

# White Rose CCS Project

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# White Rose Project



- Introduction
- White Rose Consortium
- White Rose Full Chain CCS
  - Oxy-Combustion
  - Transport & Storage
- Project Update

# Project Snapshot

- A new modern ultra-supercritical 426MWe (gross) Oxy-Power Plant
- Located at the Drax Power Station Site, Selby, North Yorkshire
- Clean power generated for the equivalent needs of 630,000 homes
- 100% of flue gas treated, 90% CO<sub>2</sub> capture rate → 2 million tonnes CO<sub>2</sub>/year
- Biomass co-firing leading to zero - or negative - CO<sub>2</sub> emissions
- Anchor project for National Grid's regional CO<sub>2</sub> transport & offshore storage network
  - Yorkshire & Humber CCS cluster covers almost 20% of UK's CO<sub>2</sub> emissions
  - Infrastructure planned to be sized for 17 million tonnes CO<sub>2</sub>/year to enable future projects
- CO<sub>2</sub> to be permanently stored in a deep saline formation offshore, beneath the North Sea

## Largest Oxy-combustion CCS Commercialisation Project Worldwide

# Project Objectives

- To demonstrate Oxy-combustion CCS technology as a reliable, flexible, and competitively priced low-carbon technology
- To help reduce CO<sub>2</sub> 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<sub>2</sub> transportation and storage network in the UK's most energy intensive region

**Cost competitive & deliverable project to establish commercial future of CCS**

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# A Strong Industrial Consortium

CAPTURE  
POWER

**ALSTOM**

- A global leader in the world of power generation, power transmission and rail infrastructure
- A pioneer in large-scale and efficient CCS technologies

**drax**

- Owner & operator of the UK's largest, cleanest, most efficient coal-fired power station; 7% of the UK's electricity needs
- Produces more renewable power than any other UK facility
- Committed to reducing Drax & UK power generation carbon footprint

**BOC**  
A Member of The Linde Group

- The largest provider of industrial gases in UK
- A member of The Linde Group, a world leading gases and engineering company

**nationalgrid**

- An international electricity and gas company and one of the largest investor-owned energy companies in the world
- Expert in running high pressure natural gas system in a safe, reliable and efficient manner

# Delivery Plan



## OXY-POWER PLANT



• Full-Chain Integration

**Alstom**

- Delivery of Oxy-PP
- Integration of Oxy-PP

**Drax**

- O&M of Oxy-PP
- Trading Services
- Site and Site Services
- Fuel Supply
- Electrical Connection

