National Audit Office

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Department of Energy and Climate Change

Carbon capture and storage: lessons from the competition for the first UK demonstration

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National Audit Office

Department of Energy and Climate Change

Carbon capture and storage: lessons from the competition for the first UK demonstration

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Amyas Morse
Comptroller and
Auditor General

National Audit Office

12 March 2012

This study examines the Government's first carbon capture and storage demonstration competition, as an example of the Department of Energy and Climate Change's work to stimulate private sector investment and innovation in the UK's energy infrastructure.

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This report can be found on the National Audit Office website at www.nao.org.uk/carbon-capture-2012

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Key facts

£1bn

the upper limit of capital budget that was allocated to the project at the Spending Review 2010

4 years

was the length of the procurement process, from launch to cancellation

£64m

was spent by the Department on the competition, since 2007

90 per cent	of carbon dioxide emissions from fossil fuel power stations could be prevented from being emitted to the atmosphere by carbon capture and storage technology
27 per cent	of UK emissions are produced by power stations
2007	is the year in which the competition for the UK's first carbon capture and storage demonstration project was launched. Contract award was scheduled for 2009, with the expectation that the project would operate from 2014
Nine	bidders responded to the carbon capture and storage competition, launched on 19 November 2007. Four bidders were selected at pre-qualification but, by October 2010, three had left the competition
£1.9 billion	total lifetime capital cost of the project as estimated by the Department in July 2010
£1 billion	upper limit of capital budget awarded to the Department by the Treasury for carbon capture and storage at the Spending Review in October 2010
2011	the year in which the Department ended negotiations with the last remaining bidder
£64 million	was spent by the Department over the duration of the competition, from November 2007 to October 2011, including £40 million awarded to two bidders in front-end engineering and design contracts

Summary

Carbon capture and storage is a priority infrastructure investment

What is carbon capture and storage?

Carbon capture and storage is a three-part process that involves capturing the carbon dioxide produced from burning fossil fuels, transporting it to a storage site, and permanently storing it under pressure, usually underground. The individual elements of the technology exist but have not yet been linked and operated together at a commercial scale power plant. The technology has the potential to reduce carbon dioxide emissions from burning fossil fuel by around 90 per cent.

1 Carbon capture and storage is one of the forty priority areas for UK infrastructure investment identified within the Government's National Infrastructure Plan for meeting the infrastructure needs of the UK economy. The Government's vision is that it can reduce carbon emissions from the energy sector and tackle climate change through supporting:

- the commercial deployment of carbon capture and storage;
- new nuclear power stations;
- increased deployment of renewable energy sources; and
- improved energy efficiency.

2 The coalition Government has continued its predecessors' commitment to the energy market driving the most efficient investment strategy for power generation. The aim is for the market to incentivise investment in low carbon energy generation to meet the challenges arising from the Government's objectives to deliver a secure, low carbon and affordable energy system. For the short to medium term the Government recognises it needs market mechanisms to continue to support emerging low carbon technologies, including carbon capture and storage. The Government expects to continue to provide direct support for industry projects to develop the technology.

