



Department
of Energy &
Climate Change

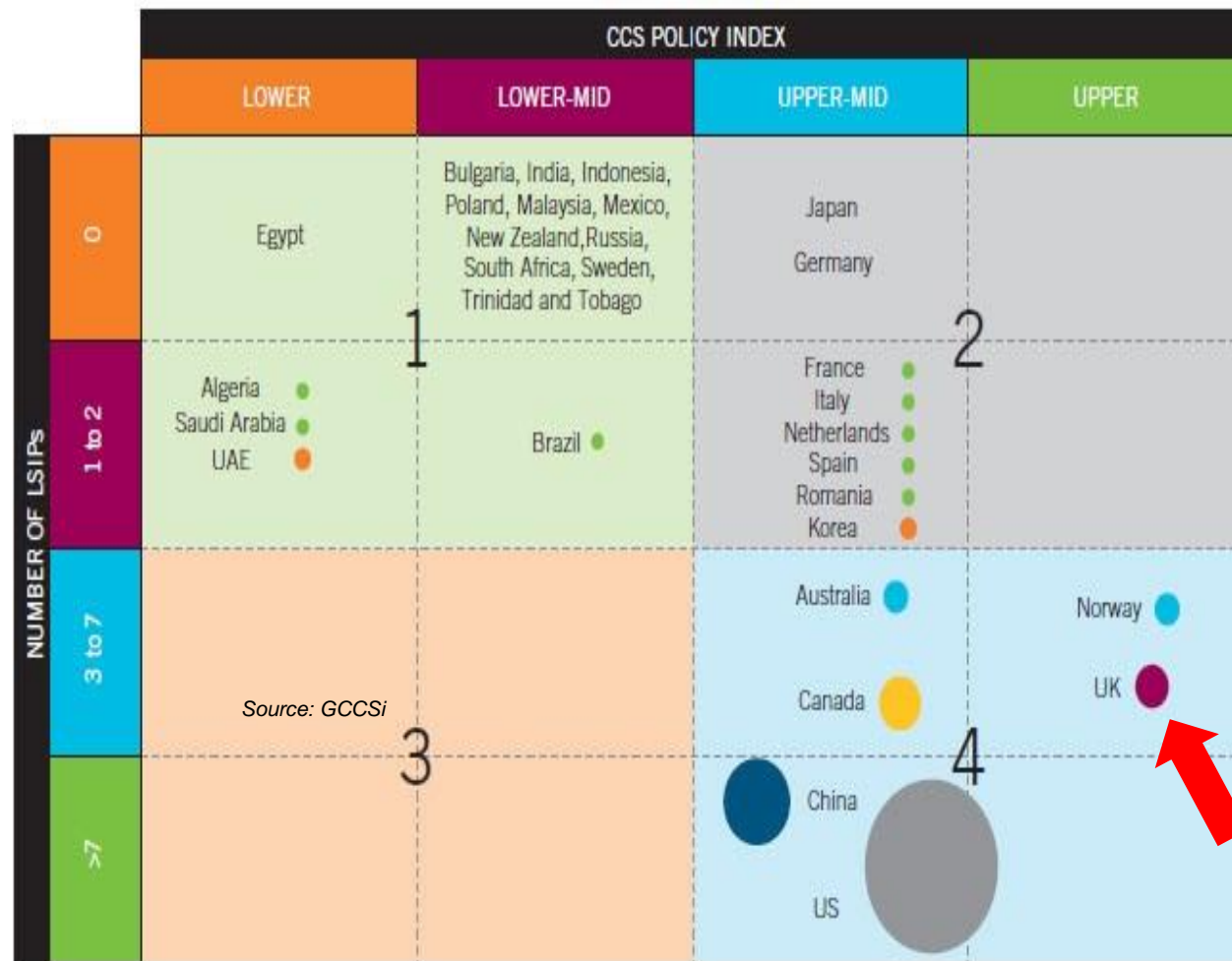
Supporting Carbon Capture and Storage through Policy and Regulation: UK approach

