

Carbon Capture and Storage

HM Treasury consultation on barriers to commercial deployment

Response by Centrica plc

May 2006

Introduction

Centrica welcomes the opportunity to respond to the Treasury's consultation on barriers to commercial deployment of carbon capture and storage. We consider that the report prepared by the House of Commons Select Committee on Carbon Capture and Storage is an excellent summary of the CCS technologies available and the barriers preventing the development of major carbon abatement programmes. We would make the following comments on the Treasury's consultation.

Paragraph No.	Comments/Views
1.32 (a)	<p>The potential scale of carbon saving from a CCS project is vast. The largest power stations typically emit around 6MTC per year and a CCS project could realise a saving of around 85% of the carbon output. This results in a potential project saving of some 5MTC per year for one project.</p> <p>We would suggest that the House of Commons Select Committee has provided the best information on the technology types and the relative performance of each technology.</p> <p>Comparison with other options for carbon abatement:</p> <p>1. Energy Efficiency</p> <p>Through our retail business, British Gas, Centrica is a leader in the provision of energy efficiency measures for domestic customers. This provides a very cost effective method of reducing carbon, but requires the engagement of a huge number of stakeholders through a range of supply chains in addition to the enthusiasm of millions of consumers.</p> <p>However, carbon savings resulting from energy efficiency measures are dependent on the behaviour of the consumer. Potential savings resulting from insulation, for example, could</p>

be eroded by the consumer increasing the temperature in the home.

2. Nuclear

Nuclear power certainly addresses the issue of low carbon generation. Under the present framework, however, it is likely that few companies would be willing to invest in replacing the existing or in building additional nuclear capacity and it will be important to address planning, licensing and waste issues.

If the Government chooses to support new nuclear build, then this should not be through further subsidies as nuclear will gain the economic benefit of its low carbon intensity through the long term carbon market. We do not support a nuclear obligation as this would mean there is no longer a level playing field for other generation technologies such as carbon capture and storage, Combined Cycle Gas Turbine (CCGT), and microgeneration, as well as investment in energy saving.

3. Renewables

Centrica are a major supporter of HM Government's Renewables Obligation (RO) and are consequently a significant investor in new Renewable Generation projects (e.g. on-shore and off-shore wind farms). This is demonstrated by our 100% compliance in meeting our renewables obligation in each of the first three compliance periods of the RO. The RO is an example of a policy mechanism whereby fiscal and regulatory support has been provided by the Government and has successfully incentivised investment in zero/low carbon power generation technology. Centrica prefers a market based energy policy framework, which shows no preference for any particular technology.

- 1.32 (b) The opportunity to reduce carbon emissions with CCS from fossil fuel power stations is very favourable and significant in comparison to the recent growth and development of wind powered generation, which we also fully support. The considerably higher load factor, operational flexibility and (in the case of coal-fired plant) fuel diversity for the UK fuel mix, provided by a fossil fuelled generator, provides further support for CCS in the form of an additional contribution to the UK's security of supply.
- 1.34 (a) We agree with the reports' summary of the three elements of the CCS process, namely: capture; transportation and storage. Being primarily an energy supplier, rather than a technology researcher or developer, the options that we are aware of for deployment of CCS are:
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Capture – pre-combustion as is available from a potential new fleet of clean coal generators from IGCC and the production of synthetic natural gas from coal, and post-combustion which can be deployed as retro-fit solution to existing fossil fuelled generators.

Transportation – from an economic viability point of view we have only been made aware of the pipeline method of transporting captured carbon dioxide within CCS proposals especially in the context of large volumes from commercial scale fossil fuelled plant.

Storage – we are aware of the methods discussed within the report, i.e depleted oil (& gas) fields (and we have direct experience in gas injection into such fields, via Rough), saline aquifers and unmineable coal mines. We are also very aware of the potential for Enhanced Oil Recovery (EOR) using captured CO₂.

