

APGTF Workshop on Carbon Capture and Storage

14th March 2011

CCS: UK Policy and Strategy

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- UK has legally binding CO₂ reduction targets under the Climate Change Act 2008

80% by 2050

- Through the Copenhagen Accord, the EU agreed global temperatures should not increase above

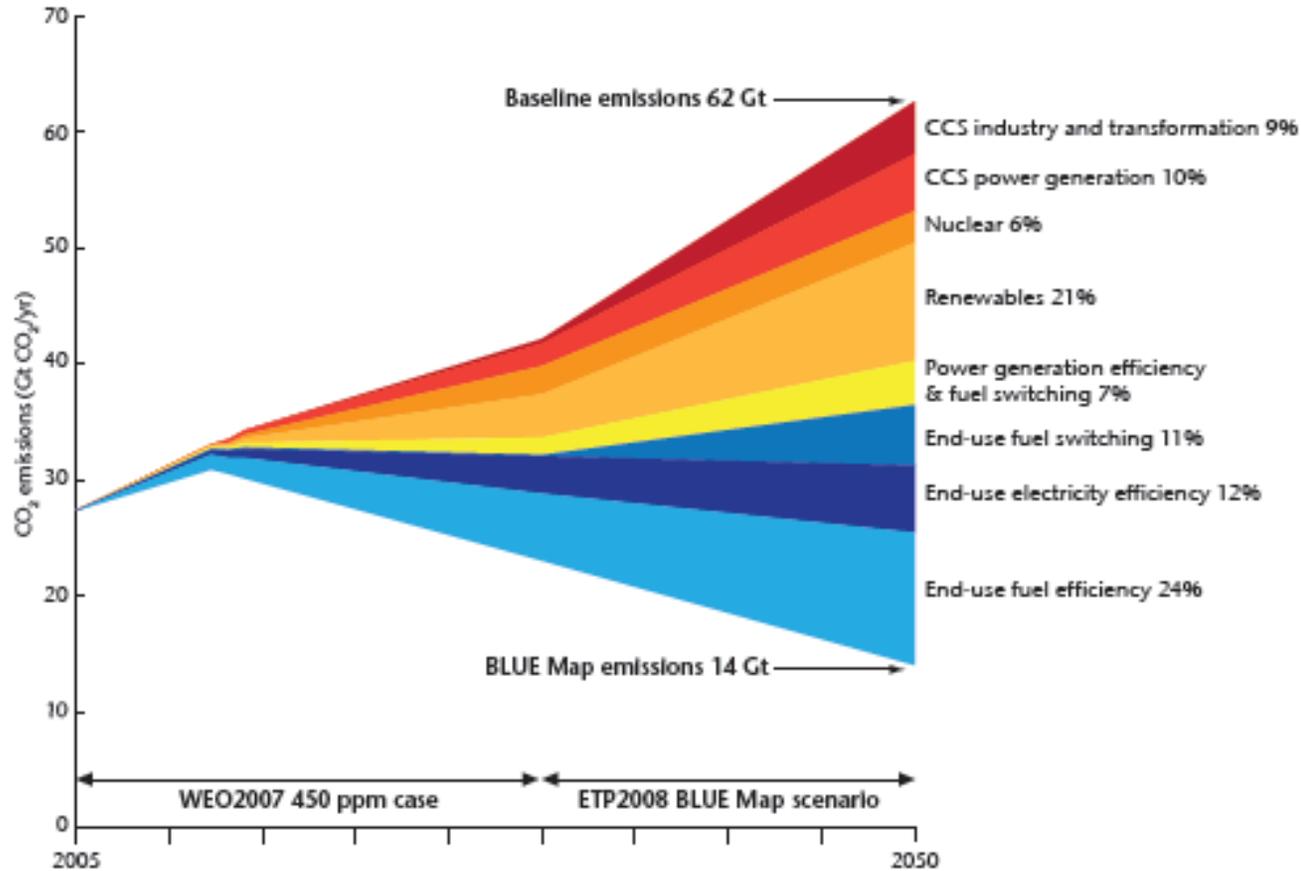
2°C

- According to estimates made by the IEA, tackling climate change will cost more in the future without CCS by

70%

Why CCS is important...