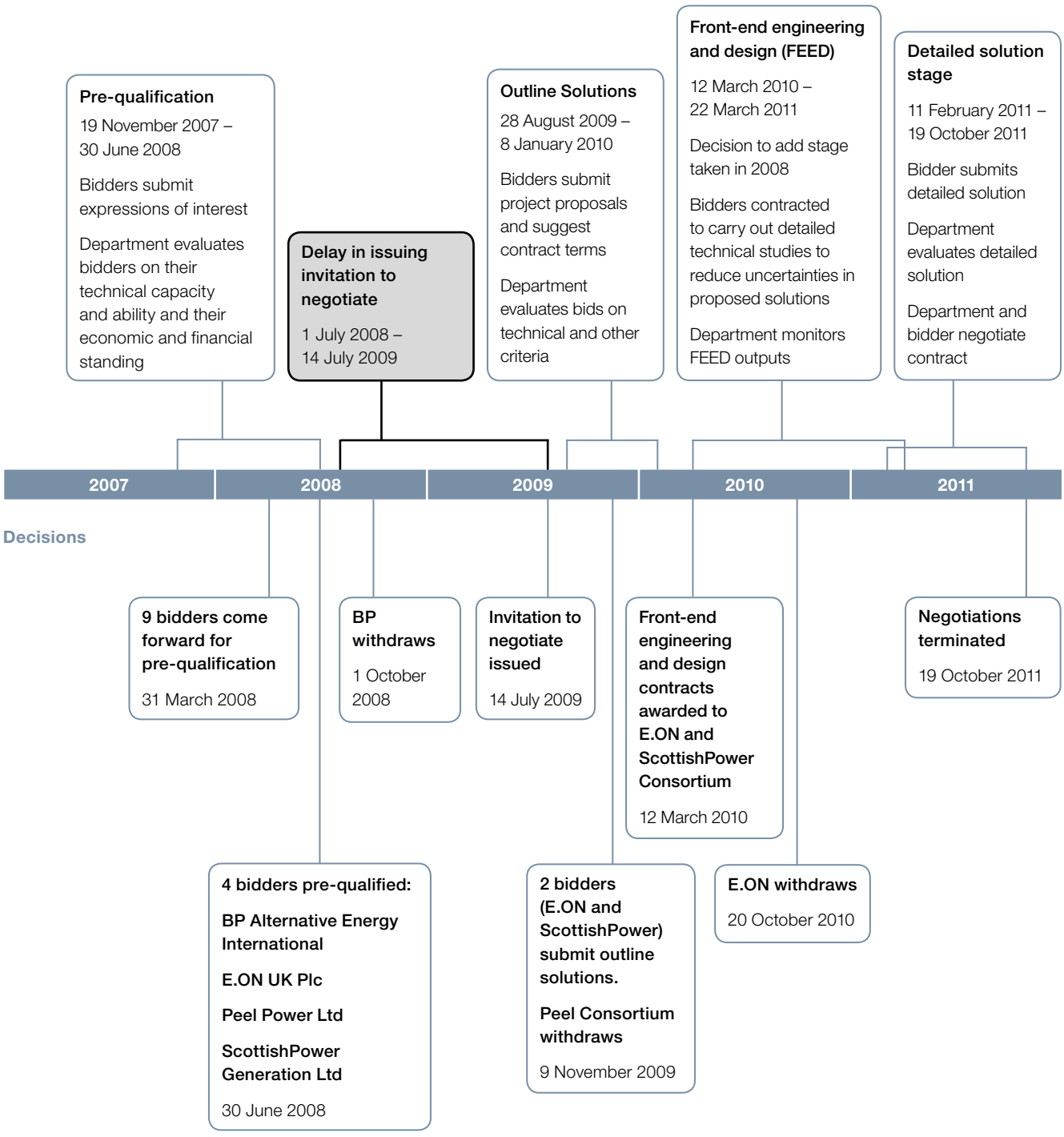
3 This study examines the Government's first carbon capture and storage demonstration competition, as an example of the Department of Energy and Climate Change's work to stimulate private sector investment and innovation in the UK's energy infrastructure. In our report we consider the background to the procurement and the challenges the Department of Energy and Climate Change (the Department) faced and how they were addressed. Our aim is to identify the lessons to be learned to help the Department secure value for money from its programmes in the future.

The carbon capture and storage procurement process

4 In November 2007, the then Department for Business, Enterprise and Regulatory Reform (the Department's predecessor) launched a competition for industry to run a project to design, construct and operate the UK's first commercial-scale carbon capture and storage demonstration project at a coal-fired power station, by 2014, with government funding. The coalition Government has continued the last Government's commitment to fund up to four carbon capture and storage demonstration projects and in the Spending Review in 2010 announced that it had made available up to £1 billion in capital investment for the first carbon capture and storage demonstration project.

