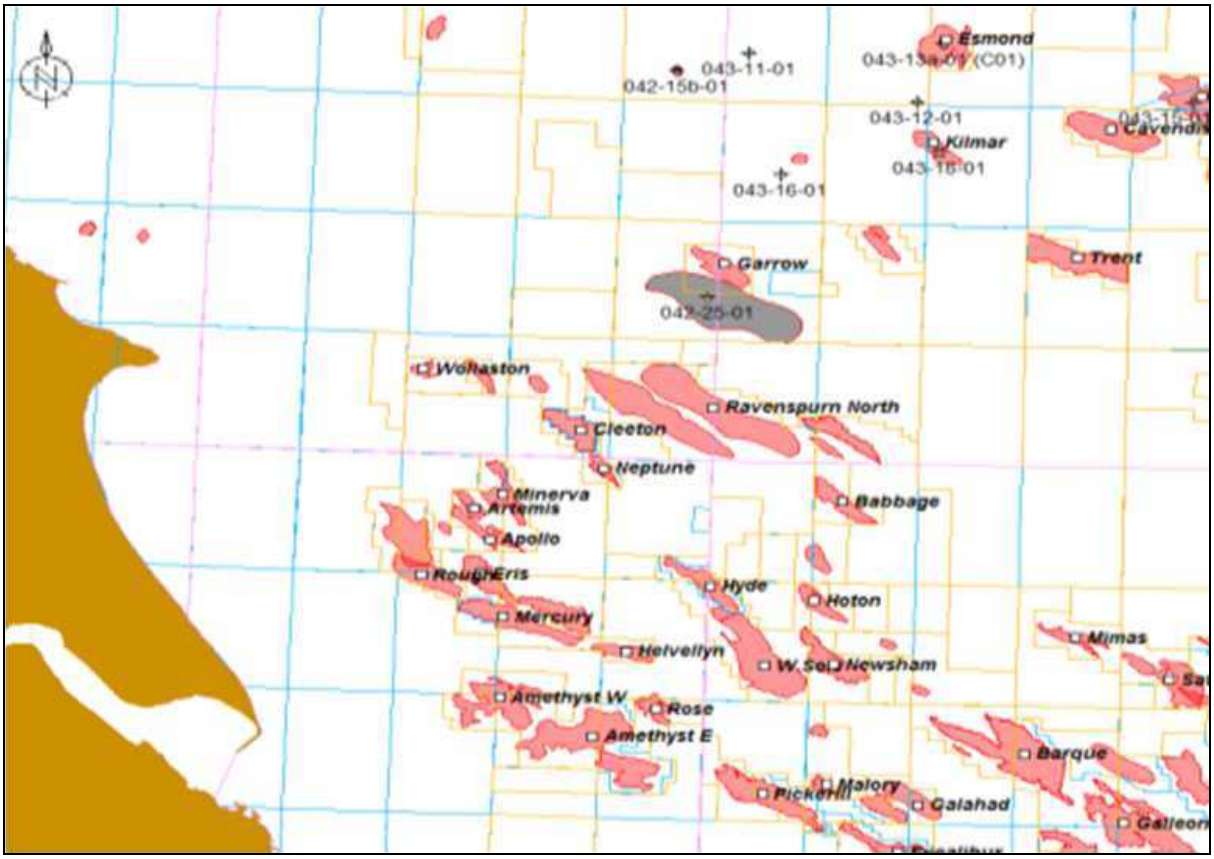
Figure 3.4: Route of CO_2 Transportation Infrastructure



3.21 The cross-country (onshore) element of the NGCL project is expected to be 75 km long and would use broadly the same technology as the high pressure national gas pipeline network which is owned and run by National Grid. The cross-country pipeline would have a diameter of 600 mm and be buried approximately 1.2 m underground.

3.22 The Figure 3.5 below shows the site of the 5/42 CO_2 store (as noted on Figure 3.4 above).

Figure 3.5: Site of the 5/42 CO_2 store



3.23 The dense phase CO_2 would be piped at a pressure of up to 200 barg to the storage area under the North Sea. The undersea element of the pipeline would also have a diameter of 600 mm and be located on the seabed. The pipeline would be designed to have a capacity to carry up to 17 million tonnes of CO_2 each year.

3.24 Above ground installations would be needed for the onshore pipeline to operate safely and efficiently. These include:

- a multi junction which would allow other power stations and industrial plants to be connected;
- three block valve sites along the route which would allow sections of the pipeline to be isolated to facilitate operation and maintenance;
- a pipeline inspection gauge trap (referred to as PIG trap) adjacent to the Project site for monitoring and maintenance; and
- a pumping station to be located between the villages of Barmston and Fraisthorpe to increase the CO_2 pressure prior to offshore transportation.

ECONOMIC CASE

3.25 CCS policy noted above requires project promoters to show the economic case which establishes a conceivable set of economic circumstances which would enable a developer to retrofit carbon capture technology to all or part of the generating station. This policy requirement is inconsistent with the Project since the Project would not be retrofitting carbon capture technology; it would be constructed with the carbon capture technology in place ready to operate from the commencement of commercial operations.

