Carbon capture and storage: A consultation on barriers to commercial deployment - Summary of consultation responses

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A SUMMARY OF CONSULTATION RESPONSES

INTRODUCTION

This document sets out a summary of responses to *Carbon capture and storage: A consultation on barriers to commercial deployment*.[1] The views expressed are those of respondents to the consultation and not those of HM Treasury or the Government.

The consultation document was published on 22 March 2006. There were 44 responses. The names of respondents are given in the annex.

This summary is structured according to the headings in the consultation document, i.e.:

- Potential carbon reductions
- Technology
- Engineering and manufacturing capability
- Regulation, liability and public acceptance
- Cost
- Economic incentives

An explanation of carbon capture and storage (CCS) is provided in the original consultation document.

[1] *Carbon capture and storage: A consultation on barriers to commercial deployment*, HM Treasury, March 2006.

KEY POINTS FROM CONSULTATION RESPONSES

Potential carbon reductions

- CCS has the potential to reduce the UK's carbon dioxide (CO_2) emissions.
- CCS perpetuates a focus on fossil fuels as opposed to renewable energy options.
- There will be a need to replace a significant proportion of the UK's power generation infrastructure within the next decade.
- Many fields on the UK Continental Shelf (UKCS) are about to enter their decommissioning phase. In the UK, the deployment of CCS is likely to involve storage of CO_2 in fields on the UKCS. The choice of locations potentially available for CO_2 storage will become more limited as fields are decommissioned.
- Coal has a high carbon content and the burning of coal emits a high level of CO_2. CCS would allow the use of coal for energy generation with dramatically reduced emissions thereby, in a carbon-constrained world, allowing coal to continue to be used within the energy generation mix and reducing reliance on imported gas. This would lead to greater security of energy supply. An increase in the use of coal for energy generation would also promote the domestic coal mining industry.
- The construction of "capture ready" plant – that is plant designed and constructed to make later retrofitting of CO_2 capture equipment more straightforward and less expensive – might be a sensible precursor to a full introduction of CCS.
- It is difficult to define sensibly the term capture ready, indeed, it could be said to be a meaningless term. There is the possibility that a plant might be disingenuously described as capture ready on the basis of some very minor adaptations.
- Carbon capture might be coupled to the production of hydrogen and, thus, support a move to a "hydrogen economy" (e.g. where hydrogen is used to power transport).

Technology

- None of the capture, transport or storage technologies on which CCS is based are "novel".
- The technologies have not been brought together in a commercial-scale CCS project linked to energy generation. It will be a considerable challenge to develop CCS linked to energy generation on a commercial scale.
- There are different technological options for the capture, transport and storage of CO_2. At the present time it is not possible to select which technologies are best, indeed, identifying the optimal technologies may depend on the specific circumstances of a particular CCS project.

- Retrofitting would not be practical. Existing power plants (particularly coal plants) are relatively inefficient and the fitting of capture technology would lower efficiency still further. The only way to retrofit and sensibly manage the energy penalty issue would be to completely refurbish/ rebuild the existing power plant.
- Retrofitting is practical where certain technologies are concerned.

Engineering and manufacturing capability

- The early adoption of CCS by the UK might help to encourage other countries, such as China and India, to adopt CCS on a wide scale. CCS might have an important role to play in mitigating the growing emissions from these countries.
- Early adoption might bring advantages for the UK. In particular, the UK might become a leader in relevant skills and technology which would, in turn, mean significant export potential.
- The UK does not lack people with the appropriate skills to take forward CCS (there is no "skills gap"). Indeed, the UK has advantages over other countries in terms of skills levels.
- The UK does currently suffer from skills gaps. The lack of appropriately skilled people will be a barrier to the deployment of CCS.
- A skills gaps will emerge in the next decade. It is important to fund training for the next generation of CCS experts. The construction of facilities for the 2012 Olympics will draw on a similar skills pool to that needed for CCS projects.

Regulation, liability and public acceptance

- There is a detailed regulatory framework in place covering matters such as waste, dumping of matter at sea and land use planning. This framework was not created with CCS in mind and, as such, it represents a barrier to the deployment of CCS.
- The Government should work with relevant organisations (other governments, regulatory bodies) to put in place a regulatory regime which both enables CCS and controls the risks.
- Provided that appropriate measures are taken, there is no significant risk of leakage of CO_2 from geological storage.
- In the event that CO_2 did leak, it might result in the deaths of both people and wildlife. Leaked CO_2 would enter the atmosphere thus negating the benefits of CCS.
- Geological factors suggest that it would not be appropriate to store CO_2 in unmineable coal seams in the UK.
- CO_2 must not be directly injected into the sea.
- Fisheries bodies may have an interest.