5 On 19 October 2011, the Department withdrew from negotiations with the last remaining bidder in the competition – a consortium made up of ScottishPower, National Grid and Shell – as the Department considered it could not agree a deal that would represent value for money (**Figure 1**). The Department decided that the project could not be funded within its agreed £1 billion capital limit. It also could not agree with ScottishPower how to offset the additional cost of the new carbon price floor (a minimum charge for emitting carbon dioxide) to secure the availability of Longannet power station for the duration of the demonstration project. Furthermore, there was no prospect of agreeing contract terms that would be mutually acceptable to all members of the consortium and the Department. Because of the strategic importance of advancing carbon capture and storage technology, the Department confirmed that the £1 billion agreed for the demonstration project would be available to pursue other carbon capture and storage projects as part of a new process, the details of which it is currently developing.

Figure 1
Key events during the competition



Source: National Audit Office

Key findings

6 The Department and its predecessor's costs in running the competition were relatively small compared to the overall scale of the investment required to develop carbon capture and storage and the potential importance of the technology to delivering an affordable, secure and low carbon energy system. Over the four years of the competition, the Department and its predecessor spent £64 million, including £40 million on engineering and design studies.

7 Procuring a demonstration plant was a challenging, high-risk undertaking. The Department's predecessor, the Department for Business, Enterprise and Regulatory Reform wanted industry to take up a commercial contract, for a large and potentially costly developmental project, with considerable uncertainty over its design and costs. The competition took place against an evolving background of economic, policy and regulatory uncertainty. The Department was progressing the competition at the same time that it was developing UK policy and energy market reforms to incentivise decarbonisation of energy generation. It was also contributing to developments in EU energy policy to facilitate and regulate carbon capture and storage. The Department's predecessor was inexperienced at dealing with a project of this scale. After launching the competition the Department's predecessor responded to concerns about its commercial capacity and skills, by recruiting an experienced Senior Responsible Officer, increasing the capacity of the team and improving its commercial strategy. The project team transferred to the Department of Energy and Climate Change when it was established in 2008.

8 The Department's predecessor pursued the carbon capture and storage demonstration project without reviewing alternative options for working towards the Government's policy objectives. The competition was launched based on the strategic importance of carbon capture and storage but without a detailed business case or options appraisal, and without clarity over how a single demonstration project would contribute to policy objectives. The Department's predecessor did not formally review alternatives, such as holding a design competition or supporting a number of smaller scale projects developing individual aspects of the technology. Therefore, the Department and its predecessor could not clearly compare the project's progress against alternatives of stopping or pursuing other options. The Department subsequently developed plans for supporting up to three more projects to make a wider programme to meet its objectives. The Department's new programme will supersede these plans.

9 The project involved government financing for capital investment to deliver a demonstration project contract. The Department and its predecessor did not engage sufficiently early with the commercial risks involved and their consequences on cost. Before launch, the Department for Business, Enterprise and Regulatory Reform did not articulate the commercial risks in the project or develop a commercial strategy to manage them. The Department gave limited weight to commercial viability when it assessed bidders' outline solutions. It paid for engineering and design studies to reduce the risk to capital costs and developed its understanding of the commercial proposition. The Department decided to continue the competition as a single-tender negotiation in October 2010, when there remained significant uncertainty about whether an agreement on the commercial terms

could be reached. In February 2011, the remaining consortium formally stated its position that any deal would require the Government to accept material risks resulting from a change of law and from demonstration risks. The Department entered into detailed negotiations on cost and risk allocation from March 2011, which were ultimately unsuccessful.