Tackling Global Climate Change

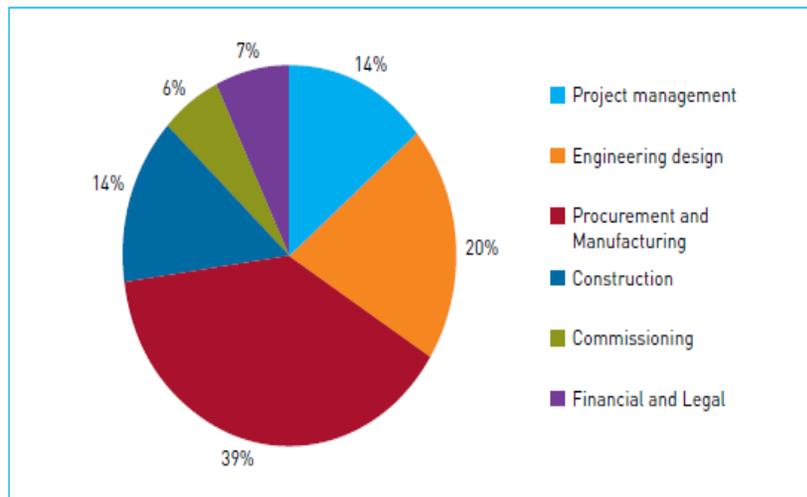


Source: IEA, *Energy Technology Perspectives* (2008a).

KEY POINT: Without CCS, overall costs to halve CO₂ emissions levels by 2050 increase by 70%.

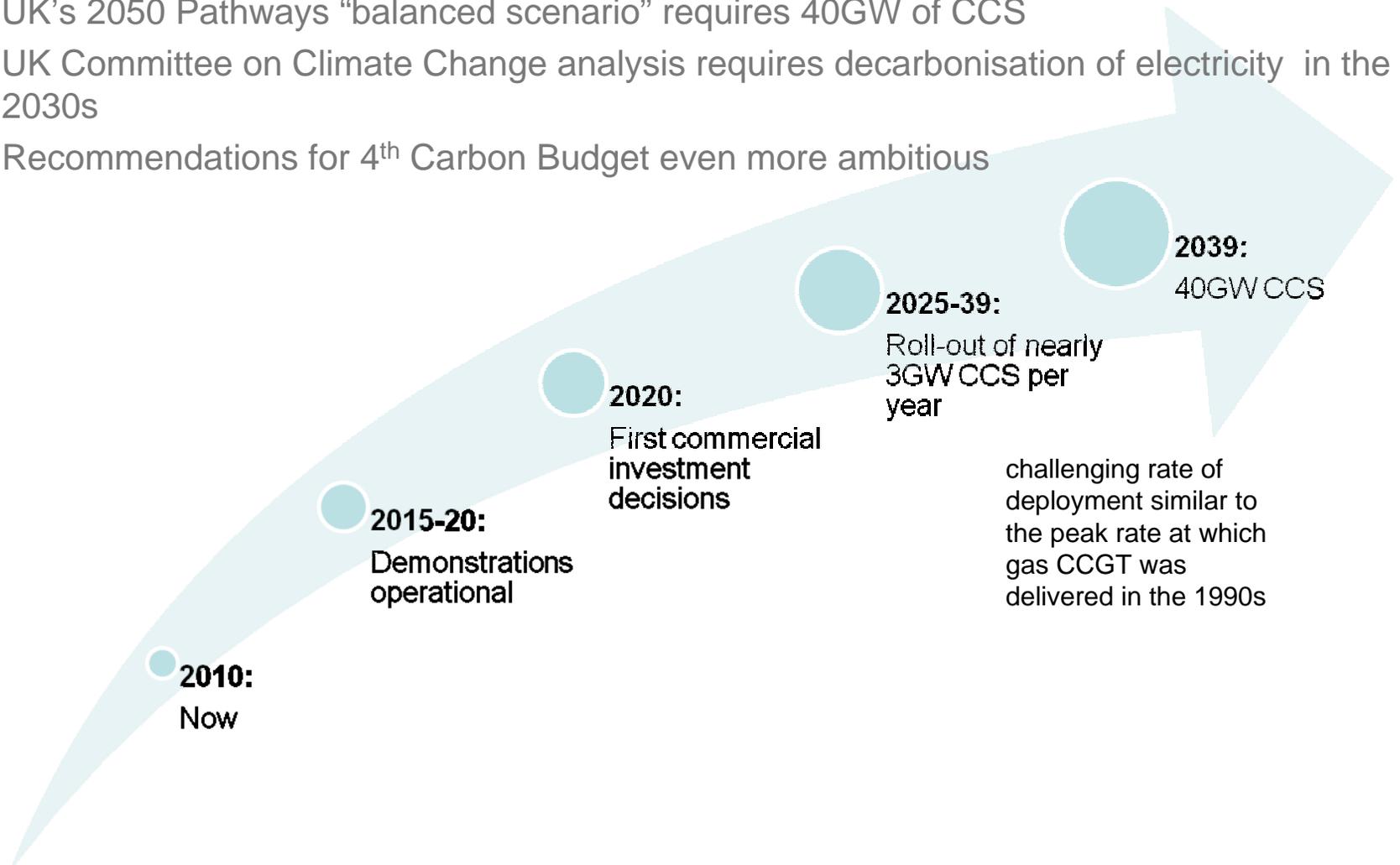
The prize from CCS is potentially enormous...

