

Government Response to the
House of Commons Environmental
Audit Committee Report:
Carbon Capture and Storage (CCS)



**GOVERNMENT RESPONSE TO THE
HOUSE OF COMMONS ENVIRONMENTAL
AUDIT COMMITTEE REPORT:
CARBON CAPTURE AND STORAGE (CCS)**

(NINTH REPORT OF SESSION 2007-2008)

Presented to Parliament by the Secretary of State for
Energy and Climate Change

By Command of Her Majesty

August 2009

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Introduction

This memorandum sets out the Government's response to the Environmental Audit Committee's report of 22 July 2008 on Carbon Capture and Storage.

The Government agrees with the Committee's views on the importance of CCS. CCS has the potential to: reduce emissions from fossil fuel power stations and industrial installations by around 90%; enable fossil fuels to continue to be an important element of a secure and diverse energy mix; reduce the costs of tackling climate change; and create new economic opportunities for the UK. We expect to see CCS starting to make a substantial contribution to UK and global effort to tackle climate change in the 2020s, which will require a concerted, shared effort to drive the technology forward over the next decade. The Government recognises many of the issues raised by the Committee and significant progress has been made over the past year in addressing these, including securing EU funding for CCS demonstration, plans to fund up to four CCS demonstrations in the UK and a proposed new framework for coal and CCS¹.

Some of the Report's recommendations touch on related issues and we have grouped these together for a combined response.

BACKGROUND

Climate change is the greatest environmental challenge facing the world today. The Government's goal is to play an active part in global efforts to stabilise atmospheric greenhouse gas concentrations to avoid reaching dangerous levels, and to adapt to the climate change that is now inevitable. The UK has a vital role to play as a leader in the drive to tackle climate change and so the Government is working through the EU, G8 and UNFCCC processes to reach global agreement on action.

The Government has established a legally binding framework to tackle climate change through the Climate Change Act 2008. This sets a binding target of reducing the UK's greenhouse gas emissions to at least 80% below 1990 levels by 2050, to be achieved through actions both at home and abroad. We set out proposals in Budget 2009 for the levels of the first three carbon budgets up to 2022, setting us on a trajectory towards 2050.

The challenge is to deliver the transition to a low carbon electricity system while maintaining the security of our electricity supplies: reliable and affordable supplies of electricity are fundamental to our quality of life and health, and to the success of our economy. This means ensuring that we have sufficient electricity generation capacity available, that we maintain a diverse energy mix so that we are not overly reliant on any one fuel or technology. Clean coal – through the development and deployment of CCS – has the potential to play a valuable role.

1 A Framework for the Development of Clean Coal: consultation document. DECC. 17 June 2009. http://decc.gov.uk/en/content/cms/consultations/clean_coal/clean_coal.aspx

Recommendations/Conclusions of the Report

Recommendation 1: We welcome the competition on post-combustion CCS from coal and recognise that it will make an important contribution. However, we feel it would aid the development of CCS if the Government were to extend its support to a programme of demonstration projects, including pre-combustion technology. Furthermore, the Government must view its competition as only one part of a wider strategy; it must continue to support other CCS projects including the development and integration of the individual components and new CCS technologies. While undoubtedly valuable, the competition must not detract effort and resources from other work on CCS within the UK. The timely development of a range of CCS technologies would also give the UK a clear competitive advantage on the global stage. (Paragraph 8)

Government Response

The Government agrees with the Committee that the timely and effective development of CCS technologies requires a strategic approach across the whole innovation chain, from research and development through to commercial-scale demonstration of a number of CCS technologies, including pre and post combustion technologies.

We want to see CCS proven for wider deployment by 2020. Each step of the CCS technology chain – capture, transport and storage – has separately already been shown to work. But there are significant technical and cost challenges to be met before CCS can be widely deployed. Commercial-scale demonstration is the next key step and the costs and risks of CCS demonstration mean that Government intervention is necessary if projects are to proceed in the timescale required to meet climate change objectives.