10 The Department established finance for the capital costs of the project three years after its predecessor launched the competition and did not reach agreement with the Treasury on the funding for operating costs. The affordability of the project was a critical factor in the Department deciding to end negotiations. Lack of clarity over government finance for the project delayed the early stages of the competition and added to the commercial risks for bidders. In October 2010, the coalition Government identified a £1 billion capital budget for the project. At this time, the Department estimated that the ScottishPower consortium's bid required capital of £1.9 billion. This preliminary figure was based on data provided by the ScottishPower consortium before its engineering and design work had been completed and included an adjustment for optimism bias, in line with standard Treasury guidance. The Government's goal was to see if engineering and design work could reduce costs to within the budget available. Agreement on government funding for operational costs was deferred until after further work on reforms to the energy market. Despite subsequent negotiations and efforts to reduce project cost uncertainty, the Department stopped the competition because it was not affordable.

11 The Department for Business, Enterprise and Regulatory Reform's procurement approach provided structure but restricted negotiations to the project specifications that were set at the outset. Following advice, the Department's predecessor decided that the negotiated procedure form of competitive public procurement would provide flexibility and allow bidders to be innovative, in their designs and solutions. However, narrow project specifications, including post-combustion carbon capture at a coal-fired power station of 300 megawatts, limited the number of bidders and their options, and made negotiations inflexible.

12 External reviews of the project were undertaken frequently and advised of significant risks. The Department took decisions to continue, without fully considering the opportunity cost of continuing and alternative courses of action. The Government's decisions in April 2009 to proceed, and, in March 2010, to award engineering and design contracts, were not informed by detailed consideration of the probability of reaching acceptable contract terms or a full and objective assessment, of the value of alternative courses of action to pursuing the existing competition, including the opportunity costs should the competition fail. In awarding the engineering and design contracts in March 2010, the Department took bidders' willingness to contribute a quarter of the costs of the work as assurance on their commitment to the project. In July 2010, a Major Projects Review noted that the project was feasible but that significant issues existed. In March 2011 and June 2011, the Major Projects Review Group raised strong doubts that an acceptable outcome could be achieved from the negotiations. From May 2011, the Department identified detailed criteria for assessing the value for money of the project and challenged the process through its new approvals committee. This led to the final decision to end the competition in October 2011.

13 Although the competition did not result in a contract, it has increased the Department's experience of the associated technical, regulatory and commercial challenges, and its knowledge of the costs of carbon capture and storage. Industry stakeholders have welcomed the two engineering and design studies completed as they may help to reduce the costs of future engineering and design work. The procurement process and the bidders' proposed solutions also supported the Department's policy and regulatory work and will inform its new programme. The Department has carried out an internal review of the original competition, disseminated the findings widely within the Department and shared the key lessons that it has identified with industry.

Lessons for securing value for money

14 The carbon capture and storage demonstration project was an example of a strategically important project, for which the development costs are small scale compared to the potential benefits from the project. In such cases, it is critically important for the project to be initiated well so the chances of success are maximised. It is also important for progress to be managed well, with appropriate regard to likely value for money, likelihood of successful delivery and the opportunity costs if progress is not as intended. We therefore make the following recommendations:

a **The Department for Business, Enterprise and Regulatory Reform launched the demonstration competition without considering alternatives or having a clear plan stating how the project would meet government policy objectives.** The Department's new support programme is intended to contribute to meeting the Government's vision for a secure, low carbon and affordable energy system. It is part of the Government's wider plans for meeting Carbon Budgets and the National Infrastructure Plan aim to support a competitive economy. The Department should clearly articulate how its programme and the individual projects will contribute to meeting the Government's objectives. It should set related milestones and metrics so that it can monitor progress and consider consequences for meeting the energy vision and infrastructure plan. The Department should clarify with the Treasury and Cabinet Office the nature of its accountability to the new Cabinet Committee for infrastructure so that roles are not blurred.

b **Regulatory uncertainty contributed to the Department's inability to reach a commercial contract.** The Department intends to address in its proposed roadmap for carbon capture and storage how it will work to address the barriers to commercial deployment of the technology. To move to a commercially viable, privately financed and consumer funded model for carbon capture and storage the Department will need to work closely with industry and other government departments to identify all the key risks and systematically address them.

