



**North Killingholme**  
**Power Project**

**Non-Material Change to  
Development Consent Order**  
**Carbon Capture Readiness  
Feasibility Study / Carbon  
Capture and Storage Design  
Concept Report – Non-Technical  
Summary**

**C.GEN Killingholme Limited**

**C.GEN**

**QUALITY CONTROL**

|                             | <i><b>First Issue</b></i>      | <i><b>Revision 01</b></i> | <i><b>Revision 2</b></i> | <i><b>Revision 3</b></i> |
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## Non-Technical Summary

This document is a non-technical summary of the updated Carbon Capture Readiness Feasibility Study / Carbon Capture and Storage Design Concept Report (dated August 2020).

An application was made for a Development Consent Order in April 2013 ('the Application') to construct and operate a new 470 megawatt (MW) electrical generating station and associated development on land adjacent to the C.RO Ports Killingholme Limited Terminal at North Killingholme, North Lincolnshire ('the Project'). The North Killingholme (Generating Station) Order 2014 was granted by the Secretary of State on 11 September 2014 (amended by correction order on 26 October 2015) (together 'the Order').

Since the Order was granted, C.GEN has been developing the Project for delivery, but the Order is yet to be implemented. Given the time that has elapsed since the Order was granted (in 2014), C.GEN is seeking amendments to the Order to extend the time limit for implementing the Order (which currently expires in October 2021).

In seeking to extend the date, other minor ancillary modifications to the Order are proposed regarding the carbon capture elements (including in respect of the feasibility study regarding carbon capture).

The feasibility study submitted with the Order relied on a pre-combustion carbon capture solution, requiring construction of a gasification plant and subsequent operation as an integrated gasification combined cycle (IGCC) power station. Whilst the IGCC mode of operation does not currently look feasible to deliver as it is dependent on development of a carbon transport and storage network by third parties, the IGCC option remains a viable technological solution to low-carbon energy production needs. However, as the Order also enables C.GEN to deliver and operate the Project in CCGT mode (instead of in IGCC mode), the feasibility study has been updated to enable post-combustion carbon capture and storage solutions for CCGT operation.

So, the updated feasibility study now incorporates carbon capture ready solutions for the two key operating scenarios (simplified to these two key operating scenarios from the five scenarios outlined in the Environmental Statement Volume 1, 22 March 2013, Document Reference 6.1):

- Operation of Generating Station as an IGCC Plant (Using 100% coal as fuel as it represents the worst-case scenario for CO<sub>2</sub> capture);
- Operation of Generating Station as a CCGT Plant (Using natural gas as fuel).

The conclusions within the updated feasibility study for the operation of the Generating Station as an IGCC Plant with pre-combustion carbon capture remains unchanged from the 2013 submission. The feasibility study update covers the new assessment undertaken for operation of the Generating Station as a CCGT Plant and retrofitting with post-combustion carbon capture.

With the update, the feasibility study now successfully demonstrates both pre-combustion carbon capture and post-combustion carbon capture against the criteria outlined within the CCR Guidance<sup>1</sup> and the Draft Supplementary Guidance<sup>2</sup>, as summarised below.

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<sup>1</sup> *Carbon Capture Readiness (CCR) – A Guidance Note for Section 36 Electricity Act 1989 Consent Applications, November 2009*

The CCR Guidance:

- a. Sufficient space is available to accommodate either of the proposed CO<sub>2</sub> capture technologies;
- b. It will be technically feasible to retrofit either of the proposed CO<sub>2</sub> capture technologies;
- c. There are suitable offshore CO<sub>2</sub> storage areas available;
- d. It will be technically feasible to transport the captured CO<sub>2</sub> to the offshore CO<sub>2</sub> storage areas; and
- e. It may be economically feasible, within the lifetime of the Project, to implement either of the proposed CO<sub>2</sub> capture technologies (including transport and storage).

The Draft Supplementary Guidance:

- a. It will be technically feasible to retrofit the proposed CO<sub>2</sub> capture technologies;
- b. The environmental impacts of retrofitting either of the proposed CO<sub>2</sub> capture technologies have been fully considered; and
- c. The Project complies with the requirements of the CCR Guidance.

With respect to demonstrating sufficient space is available for the post-combustion carbon capture plant, the updated feasibility study determines a minimum area of 2.25 ha is required. A precautionary approach has been adopted, however, and the feasibility study has identified an area of 2.3ha to be reserved. Aligned with this requirement, a preliminary carbon capture plant equipment layout is outlined in Figure 10, included as part of the feasibility study update.