In recognition of this, the Chancellor announced in Budget 2009 that the Government intends to put in place a funding mechanism to support up to four CCS demonstration projects, including both pre- and post-combustion coal projects. This mechanism will raise funding from electricity suppliers to support the selected projects and will require primary legislation. The Draft Legislative Programme² published on 29 June for consultation contains proposals for an Energy Bill for the fifth session of Parliament that would enable this to be taken forward. As part of the process of developing this mechanism, including the administrative arrangements and payment mechanisms, we explore a number of proposals and issues in the consultation on 'A Framework for the Development of Clean Coal', published on 17 June.

The Chancellor also confirmed the Government's intention to proceed with the CCS demonstration competition that was launched in 2007, subject to receiving suitable bids and final funding approval in subsequent spending reviews. As the first step, the Budget announced the Government's intention to provide up to £90m public funds for detailed design and development work (FEED studies). These studies are expected to reduce the level of risk and give greater clarity on costs. The knowledge generated from the studies will be made available to promote global understanding of CCS. Once complete, the demonstration project is expected to be one of the first large scale demonstrations of CCS anywhere in the world and should add significantly to global experience of this technology.

2 <http://www.commonleader.gov.uk/output/Page2826.asp>

In addition to our support for commercial-scale CCS demonstration, we continue to support the development of a wide variety of CCS components through our support for research, development and demonstration via the Technology Strategy Board (TSB), the Energy Technologies Institute (ETI) and the Environmental Transformation Fund (ETF). For example:

- The Technology Strategy Board confirmed its commitment to Carbon Abatement Technologies, including CCS, in its 2008 strategy for Energy Generation and Supply, and has a portfolio of existing projects on carbon abatement technologies with a total project value of about £14.5M.
- DECC's Environmental Transformation Fund (ETF) includes support for CCS through the Carbon Abatement Technologies Demonstration Programme. To date some £2.2 million has been committed to one project for the demonstration of a 40MWt Oxyfuel combustion system.
- The Energy Technologies Institute published its technology strategy in January 2009. The ETI has already launched three calls in the areas of offshore wind, marine and distributed energy technologies and is now considering its plans for CCS including next generation capture technologies, modeling and storage.
- On 15th June, a £15m competition offering funding for applied research, development and demonstration of Carbon Abatement Technologies was launched jointly by the Technology Strategy Board, Northern Way and the Department of Energy and Climate Change ETF³. By working together we maximise the benefits of public expenditure and provide a simple single route to funding for these technologies.

Recommendation 2: We are extremely disappointed by the lack of progress on CCS. (Paragraph 9)

Recommendation 3: It is essential for the Government to give a far higher priority to the development of CCS. It must communicate and follow a clearer and more urgent strategy in order to speed this development and provide a stronger signal to industry. The indecision that has afflicted the development of CCS up to now must end; any further delay will be extremely damaging environmentally and will mean that the chance to gain a competitive advantage is being squandered. (Paragraph 10)

Government Response

Our approach to CCS in the UK must set an example globally and we outlined ambitious proposals to drive the development and deployment of clean coal on 23 April, which were set out in more detail on 17 June in a formal consultation document 'A Framework for the Development of Clean Coal'.

In parallel, we are developing a strategic framework that will enable the timely wider deployment CCS. For example, under the Energy Act 2008 the UK is one of the first countries in the world to have a comprehensive regulatory regime for the storage of carbon dioxide in geological formations while, on 23 April, we confirmed that all new gas, oil, biomass and coal power stations at or above 300MWe will have to demonstrate that they are Carbon Capture Ready. On 17 June we published reports exploring the value of coal carbon abatement technologies to UK industry and looking at issues to be considered in developing a regulatory framework for CCS transportation infrastructure.

3 <http://www.innovateuk.org/ourstrategy/application-areas/energygenerationtransmissionandsupply/energygenerationandsupply/competitions.ashx>

Later in 2009, we plan to publish a CCS strategy that will consider: international development of CCS, including in the EU; UK business opportunities and jobs; infrastructure development; skills; capacity building and other supply chain constraints; and technology development.

The UK is leading international efforts on CCS through active engagement in multilateral fora.