c **The Department defined narrow project specifications. These limited the number of bidders applying to the competition, the technical project options they could submit, and the flexibility of the negotiations.** In its future programme, the Department should set procurement specifications and associated evaluative criteria that meet its policy objectives but allow sufficient flexibility for innovation.

d **The demonstration project was to test the integration of the technology at commercial scale and would have involved many technical challenges. The Department engaged with the project costs but not the commercial costs until a later stage in negotiations with the final bidder.** For its new programme, the Department needs to understand fully its commercial proposition to industry, fully investigate the costs and the technical, price and regulatory risks in individual projects and compare their value. The Department should address how it will monitor the return industry is likely to make and how government risks can be minimised. To do this, the Department will need appropriate commercial skills in place from the outset of its new programme.

e **The first demonstration project was affected by lack of clarity over its affordability.** The capital budget of £1 billion remains committed in principle for the new carbon capture and storage programme and the Government has proposed new market mechanisms to support low carbon technology. Before starting a new programme, the Department and the Treasury should be clear on the capital investment available in total and across the length of the programme. It should also set out how industry will be incentivised and establish any affordability constraint.

f **The competition process showed early indications of risks to value for money materialising, which neither went away nor were resolved. As long as there remained a chance of the project succeeding, its potential strategic benefits outweighed its costs, and so the Department considered continuing represented value for money without full reference to opportunity cost.** At a late stage in the competition, the Department developed criteria to challenge itself on whether the contract was likely to deliver value for money for the taxpayer. For its new programme, the Department should identify value-for-money criteria to be used from the outset. It should set programme governance arrangements to assess routinely whether the programme is on course to deliver value for money. And at project level it should allow for formal breakpoints with triggers for further reviews as necessary to test the value for money of proceeding further.

Part One

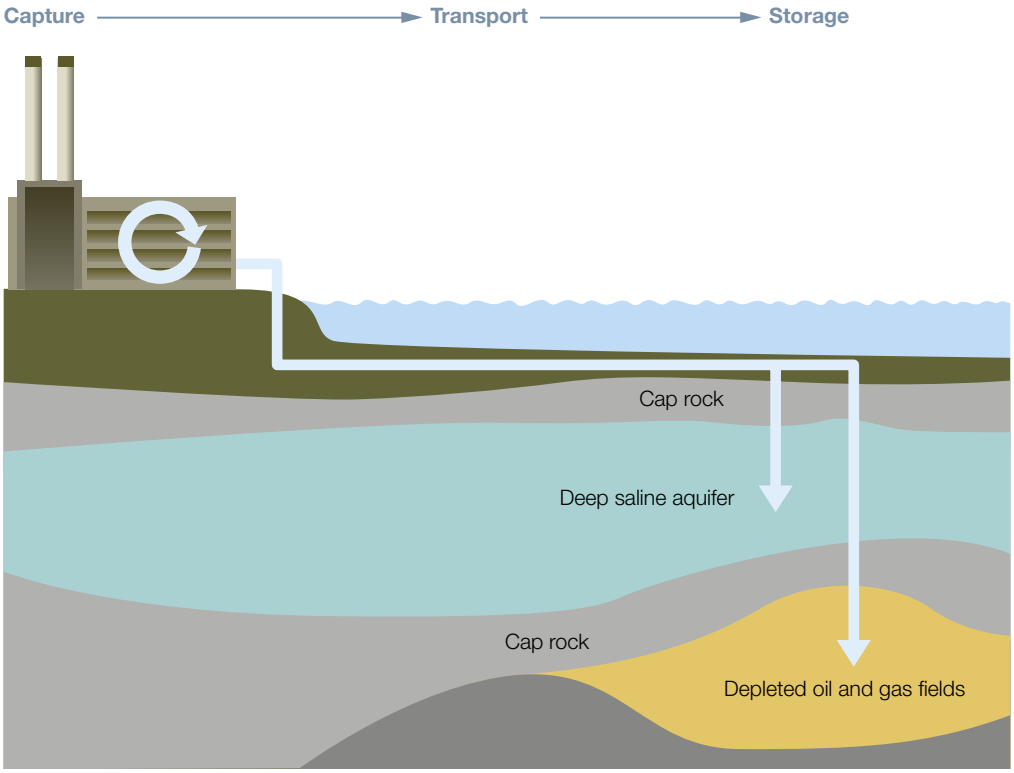
Introduction

The demonstration of carbon capture and storage is part of the Government's plans for establishing a new low carbon energy system

