White Rose Carbon Capture and Storage Project

Carbon Capture and Storage (CCS) Commercialisation

The Peterhead (1) and White Rose CCS projects are the two schemes supported under the Government’s £1 billion CCS commercialisation programme, of which up to £100 million has been committed to the projects for Front End Engineering Design (FEED), risk reduction programmes involving detailed planning, engineering and financial work. In early 2016, the projects are expected to take final investment decisions, with Government potentially investing up to £900 million of capital support.

Project Description and location

White Rose comprises a new 448 MWe (gross)(2) ultra-critical coal fired oxy power plant equipped with full CCS, with the capacity to provide electricity sufficient for 630,000 households whilst capturing and permanently storing two million tonnes of CO₂ per year arising from the combustion process (90% of CO₂ emissions). White Rose is being developed by a Joint Venture of Drax, Alstom, and BOC, Capture Power Ltd, in partnership with transport and storage providers, National Grid Carbon Ltd.

The oxygen will be provided by the Air Separation Unit and the mixture of this with flue gas will eliminate the high volume of nitrogen present naturally in air. As a result a CO₂ rich flue gas will be produced, allowing it to be easily processed to the purity levels required for transportation / storage. The figure below summarises the technology.

Project Consenting and ERM’s Role

ERM has been involved in supporting the development of the oxy power plant for the project since 2011. The Planning Act 2008 introduced a new system for examining and determining applications for the types of NSIPs. Before a NSIP can proceed an application for a Development Consent Order must be submitted to the Planning Inspectorate (PINS). PINS is responsible for examining the application and making a recommendation to the relevant Secretary of State who then takes the decision as to whether a DCO should be authorised. The DCO supplants a number of consents (e.g. planning permission) and can also include a range of other consents and licences. Due to the scale of the oxy power plant the DCO needed to include an EIA developed in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 as amended.

The oxy power plant will combust fuel (principally coal, with the option of co-firing biomass) in a boiler in a mixture of oxygen and re-circulated flue gas.
ERM’s role has chiefly been the development of the EIA and its extensive supporting studies which, for brevity, included baseline data collection / analysis, modelling (i.e. to air, water & land), consultation to the requirements of the PA 2008, providing information to inform a Habitats Regulations Assessment and now examination phase / construction stage support.


Key Issues and Approach to Environmental Impact Assessment

Due to being a ‘first of kind’ ERM had to work closely with the project team to develop and communicate a clear understanding of the project to all stakeholders. Our involvement as an integral part of the public consultation and regulator engagement activities assisted with this process. Visualisations including 3D models and photomontages played an important role to ensure everyone, from the project team to local communities, could understand the project and provided a consistent and visual basis for the full suite of documents supporting the DCO.

Key technical challenges were in developing bespoke approaches to model emissions to atmosphere and operational noise. The air quality model for instance was subject to numerous iterations and informed by a close partnership with Alstom and covered a wide range of operating scenarios and feedstock. It is noteworthy that the Environment Agency have been supportive of the finding of this modelling work largely, we consider, due to the depth of the study and early engagement.

Key Lesson Learnt

As White Rose is undergoing FEED, it is important to retain design flexibility to respond to emerging economic circumstances and technological advances to enable commercialisation.

A degree of flexibility was built into the project design greater than would be typical for more ‘mature’ or simpler facilities (for instance a combined cycle gas turbine).

This need for flexibility does, however, introduce complexity into the DCO process. The EIA Regulations require an ES to provide a description of the location, design and size of the project to enable the likely significant environmental effects to be assessed and to enable the decision maker, statutory consultees and the public to be informed.

ERM balanced sought to balance defining the project in enough detail to assess effects, while leaving enough flexibility to enable the project to be successfully delivered under conditions which may be subject to change, such as final operational parameters. The adopted approach provided a reasonable worst scenario and took account of all the reasonable variations (up to the worst case scenario from an environmental perspective). Such an approach is good practice, as reflected in the PINs Advice note 9 ‘Rochdale Envelope’.

Roderick Ellison, Principal Consultant - Environmental Assessment and Planning
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(1) The Peterhead Project is an entirely separate CCS scheme being development by Shell and SSE retrofitting post combustion capture technology to an existing gas fired plant.
(2) MWe – Megawatt (electrical) – a megawatt is equal to one million watts

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