22 April 2015



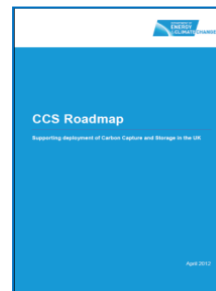
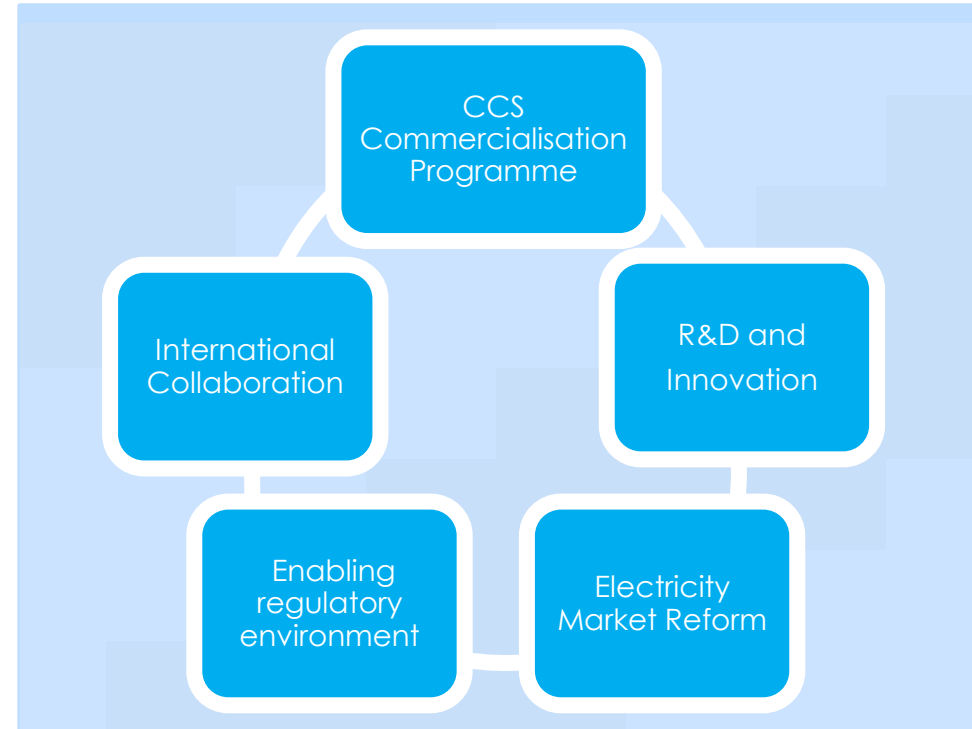
UK Position

- Most active country in EU on CCS
- One of the best policy environments for CCS in the world (GCCSI)
- Primary driver is the reduction in CO₂ not enhanced oil recovery



Developing CCS: Five key actions

- Enabling policy and regulatory environment
- Electricity Market Reform: creating a market for low carbon energy
- £1bn CCS Commercialisation Programme
- R&D and Innovation - £125 million
- International collaboration





Policy to discourage investment in unabated fossil fuel power generation...

The policy/regulatory triple lock to ensure ‘no new coal without CCS’:

- **Emissions Performance Standard (EPS):** Part of Energy Act 2013. Limits carbon emissions from new fossil fuel power stations. EPS level set at 450g CO₂/kWh ‘base-load’ - around half that of unabated coal;
- **Planning policy:** Any new coal power station must be built with at least 300MWe of full-chain CCS (2011 National Policy Statement). All new thermal power stations (including gas) must be constructed ‘carbon capture ready’ (CCR);
- **Carbon Price Floor (CPF):** Currently £10 per tonne / CO₂, rising to £18 in April 2015. Frozen at £18 to 2020, then projected to rise to £70 by 2030.



...And to encourage investment in CCS

Energy Act 2008 prohibited storage without an environmental permit and provided the legal basis for storage of CO₂ beneath the UK seabed. Also set out legal responsibilities for those undertaking offshore storage.