1.1 Carbon capture and storage is a central element of the Department of Energy and Climate Change's plans for securing the UK's energy supply while reducing greenhouse gas emissions. The Department's modelling of scenarios for the development of the UK's energy supply in accordance with its commitments to reduce the UK's total emissions suggest that around 40–70 gigawatts of new low carbon electricity generating capacity will be needed by 2030. The Department's information from industry suggests that this can be supplied by new nuclear power stations, renewable energy and fossil fuels with carbon capture and storage,[1] but the scale of investment required is challenging and therefore highly uncertain. Alongside nuclear power and renewable energy, fossil fuels with carbon capture and storage could contribute to a more secure and reliable energy system, because it could be used flexibly when wind power is not available or to complement nuclear energy.

1.2 Carbon capture and storage is a three-stage process that can be used with coal, gas and industrial processes. It involves removing carbon dioxide (before, during or after burning) before it enters the atmosphere; transporting it to a safe storage site, such as a depleted oil or gas field; and its long-term storage deep underground (**Figure 2**). It is the only technology option available to reduce carbon dioxide emissions from large-scale fossil fuel power plants, and is thought to be able to reduce emissions by up to 90 per cent. Without it, the International Energy Agency estimates that the global economic costs of tacking climate change could be 70 per cent higher.[2] The individual elements of the carbon capture and storage process have been proven over many years.[3] However, the full chain of technologies is complex and expensive to install and operate and has not yet been technologically or economically proven at a commercial scale with electricity generation.[4]