- CCS could provide up to **20%** of the CO2 reductions the UK needs to make by 2050
- The International Energy Agency predict that globally we will need 3,500 major CCS plants by 2050
- The CCS sector could provide export opportunities worth up to £6.5 billion a year by 2030
- CCS also has the potential to sustain 70,000 – 100,000 high value jobs in UK

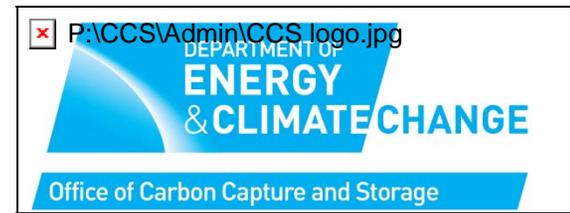


Demonstration to deployment: Example timeline

- UK's 2050 Pathways “balanced scenario” requires 40GW of CCS
- UK Committee on Climate Change analysis requires decarbonisation of electricity in the 2030s
- Recommendations for 4th Carbon Budget even more ambitious

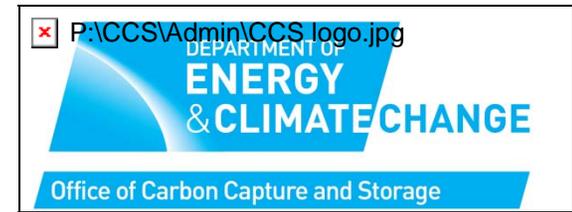


The UK Government's Commitment to CCS



- No new coal fired power stations without CCS
- Two Front End Engineering (FEED) Studies, undertaken to inform the 1st CCS demonstrator
- Committed **up to £1 billion** for the **first CCS** demonstrator
- Committed to continuing public sector investment in **three further CCS** demonstration projects
- Opened up the selection process for demonstrations 2-4 to include gas
- Wider regulatory reforms introduced to underpin deployment of CCS: Electricity Market Reforms, Carbon Price Floor, Emissions Performance Standard, Infrastructure Consultation
- Developing Roadmap

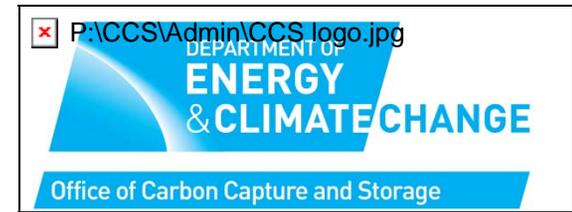
Challenges to overcome...



- **Regulatory**
 - Regulatory environment for key elements of the CCS chain not yet finalised (particularly relating to the consent for storage facilities and the treatment of liabilities associated with the storage of carbon dioxide)
- **Technical**
 - Challenges in, for example, scaling up of capture technologies, identification, characterisation and operation of storage, integration of the full chain
- **Commercial**
 - Need to develop frameworks that successfully integrate all elements of the chain into a commercially viable entity
- **Reform of the electricity market**
 - Emissions Performance Standard, carbon floor price, capacity guarantees
- **Access to finance**
 - Current economic circumstances, uncertainty over the future shape of the energy markets, challenges and risks associated with 'first of a kind' – all make for a difficult environment within which to secure finance
- **Public acceptance**

