The White Rose CCS Project: Status Update & DECC Perspective

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‘Carbon Capture and Storage (CCS) has the potential to be one of the most cost effective technologies for decarbonisation of the UK’s power and industrial sectors, as well as those of economies worldwide’

CCS Roadmap
Department of Energy and Climate Change
Topics

- Project Overview & Update
- DECC Perspective re UK CCS
White Rose CCS - Project Snapshot

• A new state of the art Oxy-Power Plant, up to 448 MWe (gross)
• Located Drax, North Yorkshire providing >300 MWe clean power, equivalent to the needs of 630,000 homes
• 100% of flue-gas treated, 90% CO₂ capture rate → 2 MTPA
• Biomass co-firing leading to zero - or near zero - CO₂ emissions

• CO₂ transported c.a. 100 miles by pipeline to off-shore storage
• CO₂ to be permanently stored in a deep saline formation

Largest Oxy-Combustion CCS Commercialisation Project Worldwide
Oxy-fuel technology

Proven       Reliable      Fuel Flexibility
Project Status

• Preferred Bidder in the UK’s £1Billion CCS Commercialisation Programme

• FEED Contract awarded - signed by the UK Government on 20th December, 2013

• FEED underway: detailed engineering, risk reduction and planning programme leading to financial close, FID and construction commencement.

• Planning Process on track:
  – DCO decision for on-shore CCS pipeline by National Grid expected by 19th November 2015

• Continuing work with the UK Government (DECC) towards Project Contract and Contract for Difference (CfD)

GEF Phase
~ 2 years

Construction Phase
~ 5 years

Operating Phase
20+ years
White Rose layout

Drax Power station  White Rose CCS Plant

Fuel delivery  Turbine  Boiler  Flue gas abatement  2 x ASU  CO$_2$ processing  Cooling system

Image by: Arup Associates
Project Objectives

- To demonstrate Oxy-combustion CCS technology as a reliable, flexible, and competitively priced low-carbon technology
- To help reduce CO$_2$ emissions in order to meet future environmental legislation and to combat climate change
- To improve the UK’s security of electricity supply by providing a coal-based low-carbon electricity generation option
- To generate enough low carbon electricity to meet the energy needs of more than 630,000 homes
- To act as an anchor project for the development of a CO$_2$ transportation and storage network in the UK’s most energy intensive region

Cost competitive & deliverable project to establish commercial future of CCS
The White Rose Developers

Developers

ALSTOM  

drax  

BOC  

national grid

Delivery

CAPTURE POWER  

national grid Carbon Ltd
CO₂ Transport & Storage - National Grid

Transport Development
- Onshore route planning
  - DCO examination completed

Off-shore pipeline
- Route corridor identified
- Surveys complete

Storage Development
- Regional assessment completed
- Endurance (Block 5/42) identified prime target
- 2012 UKs first CCS licence
- CO₂ permit in advanced stage (completion May 2016)

Store Appraisal
- 1st Appraisal well drilling completed (summer 2013) with positive results
Topics

- Project Overview & Update
- DECC Perspective re UK CCS
CCS: Strategic importance

Security of supply
The UK needs a **diverse energy mix** (incl. coal) and **flexible generation** to support intermittent RE and baseload nuclear.

Climate change
Fossil fuels still power over 80% world energy & expected to continue so CCS has a key role to play. Path to COP21 / 2015 agreement.

Jobs and growth
**Appx 3,300 jobs** at WR at peak construction averaging 1,000 jobs pa. Key role in decarbonising Energy Intensive Industries.

Affordability
Expected to be **cost competitive** in 2020s. Without CCS climate targets **£30-40bn more expensive** per year.

Source slide: DECC
CCS: Strategic importance

As part of a portfolio of actions, CCS accounts for **14%** of total energy-related CO₂ reductions needed by 2050. *(Source: IEA, 2012)*

Source slide: IEA
Path to Full Commercialisation

By 2030
- Up to 13 GW of CCS power
- Levelised cost of electricity <£100/MWh

A cost-competitive CCS industry

- Full Commercialisation (Phase 3)
- Transition Phase (Phase 2)
- £1bn Commercialisation Programme (Phase 1)

By 2050
- CCS could provide up to 20% of the UK’s energy
- Saving £30 bn/year

Source slide: DECC

White Rose CCS Project

Peterhead CCS Project
UK CCS Build Out Potential

- UK has tremendous storage potential in the Northern, Central and Southern North Sea as well as the East Irish Sea
- According to ETI, the country has potential storage of 78 G tonnes, well in excess of required storage of 3 G tonnes for the UK industry by 2050
- Transport networks to be planned for current and future CCS

Maps source:
1. Energy Technologies Institute Insights Report, carbon capture and storage potential for CCS in the UK
2. SCCS Unlocking North Sea CO₂ Storage for Europe, Practical actions for the next five years SCCS Recommendations and Conference Report
Pathway to Regional Decarbonisation

Next Steps in CSS: Policy Scoping Document

CCU (Carbon Capture & Utilisation)
Part Chain Capture
Clustering

CO₂
Coal or gas fired power station

Financial Incentives & Electricity Market Reform

BECCS (Bio-energy with CCS)

Industrial CCS

Raising Finance

Phase 1
UK’s first potential commercial scale CCS projects Peterhead and White Rose.

Phase 2, 3
Potential further CCS deployment, building on infrastructure and experience of Phase 1 projects. Decreasing amounts of potential government support.

CO₂ - Carbon Dioxide

Source slide: DECC
Costs of Delivering CCS

CCS “has the potential to be cost competitive with other forms of low carbon power generation by 2020s” **CCS Cost Reduction Task Force**
White Rose will show that abated fossil-fuel power stations will be able to generate flexible, reliable and affordable power as mid-merit plants, providing security of supply and grid stability complementing base load nuclear generation and intermittent renewables.