Figure 2
Three stages in the carbon capture and storage process

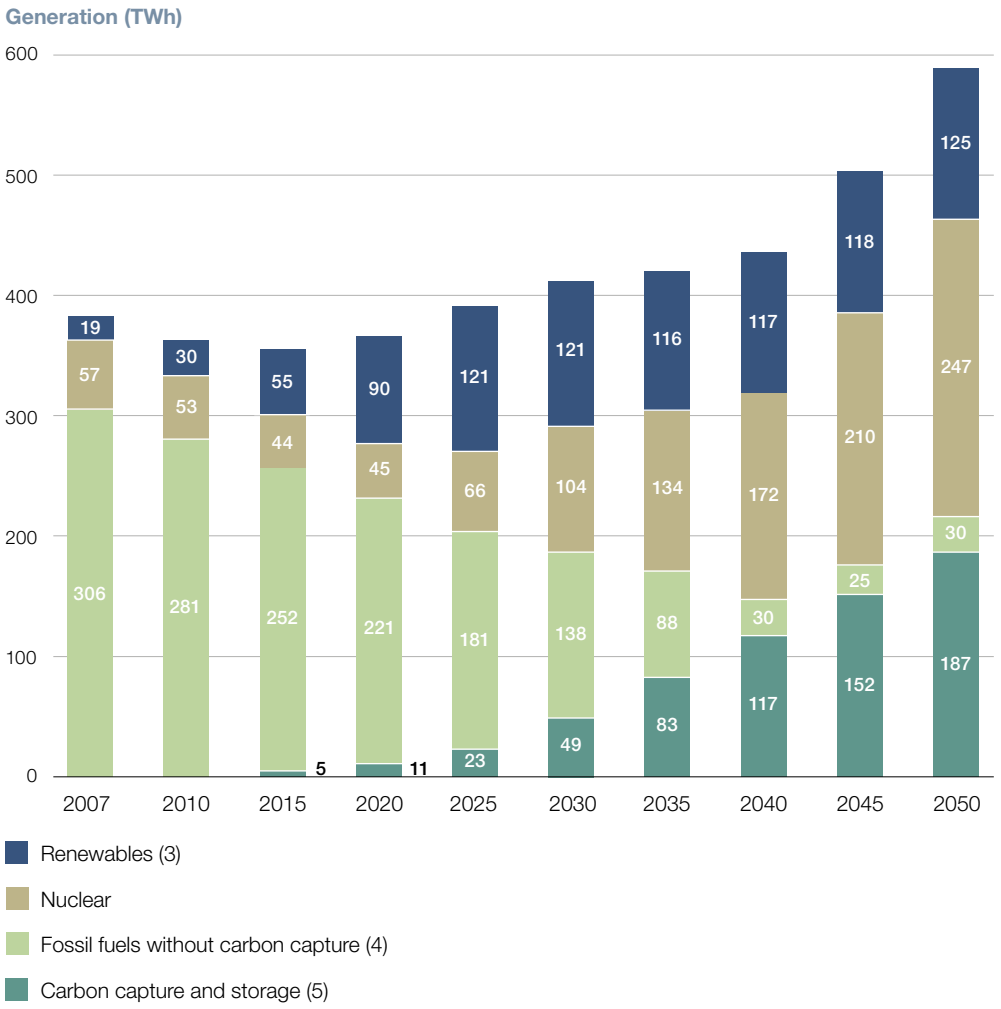


Source: Adapted from a graphic reproduced on the Department of Energy and Climate Change website, courtesy of the Zero Emissions Platform: http://www.decc.gov.uk/en/content/cms/emissions/ccs/what_is/what_is.aspx

1.3 Without carbon capture and storage, fossil fuel is unlikely to continue to be used to generate electricity, if the UK is to meet its carbon emissions commitments. The UK is committed to meeting the Climate Change Act (2008) target to reduce carbon dioxide emissions by at least 80 per cent by 2050, compared with 1990. Fossil fuels accounted for 76 per cent of UK electricity supply in 2010[5] and the power sector accounts for 27 per cent of the UK's carbon emissions.[6] To meet the Climate Change Act, the Government needs to decarbonise the electricity sector by 2050 in the face of rising electricity demand from heating, transport, industry and population growth (**Figure 3** overleaf).[7]

Figure 3

Power plants employing carbon capture and storage could make an important contribution to meeting rising electricity demand while helping to achieve emissions reductions targets in the UK by 2050



NOTES

1 This illustrates a cost-optimised scenario developed using the model the Department employed for setting its fourth carbon budget. This scenario is the product of one model using a specific set of assumptions and presents only one of a very broad range of possible pathways to meeting UK electricity demand while reaching UK emissions reductions targets.

2 TWh – Terawatt Hour – a unit of measurement for energy, equal to 1,000 gigawatt hours.

3 Includes electricity generated from biomass without carbon capture.

4 Includes imported electricity.

5 Includes electricity generated from fossil fuel and biomass power stations with carbon capture and storage applied to them.

Source: National Audit Office analysis using Department of Energy and Climate Change data

1.4 The Government first identified the potential case for supporting the development of carbon capture and storage technology in 2005. It also committed to examining economic incentives to help the technology become commercially viable.[8] The Government announced its commitment to support a commercial scale demonstration project in the 2007 budget.[9] In November 2009, it announced that any new coal-fired power stations would need to use carbon capture and storage, and retrofit the technology to their full generating capacity by 2025.[10] The coalition Government committed to continue the last Government's support for four commercial-scale demonstration projects.[11]

There is international support for the commercial deployment of carbon capture and storage by 2020