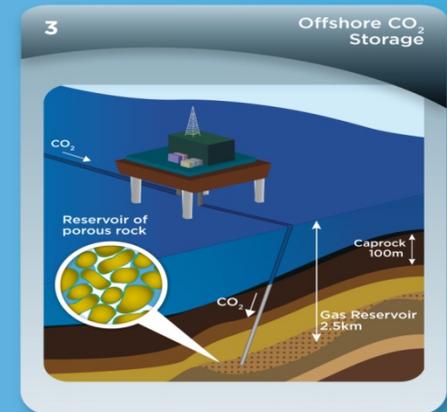
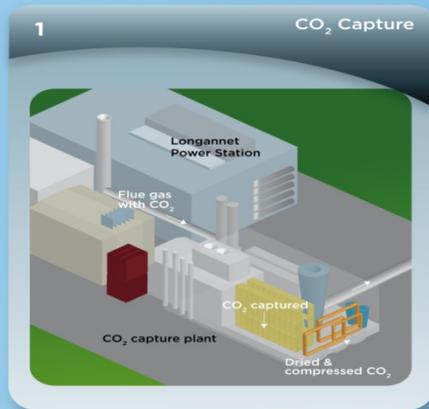
➡ ***OCCS role is to address these challenges to make CCS a reality in the UK***

Learning by doingDemo 1



- FEED studies continue - expected to complete very shortly - currently considering how best we disseminate this knowledge
- Objective to move to contract signature in second half of 2011, subject to agreeing terms which are acceptable to the Government and the Bidder
- Aim is for project to complete construction 2014-15
- 1st demonstration will bring invaluable technical, regulatory and commercial knowledge with an explicit commitment to knowledge transfer, and provide learning s for Demos 2-4,
- First stage of a process to enable wide deployment in 2020s

Commercial scale demonstration: Demonstration 1



Lessons from the first demonstration competition process...

- Competitive process requires a combination of skills, public and private sector, and significant resource;
- The CCS chain has no established business model for working together and therefore it takes time and effort for participants;
- The greater dialogue before you select the project the clearer the risk allocation will be – and clearer risk allocation makes for success in delivering the project at a cost as well understood as can be;
- Bidders need as much regulatory certainty – e.g. on storage permits – as possible, but the regulatory framework often needs to be developed in parallel.
- Need to understand what ALL parties want from the project (Government, power station, pipeline, reservoir operators.)

Learning by doing.....

Demonstrations 2 - 4

- Building on learning from Demo 1
- Market sounding process signalled a good appetite of further demonstrators and several well developed proposals
- Announced that Programme will be open to CCS projects on gas-fired power stations
- EU New Entrants Reserve process has demonstrated UK interest in CCS – 9 CCS applications out of a total of 22 across Europe.
- Set out further information on proposals last December to give early indication of likely requirements and selection process.
- Decisions on funding arrangements for demonstrations 2-4 are being considered in the context of the Budget

- Strong centres of academic research e.g. Edinburgh, Imperial College, Leeds, Sheffield, Nottingham and Cranfield Universities;
- Government funded pilot scale projects include:
 - Doosan Babcock oxyfuel combustion (coal) demonstration
 - suitable for new power plants and for retrofit applications
- **Ferrybridge: UK's largest pilot plant demonstrating post combustion capture**
 - Capacity to capture 100 t/d. Equivalent to 5Mwe
 - Completion of capture unit expected for summer 2011
 - Test operations to start in Sept-Oct 2011
 - Provide data and experience to improve the designs of the commercial-scale demonstration projects.



Doosan Babcock OxyCoal Clean Combustion Test Facility. Image courtesy of Doosan Babcock

Not just demonstration: regulatory framework

- One of the most advanced regulatory frameworks in the world
- Legislation in place to:
 - Permit **offshore** storage and created enforcement regime (Gas Importation and Storage Zone)
 - Vest property in the Crown.
 - Extend offshore decommissioning requirements
 - Power for government to assume liabilities (accepted that Government will assume long-term responsibility for stored carbon dioxide).
- Implemented the storage requirements of the EU Directive on Geological Storage, including for termination arrangements
- Finalising regulations for 3rd Party Access to storage sites and pipelines

Not just demonstration: policy framework

- Electricity Market Reform
 - Working to ensure that arrangements promote CCS as part of the low carbon energy mix
- Infrastructure
 - Consulted on the approach to developing transport and storage infrastructure
- Skills & supply chain
 - Demonstrations will help develop skills and supply chain
 - BUT major challenge to deliver 4 projects in the space of 3-4 years
 - Will need to work with industry and academia to develop plan of action

- Working with HM Treasury to inform decisions on the funding mechanism for Projects 2-4 ahead of formal launch
- Expect to agree contract for Project 1 during 2011
- Develop CCS Roadmap
- Develop details of EMR for CCS
- Respond to consultation on CCS infrastructure



Tough, but feasible.

The UK is committed to successful, early deployment of CCS