**BOC (Linde)**

- Delivery of ASU
- O&M of ASU

## CO<sub>2</sub> TRANSPORT & STORAGE



- Delivery of Transport & Storage network
- O&M of Transport & Storage network

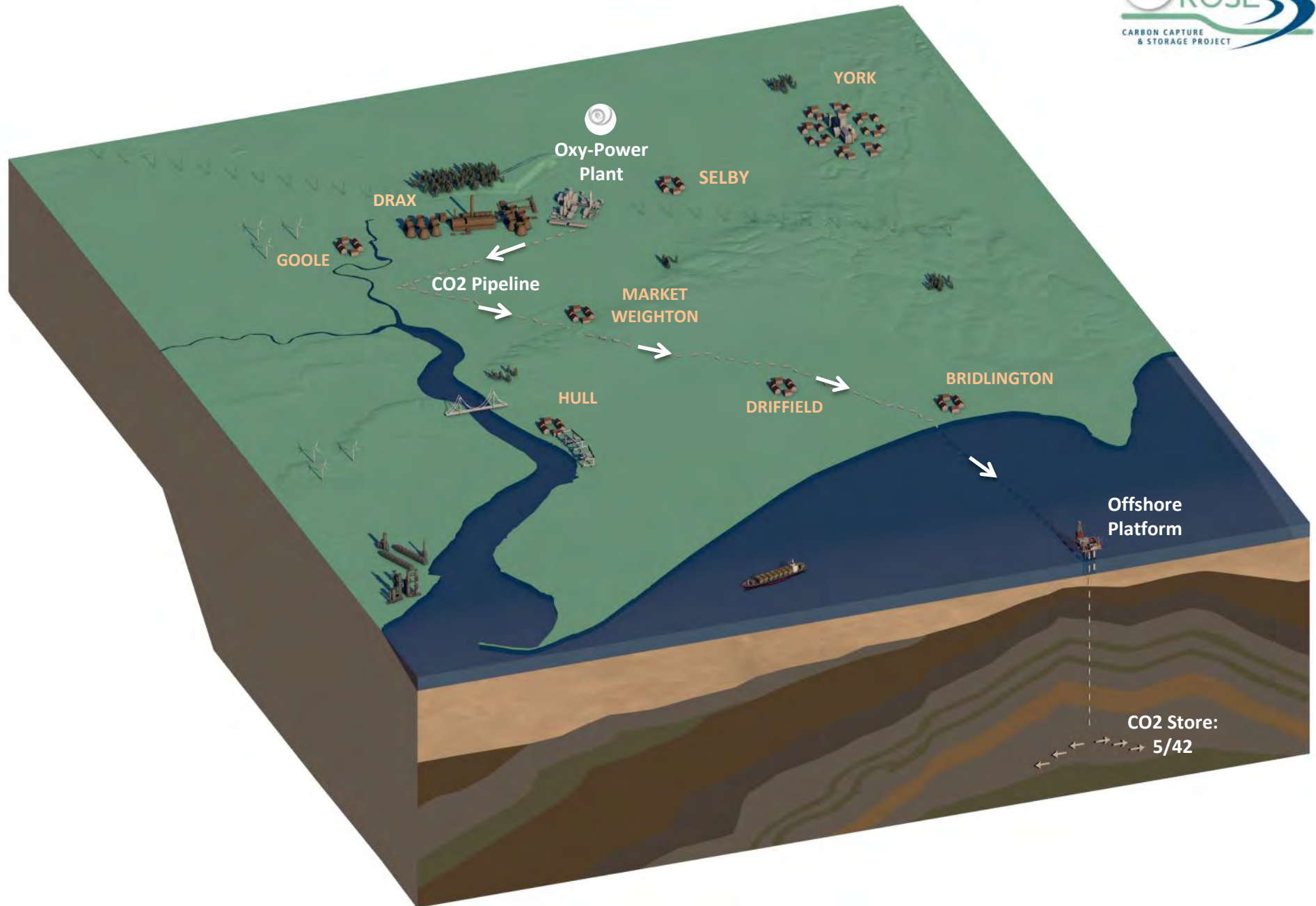