1.34 (b) As mentioned above, in terms of capture, Integrated Gasification Combined Cycle (IGCC) provides an excellent opportunity for capturing CO₂ prior to combustion within the generating turbine. Coal is synthesised into natural gas with CO₂ being a by-product of this process. This CO₂ can then be easily captured for pipeline transportation to suitable storage locations/projects. This is an excellent opportunity for the future of fossil fuelled power generating fleet in the UK at a time when several nuclear and coal-fired stations are expected to close due to age and environmental reasons respectively.

To this end, several of the UK energy suppliers have announced plans to invest in clean coal technology as part of their new-build intentions. From a retrofitting perspective, CO₂ can be captured from a post-combustion process which can be applied to existing coal and gas-fired stations – albeit at an overall greater expense than pre-combustion technology (although for some “opted-out” coal plant, retrofitting carbon capture processes may be a cheaper option).

1.34 (c) It is believed that IGCC technology is now readily available and that several turbine manufacturers are promoting the technology in response to new-build proposals. However, the cost of IGCC installations is still considerably higher than the equivalent CCGT, so some form of incentive scheme (as for any new or emerging form of technology) should be considered to support wider deployment. The current duration of CO₂ trading via the EU ETS in Phase II is unlikely to be sufficient to support major long-term investment.

In terms of transportation, we understand that the market

readiness has been established. As regards to storage, we understand that several demonstration projects are under-way across the globe and we await the results of such projects to prove the “readiness” of the concept from a safety, reliability and longevity perspective.

- 1.34 (d) Cost is obviously a major consideration when it comes to selecting from the options at each stage forming a full CCS process. For example, the capital cost of an IGCC station is in the range of £1200-£1600/kW compared to £400-£600/kW for a CCGT. In addition, it is anticipated that the integration into a full CCS project would incur an additional cost of circa. £1000-£1500/kW.

Some other considerations include:

- what and how will the project benefit from the (near) zero emissions of such a project with regards to the EU ETS?
- Current clarity surrounding the trading of CO₂ is limited to 2012 (EU ETS Phase II) – this is unlikely to be sufficient to support investment in CCS projects
- What is “best practice” in terms of CO₂ storage – saline aquifers, un-mineable coal mines or EOR?
- Who will be liable for the CO₂ storage and for how long after completion?

- 1.35 (a) An indication of costs of a CCS project using IGCC technology is given above.

The benefits of early adoption of this technology are difficult to measure whilst there is so much uncertainty surrounding the fiscal and regulatory support for such projects. The UK needs to provide as much certainty regarding such issues as carbon credit benefits and any fiscal support mechanisms as soon as reasonably practicable through the Energy Policy Review process, particularly longer term signals beyond 2012.

Benefits of early adoption could include:

- Significant carbon savings
- Development of exportable expertise in the UK
- Ability to demonstrate leadership in China and India which could lead to improved trade links
- Security of supply – maintain coal as part of the UK fuel mix
- Balance of Payments – Increased use of indigenous resources
- Re-development of UK coal mining industry
- Improved status of UK on the global climate change agenda

- 1.35 (b) We are not currently aware of the existence of any skills gap in any of the three elements of the CCS process for deployment in the UK. Indeed, the UK has significant skills, experience and
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expertise in the field of gas storage in depleted gas fields (e.g. Rough Field) for deployment in CCS projects. With over 40 years' experience of offshore oil & gas exploration, development and production in the UKCS, the opportunities for CO₂ storage in UK waters is considerable and should be exploited to the maximum.

There could, though, be a potential skills gap as the demand for coal in the UK could increase significantly. There is a question to be answered about whether the country has the skills to supply the indigenous industry, or if Government is content that these skills can and should be imported.

- 1.41 (a) In light of the expectation that LCPD opted-out coal plant and several of the older nuclear power plants will be closing over the next decade, whilst electricity demand continues to rise, combining to tighten plant margin in the UK, there is now a significant opportunity for the UK Government to address the barriers identified above to enable private companies and/or energy suppliers/utilities to invest in long-term projects resulting in near zero emissions.