- Within the EU, we were instrumental in reaching agreement in December 2008 to allow use of 300m free allowances from the New Entrant Reserve of Phase 3 of the EU ETS to support the EU's ambition to have up to 12 CCS demonstration projects operational by 2015. Further EU support was agreed in April 2009 through the European Economic Plan for Recovery which included €1.05 billion for CCS projects in 7 Member States, including the UK.
- We have played a key role in the development and delivery of the 2005 EU-China Near Zero Emissions Coal (NZEC) agreement to demonstrate CCS in China. A report from the first phase of the project will be launched at a conference in Beijing on 28-29 October 2009. The UK is working with the European Commission and China to develop the next phases, aiming for demonstration by 2015.
- We were the first country to become a Foundation Member of the Global Carbon Capture and Storage Institute set up by the Australian Government.
- We are members of the North Sea Basin Task Force, which published an initial study on North Sea carbon dioxide networks last year with further work announced by the UK and Norway on 28 May⁴.
- On 13 October 2009, the UK will co-host with Norway the Carbon Sequestration Leadership Forum (CSLF) Ministerial conference in London, where its 22 member countries will be asked to agree recommendations on the commercialisation of CCS ahead of the UNFCCC conference in Copenhagen.
- We were instrumental in securing the G8's 2008 commitment to an ambition for 20 large-scale CCS demonstration projects to be launched globally by 2010 and at this year's G8 Summit this was reiterated with the need to encourage the greater involvement of developing countries and identify sources of financing/funding.

We will continue to actively lobby to ensure that CCS is properly treated in other key global frameworks such as the Clean Development Mechanism and the United Nations Framework Convention on Climate Change (UNFCCC) for reducing carbon dioxide emissions post-2012.

Recommendation 4: Unless the Government is able to show there is sufficient storage capacity there must be some question about the long-term viability of CCS. (Paragraph 13)

Government Response

The Energy Act 2008 includes one of the first legal regimes in the world to regulate the long-term storage of carbon dioxide deep underground and licensing requirements.

Previous work funded by Government and undertaken by the British Geological Survey (BGS) gives a good level of confidence about the storage capacity of the British Isles⁵. This study estimated that the total quantified storage capacity exceeds 7.5 Gt and may exceed 22Gt (this range is

4 http://www.nsbtf.org/documents/Storing_CO2_under_the_North_Sea_Basin.pdf

5 <http://www.berr.gov.uk/files/file35684.pdf>.

due to uncertainty on saline aquifer capacity). The lower end of the range relates to already well characterised storage sites and should be sufficient to meet UK needs for many decades to come. Additionally, we might expect closer geological analysis of aquifers to validate further viable storage capacity of the UK within the range cited above. Importantly, some saline aquifers have already been proven suitable for storage of carbon dioxide.

Further studies have also been carried out by consortia in Scotland, Ireland and the Regional Development Agencies (RDAs). The study "Opportunities for CO₂ storage around Scotland" shows that from a resource of more than 80 saline aquifers studied, ten have been identified with a total potential CO₂ capacity in the range 4,600 to 46,000 million tonnes – a capability to store more than 200 years of Scotland's CO₂ output from its major fixed industrial sources⁶. The study "Assessment of potential for geological storage of CO₂ for Ireland" estimated that using the techno-economic resource pyramid recommended by the international Carbon Sequestration Leadership Forum (CSLF, 2007), that the island has a total storage capacity of 93,115 Mt⁷. The ETI are also considering further work in this area.