3.26 In 2012 the UK CCS Roadmap[1] set out the Government's approach to the development of the CCS industry in the UK. The five key components outlined in the Roadmap are:

- a CCS Commercialisation Programme with £1bn in capital funding and additional operational support available through Contracts for Difference[2] ('CfDs');
- a £125m, 4-year, co-ordinated research and development ('R&D') and innovation programme and a new UK CCS Research Centre;
- development of a market for low carbon electricity through Electricity Market Reform, including availability of Feed-in Tariff CfDs for low carbon electricity;
- commitments to working with industry to address other important areas including developing the CCS supply chain, addressing regulatory barriers and assisting the development of CCS infrastructure; and
- international engagement focused on sharing knowledge generated through the UK programme and learning from other projects around the world.

3.27 The Project is one of two schemes supported under the Government's £1 billion CCS Commercialisation Programme, with around £100 million of that funding supporting the detailed planning, engineering and project development. Around the end of 2015, a final investment decision will be taken in respect of the Project, with Government potentially investing the remainder of the £1 billion to support construction. The Government believes that the only feasible way to reduce CO_2 emissions and maintain fossil fuels in the electricity generation mix is to develop CCS technologies. Fossil fuels are an important part of the current and future energy mix because they allow a balance between the intermittency of renewable sources (as influenced by weather conditions) and the inflexibility of nuclear power.

3.28 The Project is aligned with national strategies relating to the construction and operation of new electrical generation infrastructure whilst meeting UK energy sector carbon reduction targets (e.g. CCS Roadmap). The Project is also a key part of the development and commercialisation of carbon capture and storage technology, which the government is supporting through the above £1billion of capital and research and development funding. The Project site is located on land adjoining the existing Drax Power Station.

3.29 On 20 December 2013 CPL entered into a 'Front End Engineering and Design' ('FEED') Contract with the SoS for DECC, for the undertaking of certain front-end engineering and design, knowledge transfer and other services related to the development of the Project (the 'FEED Contract'). The FEED Contract has been awarded to CPL by DECC as part of its CCS Commercialisation Programme. Beyond technical deliverables, the FEED Contract includes deliverables relating to the commercial aspects of the Project.

3.30 On 8 July 2014 the European Commission made an award decision of €300 million (around £240 million) for the Project. The funding comes from the New Entrant Reserve (NER 300) Programme managed by the European Commission, European Investment Bank and member states[3].

3.31 Additional information in relation to the funding of the Project is provided in the Funding Statement (Document Ref. 3.3).

3.32 UK gas and coal power stations equipped with carbon capture, transport and storage have clear potential to be cost competitive with other forms of low-carbon power generation, delivering electricity at a levelised cost approaching £100/MWh by the early 2020s, and at a cost significantly below £100/MWh soon thereafter.[4]

(1) https://www.gov.uk/government/publications/theccs-roadmap
(2) Energy market Reform has been progressed by the coalition government and CfDs are one of the four core elements of EMR. EMR's stated aim is to deliver green energy and transform supply to low carbon emitting sources. CfD pays the generator the difference between a measure of the cost of investing in a particular low-carbon technology (the 'strike price') and a measure of the average market price for electricity (the 'reference price').
(3) https://www.gov.uk/uk-carbon-capture-and-storage-government-funding-and-support
(4) UK CCS Cost Reduction Taskforce - Final Report-May 2013

4.0 CONCLUSION

4.1 The key point in relation to the Project and Carbon Capture Readiness is that the generating station would be a demonstration project designed to capture carbon from the commencement of operation. Therefore, there would be no need to retrofit Carbon Capture technology.

4.2 When built the Project is expected to be the largest oxy-fuel CCS plant worldwide and it would demonstrate the technical and commercial viability and market fit of CCS enabled coal-fired power stations in the future electricity market.

4.3 This Statement has demonstrated that the space needed for CCR as stated in the Overarching NPS for Energy EN-1 would be provided. The plan as identified in Figure 3.3 shows an image of the Project, with the required carbon capture and compression equipment in place. The space is within the Order Limits for the Project. As a result, the Project meets the requirements of EN-1 and EN-2. This Statement also demonstrates that the Project would (from commencement of commercial operations) meet the requirements that can be imposed by the SoS to '*retain control over sufficient additional space (whether on or near the Site) for the carbon capture equipment'* and *'retain their ability to build carbon capture equipment on this space (whether on or near the Site) in the future'*.

4.4 In addition, the Statement demonstrates that the guidance on transport and storage as stated in Overarching NPS for Energy EN-1 would be met. This aspect would be achieved through the NGCL pipeline and storage project.

4.5 NGCL would obtain the necessary DCO and CO_2 storage licence and other necessary consents for the construction of the on and offshore pipeline. The Environmental Permit which is in place for Drax Power Station is to be varied to incorporate the activities of the Project.

4.6 Furthermore, the Statement has also demonstrated that there is suitable storage for the CO_2 as required by the EU Directive on Geological Storage of Carbon Dioxide. This aspect would also be achieved by the NGCL project.

4.7 Finally, due to the funding available and the current stage of the FEED process, the Statement demonstrates that the Project (including carbon capture) is likely to be economically feasible.