White Rose CCS Project

Pathways to Commercialisation

Peter Emery

CCSA/IEA GHG meeting
London; 9th November 2015
Disclaimer

© Capture Power Limited 2015. All rights reserved. Information contained in this document is indicative only. No representation or warranty is given or should be relied on that it is complete or correct or fit for any particular purpose. It is provided without liability and is subject to change without notice. This document contains confidential and commercially sensitive information. Reproduction, use or disclosure to third parties, without express prior written authority from Capture Power Limited, is strictly prohibited.
Topics

• The promise of CCS
• Costs
• White Rose
The UK Energy Trilemma

How does the UK decarbonise whilst ensuring security of supply and affordability

Affordability

Security

Decarbonisation

Which technologies and fuels are needed to achieve the objectives?
The UK Energy Trilemma – The case for CCS

**Affordability**
- CCS can be competitive with renewables
  - Strike price £100/MWh from the mid 2020’s\(^1\)
- Savings of around 1% of GDP per annum by 2050 across UK economy vs. non-CCS\(^2\)

**Decarbonisation**
- 90% CO\(_2\) removal from fossil-fuel generation
- Biomass with CCS reduces emissions further
  - 10% biomass co-firing with coal leads to net zero CO\(_2\) emissions
  - 100% biomass leads to negative footprint creating carbon budget headroom for the balance economy.

**Security**
- CCS applicable to oil, gas and coal (keeping all fossil-fuels in the mix)
  - Provides fuel options ensuring security of fuel supply (including UK gas and coal)
  - Provides a fuel price hedge
- Flexible generation, complimenting inflexible nuclear and intermittent renewables, ensuring continuity of supply and grid stability.

White Rose will demonstrate CCS as the low-cost route to decarbonisation

---

\(^1\) UK CCS Cost Reduction Taskforce - Final Report-May 2013
\(^2\) ETI: A perspective from the ETI's Jo Coleman and Andrew Haslett "Strategy, targets, Technologies, Infrastructure and Investments – preparing the UK for the energy transition."
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**

---

1 UK CCS Cost Reduction Taskforce - Final Report - May 2013
White Rose CCS - Project Overview

• A new state of the art Oxy-Power Plant, up to 448 MWe (gross)
• Located Drax, North Yorkshire providing >300 MWe clean power
• 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
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
Full Chain Commercial Scale CCS Project

- Anchor project for regional T&S infrastructure
- Supports follow-on projects for regional cluster
  - Infrastructure sized / enabled for up to 17 MTPA of CO₂
  - White Rose capacity c. 2 MTPA
  - Saline formation store “Endurance”

The Humber Cluster connects one of the largest concentration of CO₂ emissions in Europe with a very large, proximate and available store in the Southern North Sea.

Right sizing from start supported by UK Government
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.
THANK YOU