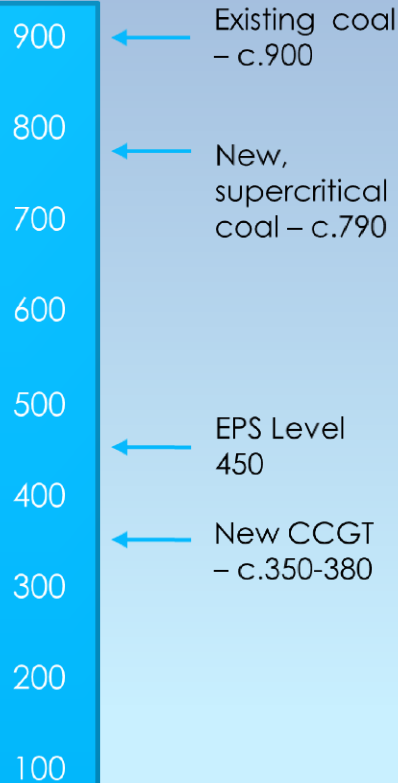
EU Directive (2009/31/EC) on the geological storage of CO₂ regulates the safe and environmentally sound storage of captured CO₂.

- Sets out a regulatory regime for assessing CCS readiness of new fossil fuel power plants, and permitting of exploration of potential CO₂ storage sites and storage operations (application procedure, conditions, content, and the requirement for the Commission to review permits, and changes and withdrawal of permits).
- Also addresses operation, closure and post closure obligations including:
 - *CO₂ stream acceptance criteria*
 - *Measurement, Monitoring and verification (MMV)*
 - *Reporting by operator*
 - *Inspections by authority*
 - *Risk assessment and measures in case of leakage*
 - *Financial security and financial mechanisms*
 - *Regulations around final closure, liability and transfer of responsibility*
 - *Third party access to network and storage sites and dispute settlements.*
 - *Reporting by Member States to the Commission*
 - *Transboundary cooperation*
 - *Penalties.*



Emissions Performance Standard

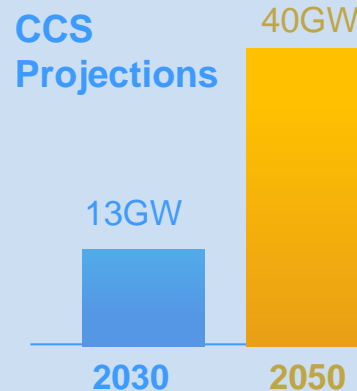
g/kWh



Energy Act 2013

CHAPTER 32

Explanatory Notes have been produced to assist in the understanding of this Act and are available separately



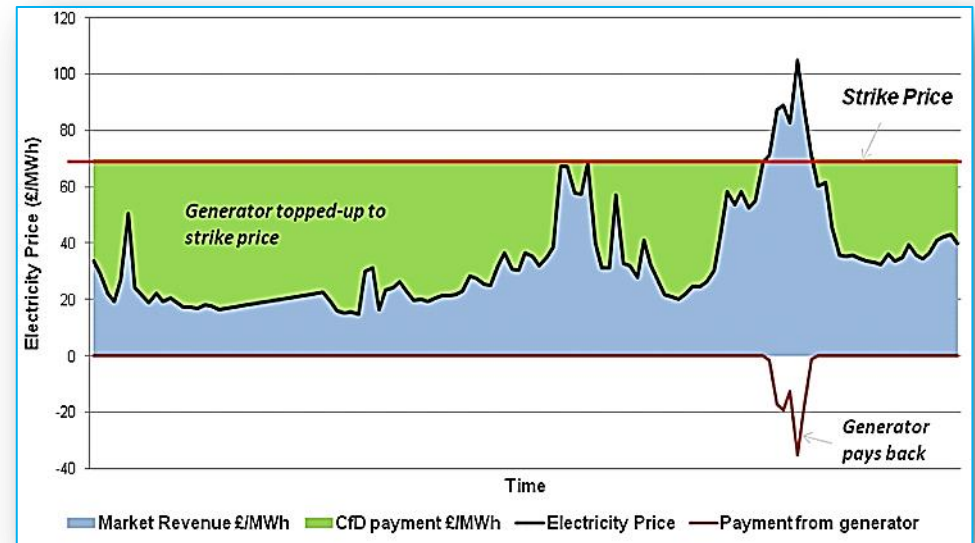
Electricity Market Reform (EMR)