- CO_2 stored in geological formations represents a long-term liability. This liability must, in time, pass to the Government. Bearing in mind the geological timescales involved, it would not be appropriate to require private companies to bear the long-term liability. Private companies have a relatively short lifespan.
- Oil companies have experience of managing liabilities for material in transit (e.g. the piping of oil). The transport of CO_2 would represent a similar situation. It is not expected that the Government should take on liabilities associated with the transport of CO_2.
- In the transport phase of CCS, CO_2 might pass through the control of various different companies. It would be useful if the Government could regulate this situation.
- It is important to ensure stakeholder engagement and gain public acceptance.
- The Government should take a role in facilitating stakeholder engagement.

Cost

- As CCS is a new concept, the costs must, at the current time, be uncertain.
- Estimates of cost must be approximate and generalised because there is limited evidence from actual experience of large-scale CCS on which to base them.
- The Inter-governmental Panel on Climate Change (IPCC) has produced some useful cost figures.
- The costs of CCS may fall over time as the technologies are established and less innovation is needed to construct a project.
- CO_2 could be used for enhanced oil recovery (EOR) – that is it could be pumped into near-depleted oil fields to facilitate additional recovery of oil which would otherwise remain in the ground. The additional oil would produce a revenue stream. This would make CCS look more attractive in commercial terms.
- There are additional costs associated with EOR over and above the costs of CO_2 storage. The revenue from additionally recovered oil would not justify these additional costs. EOR will not render CCS projects commercially viable.
- EOR is not an option for fields in the southern North Sea - these are gas fields.
- The cost of construction of pipelines for CO_2 transport would be significant.
- Pipelines to the northern North Sea would cost significantly more than pipelines to the southern North Sea by virtue of the fact that the distance from shore is greater.

- It would be sensible to construct a pipeline network for CO_2 transport as opposed to individual pipelines for specific CCS projects. A network would maximise the use of expensive infrastructure and avoid the construction of several costly pipelines to similar areas.
- The Government should facilitate the construction of a CO_2 pipeline network.
- The transport of CO_2 from capture to storage would involve it passing through the control of several commercial interests. The Government may have a role in helping companies to manage the commercial complexities involved.
- The transport of CO_2 would be a new activity and might warrant the creation of new commercial entities.

Economic incentives

- The aim should be to incorporate CCS into the European Union Emissions Trading Scheme (EU ETS) with emissions permits allocated in respect of CO_2 storage operations. As CCS would produce minimal CO_2 emissions, operators would be able to sell the permits in the market. For this arrangement to incentivise CCS the carbon price would have to be at a sufficiently high level.
- Were CCS to be included in EU ETS, provision would have to be made to clawback the value of permits allocated in respect of CO_2 storage sites from which there was leakage.
- No support should be given to CCS beyond that provided by the carbon price under EU ETS.
- In the immediate term, Government support should be given for commercial-scale demonstrations of CCS (which might be termed “first of a kind” projects or “pathfinder” projects).
- The amount of Government support would need to be substantial – perhaps hundreds of millions of pounds per project.
- Government support might take the form of capital grants, an arrangement similar to the Renewables Obligation, an arrangement along the lines of the Non-Fossil Fuels Obligation, Enhanced Capital Allowances, or support for the EU ETS carbon price (perhaps by means of a “contract for difference” between the actual carbon price and the desired price).
- Any disincentives within the current tax system to low-carbon generation (including CCS) should be addressed.
- Government should clarify the position of CCS within the North Sea taxation regime.

A Annex: List of Respondents

Advanced Power Generation Technology Forum
ALSTOM Power Ltd
AMEC
Association of Electricity Producers
BP
British Energy
Carbon Capture and Storage Association
Centrica Plc
CMS Cameron McKenna LLP
CoalPro
Conoco Phillips
Corus
Denton Wilde Sapte
Drax Power Ltd
Dr P Freund
E.ON UK plc
EDF Energy
Environment Agency
Green Alliance
Greenpeace
Health and Safety Executive
Marathon Oil UK Ltd
Mitsui Babcock
Progressive Energy Limited
Prospect
RSPB
RWE nPower
Scottish and Southern Energy Plc
Scottish Enterprise
Scottish Environment Protection Agency
Scottish Power
Shell International Ltd
Southampton Solent University
Sussex Energy Group
Technology Initiatives Ltd
The Coal Authority
The Energy Institute
UK Carbon Capture and Storage Consortium
UK Energy Research Centre
UK Offshore Operators Association
UK Oil Industry Taxation Committee
Welsh Assembly Government
World Coal Institute
WWF – UK

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