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# White Rose – Full Chain CCS



# Power Station Location



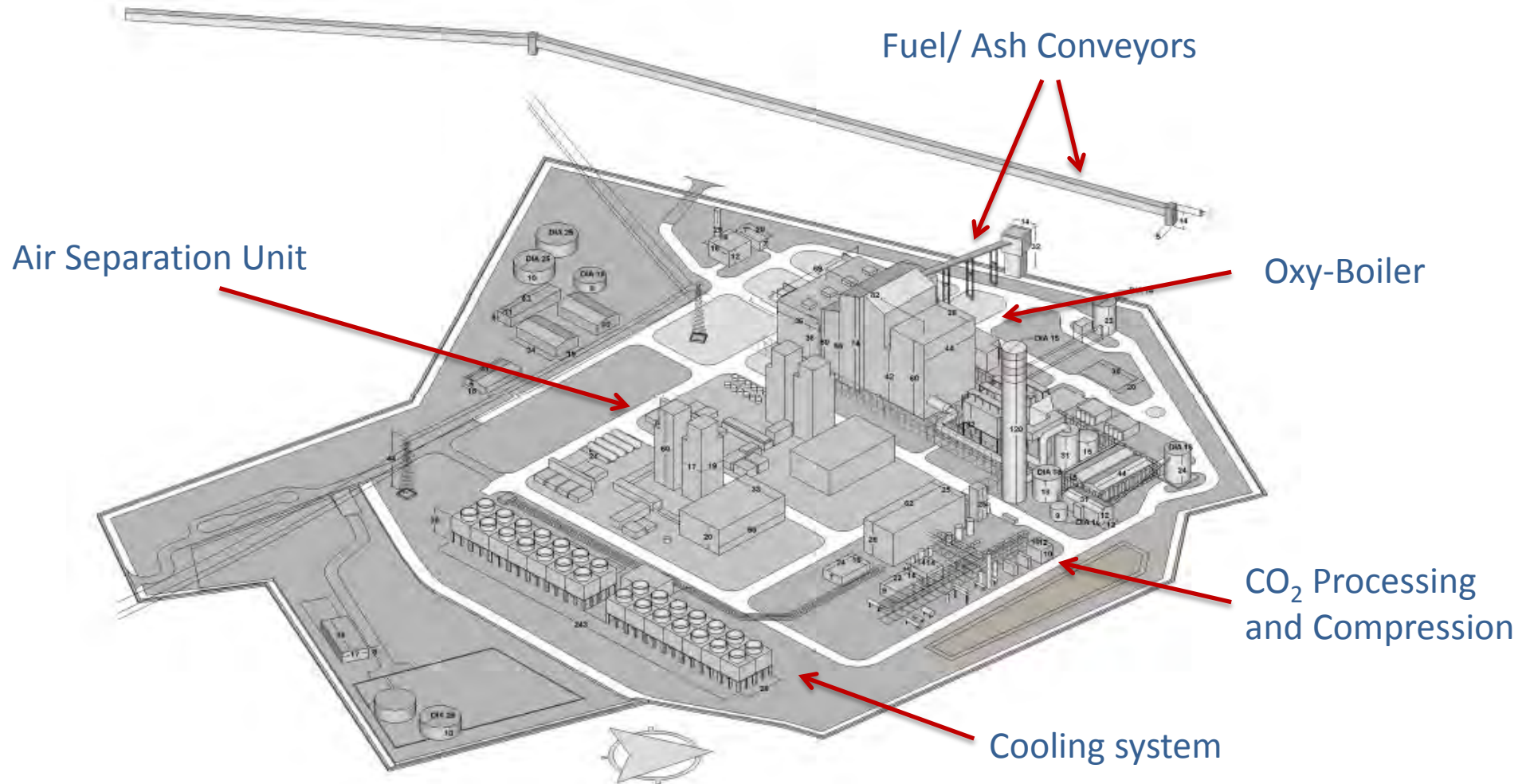
Location: Drax Power Station, North Yorkshire, UK