- Energy Act 2013
- Low carbon Contracts for Difference (CfDs)
- Delivery Plan – up to **13GW** CCS by 2030, plus nuclear and renewables
- Energy Act also includes: Emissions Performance Standard – 450g CO₂/kWh limit on emissions



The Contract for Difference - CfD (1)

- Provides long-term revenue stability for all forms of low carbon electricity
- Generators sell their electricity at a fixed price - the 'strike price'
- A single government owned counterparty body (the Low Carbon Contracts Company) will administer the CfD



- When market price < 'strike price'
 - The generator receives a top-up
- When market price > 'strike price'
 - The generator pays back the difference



The Contract for Difference (2)

1

Removal of wholesale electricity price exposure

3

Robust single counterparty

2

Guaranteed private law contractual arrangement

4

Early certainty and security of support levels

For developers

- *Regular cycle of budget release to give a clear line of sight to developers*

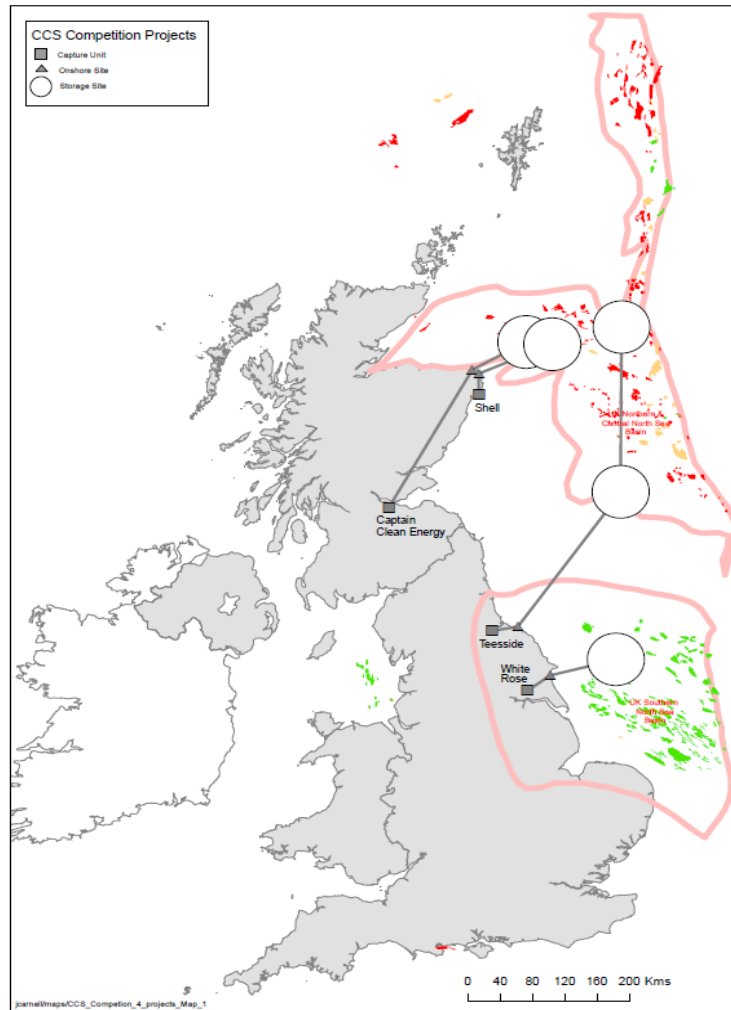
For consumers

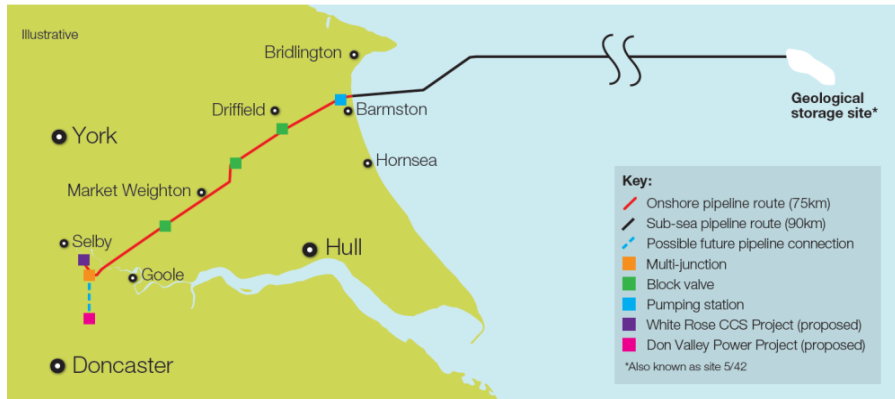
- *Competitive auctioning becomes a regular part of the landscape*
- *Driving value for money and cost reductions*
- *Reduces exposure to risk*