As illustrated by Figure 10, this 2.3 ha area is split over two Work Nos. The greater part of the area is located on Work No. 2b, covering the whole of the Work No. area, with the remaining proportion located on a strip of land in the southern part of Work No. 2a. No conflict is caused by locating the area for the post-combustion carbon capture plant within the pre-combustion IGCC plant areas of Work No. 2a and Work No. 2b because, if one solution develops, the other solution becomes redundant.

Accordingly, the updated feasibility study now successfully addresses both pre-combustion carbon capture for IGCC and post-combustion carbon capture for CCGT.

For further information on the high-level structure of the updated feasibility study (including reference to the updates made to the previous version), please refer to the Appendix to this non-technical summary.

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<sup>2</sup> November 2009 consultation document - Draft Supplementary Guidance for Section 36 Electricity Act 1989 Consent Applicants for Coal Power Stations

## APPENDIX – STRUCTURE OF THE FEASIBILITY STUDY

The feasibility study has been formulated in line with the requirements and guidance within NPS EN-1<sup>3</sup>, the CCR Guidance, the relevant EU Directives and the Draft Supplementary Guidance. The structure of the feasibility study, with details of the changes / additions made in the updated document shown in red, is provided below:

### Introductory Information:

**Section 1** - This brief introduction. *(Minor updates as applicable)*

**Section 2** – The context and assessment methodology. *(Updated to include government policy on post-combustion capture).*

**Section 3** – A description of the North Killingholme Power Project. *(Minor updates as applicable)*

### Carbon Capture Technology Information:

**Section 4** – A description of the proposed CO<sub>2</sub> capture technology *(Updated to include description, performance and calculations for both pre-combustion and post-combustion technology).*

### Technical Assessments:

**Section 5** – The technical assessment of the CO<sub>2</sub> capture technology space. *(Updated to assess space requirements for both pre-combustion and post-combustion technology. Separate assessments and layouts are provided for each technology)*

**Section 6** – The technical assessment of the retrofitting and integration of the CO<sub>2</sub> capture technologies. *(Updated to include what retrofitting and integration is required for both pre-combustion and post-combustion technology)*

**Section 7** – The technical assessment of CO<sub>2</sub> storage areas. *(Updated to include details of new required CO<sub>2</sub> storage capacity and review to ensure original storage location is still valid)*

**Section 8** – The technical assessment of CO<sub>2</sub> transport. *(Updated to ensure original CO<sub>2</sub> Transport route is still valid)*

### Economical Assessment:

**Section 9** – The economical assessment. *(Updated to include economic assessment for both pre-combustion and post-combustion technology. Separate, independent assessments carried out).*

### Additional Information:

**Section 10** – A discussion on the requirement for a Hazardous Substances Consent. *(Updated to evaluate the potential requirement for a HSC for both pre-combustion and post-combustion technology)*

### Conclusions:

**Section 11** – Conclusions *(Updated as applicable)*

### Figures:

*The following additional Figures have been added:*

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<sup>3</sup> Overarching National Policy Statement for Energy (EN-1)' (2011, DECC).

- *Figure 9 – Schematic of Post Combustion Carbon Capture*
- *Figure 10 – Outline Plot Level Plan for CCGT Power Plant with Post-Combustion CO2 Capture*

#### Appendix A:

Relevant Sections of the EU Directives *(No update required)*

#### Appendix B

CCR / CCS Requirements Checklist – *(Table B3 added to include CCR Guidance Requirements for CCGT Plant with post-combustion capture)*

#### Appendix C

Annex B of Carbon Capture Readiness (CCR) Guidance (November 2009) – “Environment Agency Verification of CCS Readiness New Natural Gas Combined Cycle Power Station Using Pre-Combustion CO2 Capture (including coal gasification) and Hydrogen-Rich Fuel Gas Combustion” *(No update required)*.

#### Appendix D

Annex C of the CCS Guidance – “Environment Agency Verification of CCS Technical Feasibility: New Integrated Gasification Combined Cycle Power Station using Pre-Combustion CO2 Capture (Coal Gasification) and Hydrogen-Rich Fuel Gas Combustion” *(No update required)*.

#### Appendix E

Annex C of Carbon Capture Readiness (CCR) Guidance (November 2009) – “Environment Agency verification of CCS Readiness New Natural Gas Combined Cycle Power Station Using Post-Combustion Solvent Scrubbing” *(New Appendix added)*.