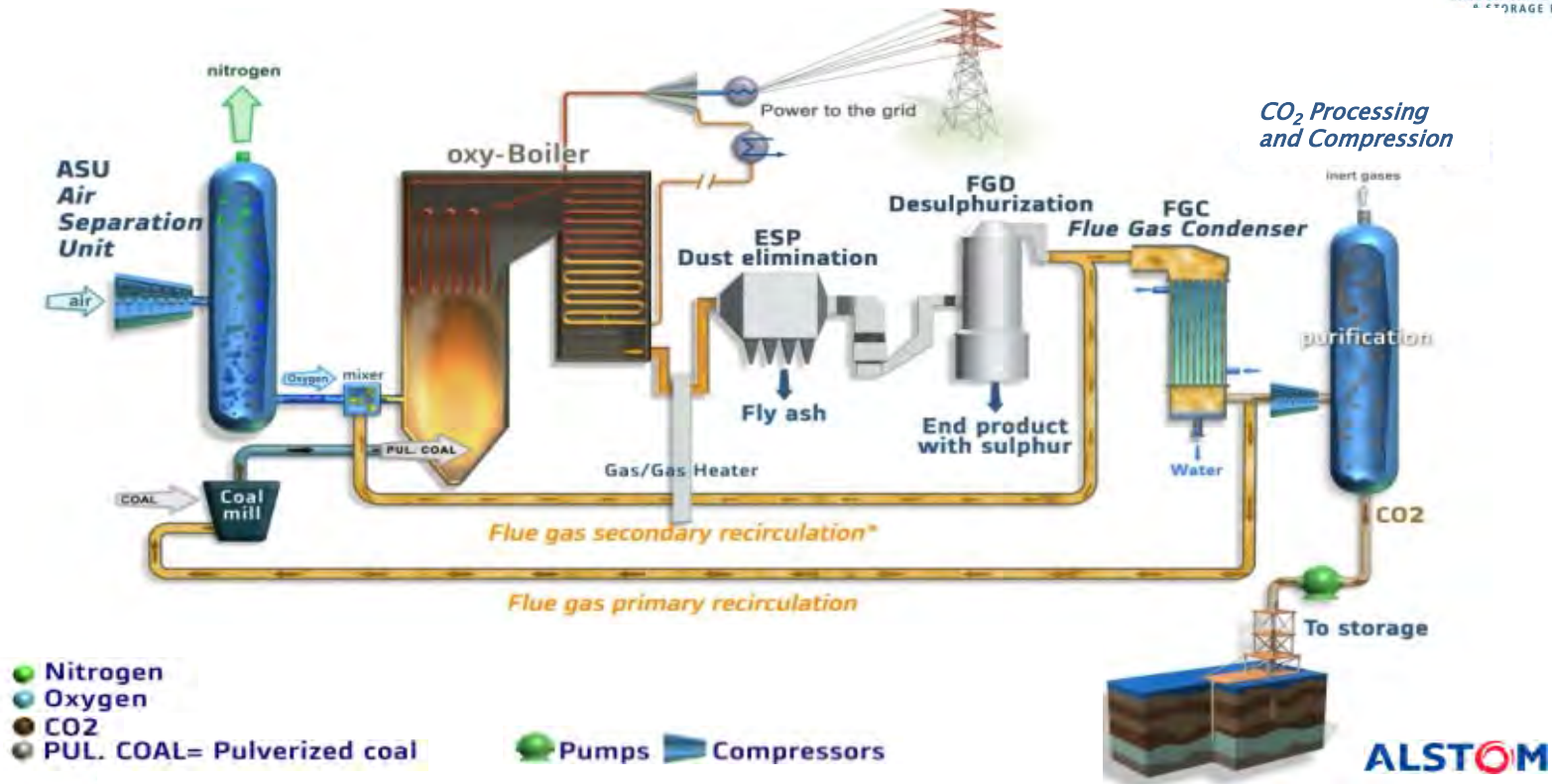
# Oxy-Power Plant



# Oxy-Power Plant Components



# Oxy-Combustion Technology



- Reliable: main components exist; drawing on high degree of conventional technology
- Fuel Flexibility: applicable for all types of boilers, firing systems and fuels
- Scale-up: no constraints anticipated for commercial units based on Schwarzepumpe pilot
- Emissions: No new chemicals introduced to the power plant



# CO<sub>2</sub> Transport & Storage - National Grid Summary



## Transport Development

- Onshore route planning
  - DCO submitted
- Offshore route planning on-going

## Off-shore pipeline

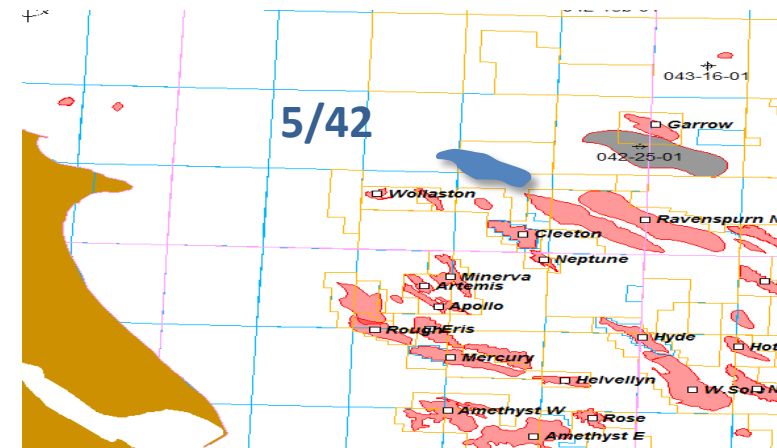
- Route corridor identified
- Surveys complete

## Storage Development

- Regional assessment completed
- Block 5/42 identified prime target, 2012 UK's first CCS Licence
- 1st Appraisal well drilling completed (summer 2013) with positive initial results

## Anchor project for UK regional T&S infrastructure

- Infrastructure sized / enabled for up to 17 MTPA of CO<sub>2</sub>
- White Rose capacity c. 2 MTPA



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# 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 risk reduction and planning programme leading to financial close, FID and construction commencement
- Continuing work with the UK Government (DECC) towards Project Contract and Contract for Difference (CfD)
- NER 300 Award Decision: On 8th July 2014, White Rose project secured award decision on funding up to €300M, sponsored by UK Government; only CCS project in the NER competition
- Engaging with funding community after strong interest shown during the pre-FEED phase



# FEED Phase Activities

- Full-chain integrated technical definition
- Consenting and permitting
- Costing
- Execution plan
- EPC, trading and operation contracts
- CO<sub>2</sub> transport & storage services agreement
- Project Contract & CfD
- Financing
- Knowledge transfer

# The Future of Clean Power



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