Commercialisation Programme

- £1bn capital funding
- Operational support through the Contract for Difference
- Government / industry risk-sharing of CCS-specific risks





White Rose

- Ultra-supercritical 448MWe (gross) Oxy-Power coal plant at Drax Site, Yorkshire
- Enough low carbon electricity to power the equivalent of 630,000 homes
- 100% of flue-gas treated with 90% CO₂ capture rate. Estimated 2 million tonnes CO₂/year captured
- Potential biomass co-firing leading to zero (or negative) CO₂ emissions
- Anchor project for National Grid's regional CO₂ transport & offshore storage network
- CO₂ storage in a deep saline formation off-shore beneath the North Sea



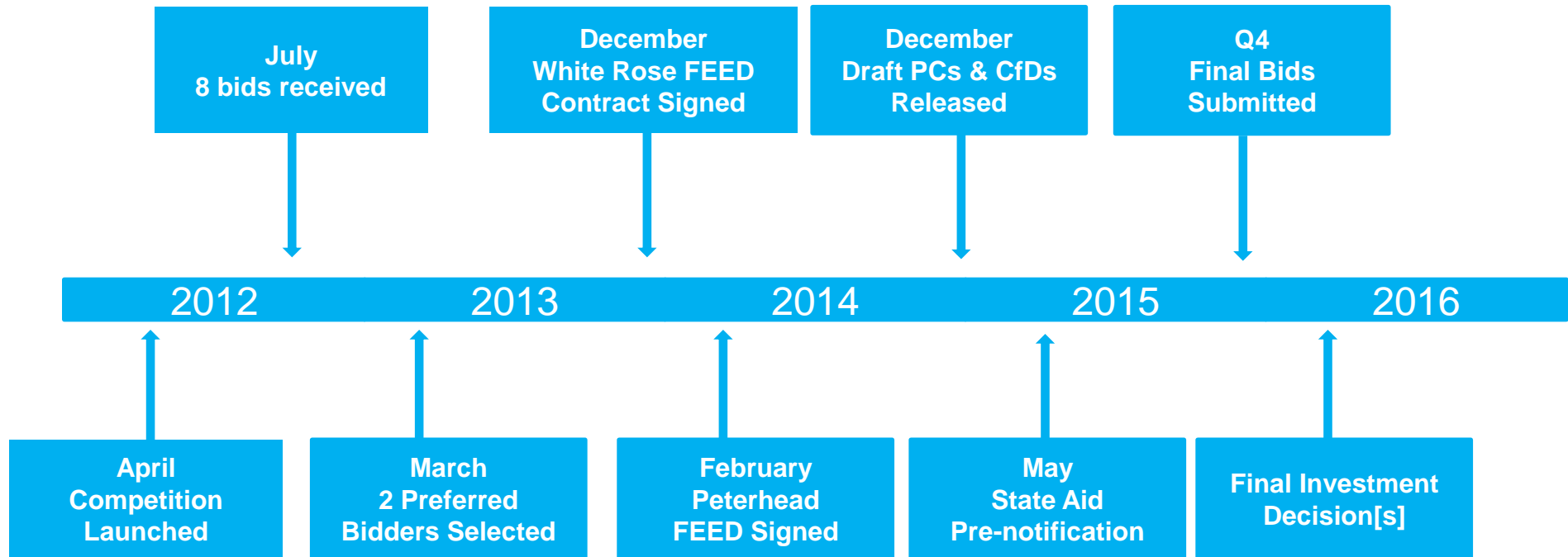
Peterhead

- World's first full scale gas CCS project
- A 340MW post-combustion capture retrofitted to part of an existing CCGT power station at Peterhead, Scotland
- Enough low carbon electricity to power the equivalent of 500,000 homes
- 85% CO₂ capture rate. Estimated 1 million tonnes CO₂/year captured
- Reuse of North Sea infrastructure - linking into the existing offshore pipeline from St Fergus to the store
- Storage in the depleted Goldeneye reservoir (a producing gas field from 2004 to 2011)