Clear regulatory and fiscal incentives are now required to enable UK based companies to make crucial decisions and contribute to the low carbon economy envisaged within the Energy policy review consultation document. Carbon Capture and Storage (CCS) should be eligible to take advantage of any steps being taken to establish long term carbon contracts to help new and emerging technologies.

CCS could be a major solution to the UK Governments' ambitions for a low carbon economy by 2020.

- 1.41 (b) We have no specific comments to make on this issue at present.

EU ETS offers potential to support the development of CCS but the level of support would be insufficient to encourage development and there is insufficient visibility on longer term support (Phase II only extends to 2012)

- 1.41 (c) Long-term liabilities are normally partnered by high insurance costs.

Commercial organisations cannot be expected to hold the long term liability for the carbon stored for hundreds of thousands of years. It is reasonable to expect that organisations pursuing CCS should bear the liability for carbon during capture, transportation and storage up to the point where the injection well is sealed and possibly for a 'proving' period of (say) 5

years post completion. Beyond this point the regulatory framework must include the transfer of any liability to Government

- 1.41 (d) We have no specific comments to make on this issue at present.
- 1.41 (e) We have no specific comments to make on this issue at present. We believe that the House of Commons Select Committee has provided an excellent summary of the likely public reaction to CCS.
- 1.48 (a) As previously explained, indicative costs of IGCC (to enable CCS) are in the region of £1200-£1600/kW with an additional £1000/kW for the capture, transportation and storage processes. We have no knowledge of the costs of post-combustion sequestration for retrofitting the existing fleet of coal and/or gas stations.
- 1.48 (b) We have no specific comments to make on this issue at present. We have no experience of deploying new generating technology and observing the change in costs over time, but would add that we would expect reductions in costs as technology is proven and utilised on a larger scale.
- 1.48 (c) Current forecasts of future commodity (gas and coal) prices indicate a fall for UK energy costs. However, this bearish sentiment is still not sufficient to support any large scale deployment of clean coal technology such as IGCC due to the considerable capital costs compared with those of established CCGT new-build costs.
- 1.48 (d) We have no specific comments to make on this issue at present. We have yet to approach potential EOR partners (oil/gas field operators) to discuss and understand the economics of EOR.
- 1.48 (e) We have no specific comments to make on this issue at present.
- 1.48 (f) We have no specific comments to make on this issue at present.
- 1.48 (g) We have no specific comments to make on this issue at present. We have yet to progress a project with the intention of building a plant which would be “capture ready”, and so have no knowledge of any additional costs in doing so.
- 1.48 (h) As mentioned above, the current cost comparison of an IGCC compared with a CCGT of equal capacity (regardless of CCS deployment) is prohibitive despite a positive outlook for the cost
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of energy commodities. With current high capital costs, such an investment would not be a profitable option. As stated above, both fiscal and regulatory incentives are required to assist in the deployment of such projects.

Consequently, CCS should be eligible to take advantage of any steps being taken to establish long term carbon contracts to help any new and emerging technologies.

- 1.54 (a) We accept and acknowledge the Principled Approach outlined in the 2005 Pre-Budget Report, particularly the principle stating that an “Action on the environment must be part of a long-term strategy”. This is particularly important with regards to any fiscal and/or environmental support given by the Government to any party wishing to invest in any new-build power plant that may involve: new, cleaner technology for fossil fuel with “capture ready” status and/or a new build power plant with CCS capability. These are significant in size and are long-term investments by their nature, and so require stable fiscal and regulatory regulation to underpin their deployment.

Again, we re-iterate that CCS should be eligible to take advantage of any steps being taken to help new and emerging technologies.

- 1.54 (b) We fully agree with the discussion within the document that identifies “liability” and the “hand-over of liabilities” of CO₂ transportation and storage as a major consideration in the development of any public policy mechanism.

The use of enhanced capital allowances (ECAs) could be a possible way forward for providing the necessary short-term fiscal support of new and emerging technologies. Greater clarity for regulatory and fiscal regimes (particularly the operation of the EU ETS) for the longer term, beyond the current 5 year horizon would also benefit potential CCS participants.