Recommendation 5: The possibility of CCS should not be used as a fig leaf to give unabated coal-fired power stations an appearance of environmental acceptability. (Paragraph 14)

Recommendation 6: The current momentum for new coal-fired plant is not taking adequate account of its environmental impact and the challenges of developing and deploying CCS technology. (Paragraph 15)

Recommendation 7: Replacing old coal-fired power stations with new ones, rather than using alternative energy sources, locks Britain in to a high level of emissions for many years to come. The increased efficiency of new plants is nowhere near enough to make unabated coal an environmentally acceptable choice. Any alternative form of electricity generation would provide significantly more substantial emissions reductions. (Paragraph 16)

Recommendation 9: The Government argues that coal has a role to play in meeting energy demand. If this is true then the Government must prioritise the development of commercial scale CCS. However, the argument that coal is essential to guarantee energy supply must not be abused. Unless there is a dramatic technological development, coal should be seen as the last resort, even with the promise of CCS. We are concerned that the Government is considering opening the door to a new era of coal-fired generation because it is the easy option, and one that generators will be only too willing to take. Such an approach is extremely dangerous both environmentally and economically when there is no certainty over when, or if, CCS will be commercially viable. (Paragraph 18)

Government Response

The Government agrees that we cannot continue with business as usual, building unabated coal fired power stations. That is why we have, since the Committee's report, put forward strong regulatory conditions, the most environmentally ambitious in the world (see below).

Alongside the commitment to up to 4 CCS demonstration projects, we think this puts Britain at the forefront of work on CCS. We believe it is necessary, domestically and globally, to drive the development of CCS. In the UK we need the trinity of low carbon fuels: renewables, nuclear and

6 Scottish CCS study – Opportunity for CO₂ storage around Scotland April 2009

7 Ireland CCS – Assessment of potential for geological storage of CO₂ for Ireland. Sept 2008.

low carbon fossil fuels to meet our energy needs and internationally, there can be no solution to the problem of climate change without a solution to the issue of coal.

Coal power stations play a vital role in providing the UK with reliable electricity supplies: they provide a third of our electricity; can be operated flexibly in response to variations in demand from consumers and supply from other generators, which will become increasingly important as we see growth in wind generation; and they add diversity to our energy mix, in particular providing an alternative to gas.

There are abundant reserves available in many countries, which can be easily extracted, transported and stored (albeit at some cost to the local environment); while coal power stations offer reliable and controllable output. As a result, the IEA predicts significant growth in the amount of energy generated from coal globally over the next two decades.

This is not sustainable, on a high carbon basis, and any credible strategy for tackling climate change must actively set out to address the challenge of reconciling nations' energy security needs with the urgent need to tackle global carbon emissions.

Recommendation 10: The Government should make clear to industry that it will not permit the operation of unabated coal-fired power stations in the longer-term. The Government must take more urgent and ambitious steps to incentivise the development and retrofitting of CCS and, equally importantly, to prevent the prolonged operation of unabated coal-fired power stations. (Paragraph 19)

Recommendation 11: There is no guarantee that a plant approved on the basis that it would be CCS ready will actually be willing or able to retrofit CCS once the technology has been demonstrated on a commercial scale. We believe that planning permission granted on the condition of CCS readiness is meaningless unless the Government places a requirement on all power generators to retrofit CCS as soon as it is available and to shut down any power stations which are not then fitted with CCS. Such a requirement would need to be supported by continued investment in research and development and action to ensure that CCS becomes commercially viable. (Paragraph 22)

Recommendation 12: With even the Energy Minister recognising that there is no guarantee the carbon price will reach a sufficient level to incentivise the deployment of CCS, it is evident that the Government will need to accompany its faith in the carbon market with measures to mandate the installation of CCS technologies. (Paragraph 26)

Recommendation 15: The Government cannot allow the prolonged operation of unabated coal stations; doing so will make it very unlikely the Government will meet its own carbon reduction targets. The Government should set a date by which all power stations will Carbon capture and storage have to have emissions per unit of power generated below a certain limit (set in terms of kg CO₂/MWh) or face closure. This limit should be based on capturing at least 90% of carbon emissions. By setting such a deadline and making its intentions clear a strong signal will be sent to the power generation industry about the future of coal and the importance of CCS. (Paragraph 32)

Government Response

As discussed above, we accept that we need to step up efforts to drive the development and deployment of CCS and that there needs to be a particular focus on coal power generation. So, in April 2009 the Government set out proposals for an ambitious new financial and regulatory framework for the development of clean coal, followed by publication of a formal consultation on 17 June. The consultation seeks views on proposals to drive the development of clean coal by:

- Providing financial support for up to four commercial-scale CCS demonstrations in Britain covering a range of CCS technologies.
- Requiring any new coal power station in England and Wales to demonstrate CCS from day one on a defined part of its capacity: at least 300MW net (around 400MW gross).
- Requiring new coal power stations to retrofit CCS to their full capacity within five years of CCS being independently judged technically and economically proven, to reinforce the expectation indicated by the EU ETS that CCS will need to be retrofitted in the 2020s. We will plan on the basis that CCS will be proven by 2020. Further new coal power stations would then be required to install CCS on the full generating capacity from the outset.
- Preparing for the possibility that CCS will not become proven as early as we expect. Measures could include an annual cap on individual power stations' emissions, a limit on running hours or an emissions performance standard that would limit the amount of CO₂ that could be emitted per unit of electricity generated.

We are exploring how an emissions performance standard could support the measures outlined above.

Recommendation 8: It is true that, in theory, the EU ETS cap should keep emissions within a certain limit. However, the Government is wrong to rely on the EU ETS cap to excuse the increase in emissions that would derive from the new unabated coal-fired power stations. Emissions included in the EU ETS do not disappear – they must be accounted for somewhere. The EU ETS is a mechanism designed to reduce emissions; using it as a cover for choosing high emissions technology goes against the purpose of the scheme. Furthermore, it completely ignores the risks to Britain's economic position if the carbon price rises substantially in Phase Three of the EU ETS. The Government should prioritise emissions reductions within the UK as soon as possible (paragraph 17).

Recommendation 13: We cannot rely solely on the carbon price, either now or in the future, to ensure the implementation of CCS technology. There is a real risk that the EU ETS will not deliver a carbon price that will make CCS cost effective. (Paragraph 29)

Recommendation 14: In our Report on the 2007 Pre-Budget Report we recommended that the Government 'introduce some form of financial mechanism for incentivising CCS power plants over conventional power stations', such as a feed-in tariff for CCS plants, or contracts which guarantee funding for the difference in costs between CCS and conventional plants. The Government response to our Report failed to discuss the merits of such measures, instead reiterated the role of the carbon price. We fear that the carbon price will not deliver the level of incentive that is needed in the short-to medium-term. We urge the Government to develop and bring forward additional mechanisms that will provide an incentive for CCS. (Paragraph 32)

Government Response

We agree that the costs and risks of CCS demonstration mean that Government intervention is necessary if projects are to proceed in the timescale required to meet climate change objectives. For this reason, we announced plans in Budget 2009 to introduce a new financial mechanism to fund up to four CCS demonstration projects in the UK. The Draft Legislative Programme⁸ published

8 <http://www.commonleader.gov.uk/output/Page2826.asp>

on 29 June for consultation contains proposals for an Energy Bill for the fifth session of Parliament that would enable this to be taken forward. We are also working at EU level to stimulate investment in CCS demonstration within Europe.

Assuming that a series of successful demonstration projects reduce the costs and risks of CCS, we might expect the carbon price under the EU ETS to start to drive CCS deployment on coal power stations in the 2020s. However, the independent Committee on Climate Change has argued that uncertainty over future carbon prices means that investment in new coal power stations might go ahead without a clear acceptance of the need for future CCS installation. They suggest there is a need to establish a clearer expectation that CCS would need to be retrofitted in the early 2020s and the proposals in our consultation 'A framework for the development of clean coal' aim to deliver this.

Ultimately, if CCS is to fulfil its potential to make a significant contribution to combating climate change, fossil fuel power stations with CCS will need to be able to compete with other low-carbon technologies. This would need technical and commercial viability to be proven so that investors can choose CCS as one of a suite of low carbon options. However, again as with other technologies, whether, and for how long, any support framework in addition to the carbon price will be required cannot be determined at this stage.

The Government believes that publicly supported and timely demonstration of CCS technology at commercial scale within the next decade, in the UK and globally, will enable wide-scale deployment of CCS through the 2020s as part of the decarbonisation of the power sector under the EU ETS.



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