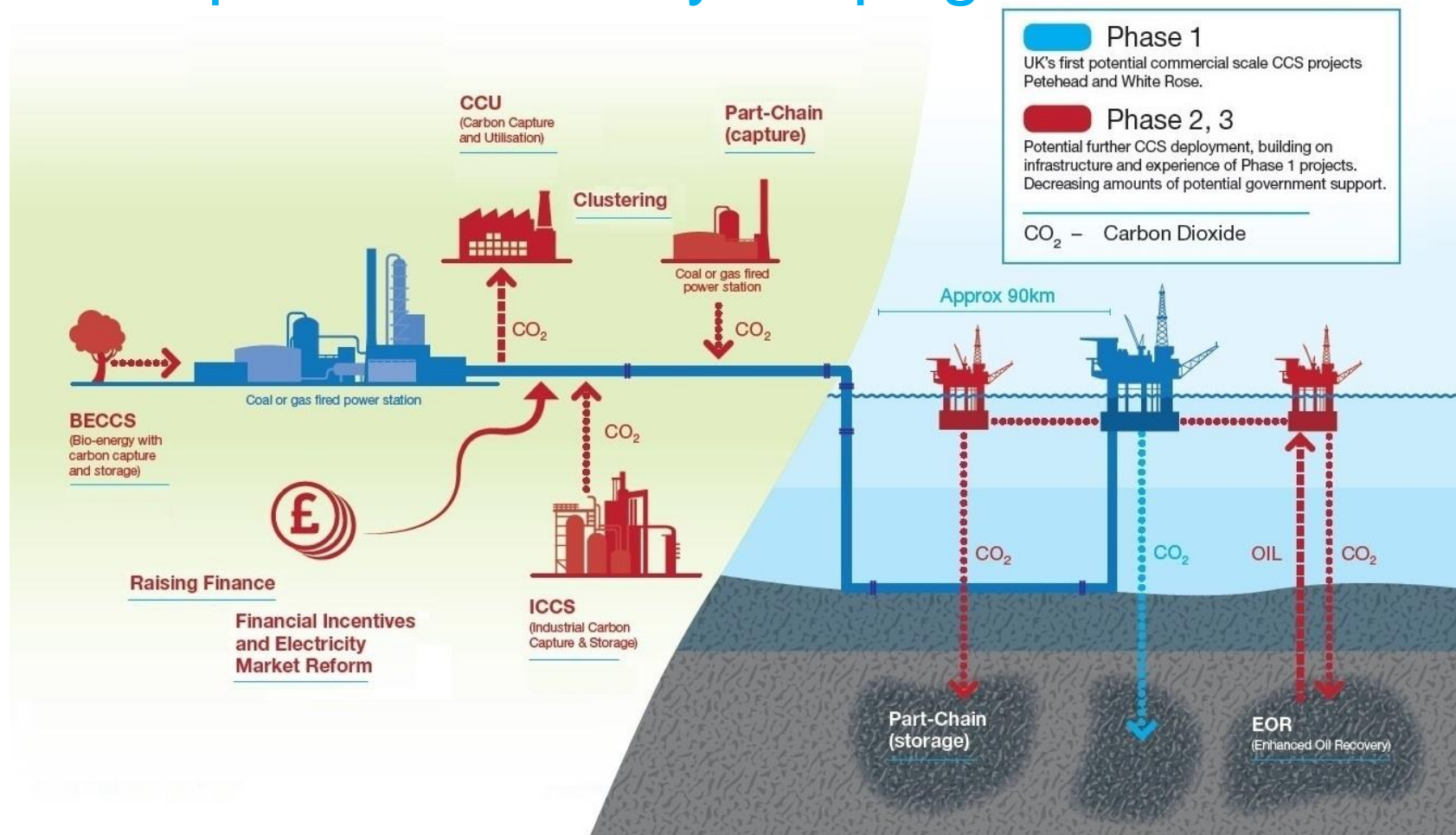
Road to Final Investment Decision



“As a result of the interventions, private sector electricity companies can take investment decisions to build CCS equipped fossil-fuel power stations, in the early 2020s, without Government capital subsidy, at an agreed CfD strike price that is competitive with the strike prices for other low carbon generation technologies.” CCS Roadmap, April 12



Next steps in CCS: Policy Scoping Document





Phase 2

- Projects coming forward with little or no capital funding from Government
- Support through CfDs
- Working to strengthen the business case
 - Learning from global projects
 - EOR
 - R&D
 - Shared infrastructure
- £.4.2m for Industrial Research & Feasibility study for Caledonia Clean Energy Project.



Phase 3

- CCS projects competing on cost with other low carbon technologies
- Enabled by EMR
- Benefitting from (for example):
 - Learnings from previous projects and increased confidence
 - Established supply chain
 - Significant cost reductions
 - Outputs of earlier R&D investments





Comprehensive Approach

- Fundamental research and understanding
- Component development and applied research
- Pilot scale

DRAFT

UK CCS R&D Programme £125m, 2011 - 2015



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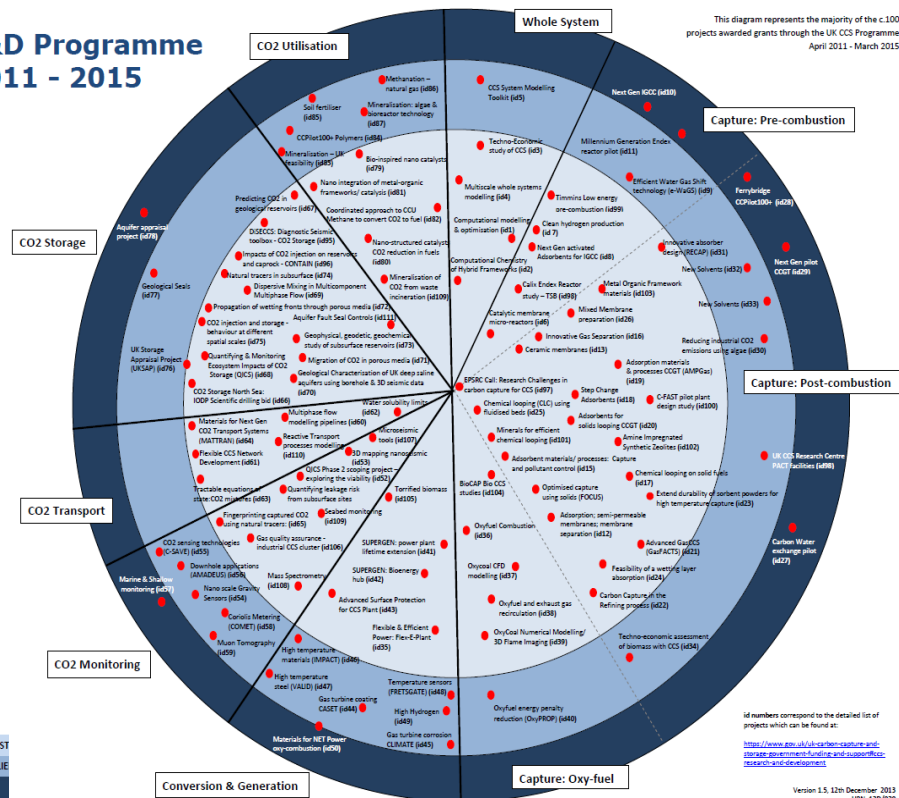


Technology Strategy Board
Driving Innovation



LCICG
Low Carbon Innovation
Co-ordination Group

FUNDAMENTAL RESEARCH & UNDERSTANDING
COMPONENT DEVELOPMENT & APPLICATION
PILOT SCALE





Beyond power

- Expect CCS to be key for decarbonising many industrial emitters
- Particularly looking at iron, steel, oil refining, cement and chemicals industries
- Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050
<https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050>
- Funding pre-FEED industrial CCS study in the Tees Valley <http://www.teessidecollective.co.uk/>



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Thank you

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