1.5 Both the European Union and the G8 support demonstrating full-chain commercial-scale carbon capture and storage. At the Hokkaido Toyako summit in 2008, G8 leaders committed to announce 20 large-scale demonstration projects with a view to beginning broad deployment of the technology by 2020.[12] In 2008, the EU launched a funding package ('new entrant reserve') potentially worth over €2 billion to support and stimulate constructing and operating up to 12 demonstration plants by 2015.[a] So far six UK carbon capture and storage projects have made bids. Successful projects will receive EU funding for up to 50 per cent of their relevant costs over ten years. Governments must guarantee to cover these costs if the project does not proceed or is unsuccessful.[13]

The Government launched a competitive procurement for a commercial-scale carbon capture and storage project in the UK in 2007

1.6 In November 2007, the Department for Business, Enterprise and Regulatory Reform (the Department's predecessor) launched a competitive procurement process to fund up to 100 per cent of the costs of building and operating carbon capture and storage technology at a UK power plant, to be operational by 2014. The competition specified that the power plant should be coal powered and that the carbon dioxide should be captured after burning the fuel.

a The EU proposes to monetise 300 million EU emissions trading scheme allowances from the new entrants reserve fund. The value of the fund will depend on the value of the emissions allowances at the date they are sold. www.eib.org/about/news/ner-300.htm.

1.7 While the competition was under way, the Government continued to develop its wider carbon reduction plans. The plans included reforming the electricity market to attract necessary investment to meet the Government's objectives to secure energy supplies, and meet carbon reduction commitments. The Department's and the Treasury's assessment of the operation of the electricity market in March 2010 concluded that the carbon price, without reform, would not deliver the investment required in the energy system. In December 2010, the Government proposed major reforms, including introducing a carbon price floor[b] which would affect the costs of fossil fuel generation, and new electricity market arrangements[c] to support new investment in low carbon generation.[14]

Nine bidders expressed interest in the competition, but by autumn 2010 only one bidder remained and the Department ended the competition in October 2011

1.8 The competition was launched as a negotiated procedure[d] under the Public Contracts Regulations (2006). After the prior information notice, the process was set to contain four stages:

- pre-qualification to select pre-qualified bidders;
- a two-stage negotiation process with the Department;
- a final bid stage to inform the selection of a preferred bidder; and
- awarding the contract in September 2009.

1.9 The Department and its predecessor re-examined and redesigned the procurement approach in 2008 and 2009. The revised timetable included a funded engineering and design stage, known as 'front-end engineering and design', to provide greater certainty on project cost estimates before awarding the contract. The revised competition schedule projected the award of the contract to take place in spring 2011.

1.10 There were nine expressions of interest in the competition. In June 2008, the Department's predecessor selected four to proceed to negotiations: BP Alternative Energy International, E.ON UK Plc, Peel Power Ltd and ScottishPower Generation Ltd. BP withdrew in October 2008 and Peel in November 2009.[15] E.ON and the ScottishPower consortium proceeded to submit outline solutions and were awarded engineering and design contracts. E.ON withdrew from the competition in October 2010[16] but completed its engineering and design study. The ScottishPower consortium continued negotiations after the engineering and design stage until the Department ended the competition on 19 October 2011, nearly four years after the launch.[17]

b The carbon price floor ensures a minimum price of carbon is applied to fossil fuels. This increases the cost of electricity generated by power stations that burn fossil fuels in proportion to the amount of carbon emissions the power stations produce.

c Such as feed-in tariffs to ensure low carbon electricity generators receive a pre-agreed price for the electricity they generate.

d The negotiated procedure is one of several processes which government bodies may follow to ensure they award contracts for supplies, goods or services in line with public contracts regulations. *The Public Contracts Regulations 2006*, No. 5, Part 3, Regulation 17: http://www.legislation.gov.uk/uksi/2006/5/regulation/17/made

1.11 The Department and its predecessor spent a total of £64 million on the competition, between November 2007 and October 2011. Of the total costs, £40 million (63 per cent) was spent on funding bidders to produce engineering and design studies. Other project costs included the cost of the Department's lead advisers (£17 million), the cost of the expert commercial and technical staff contracted to run the project (£4 million) and civil service staff costs (£1 million).

The Department is developing a new carbon capture and storage programme

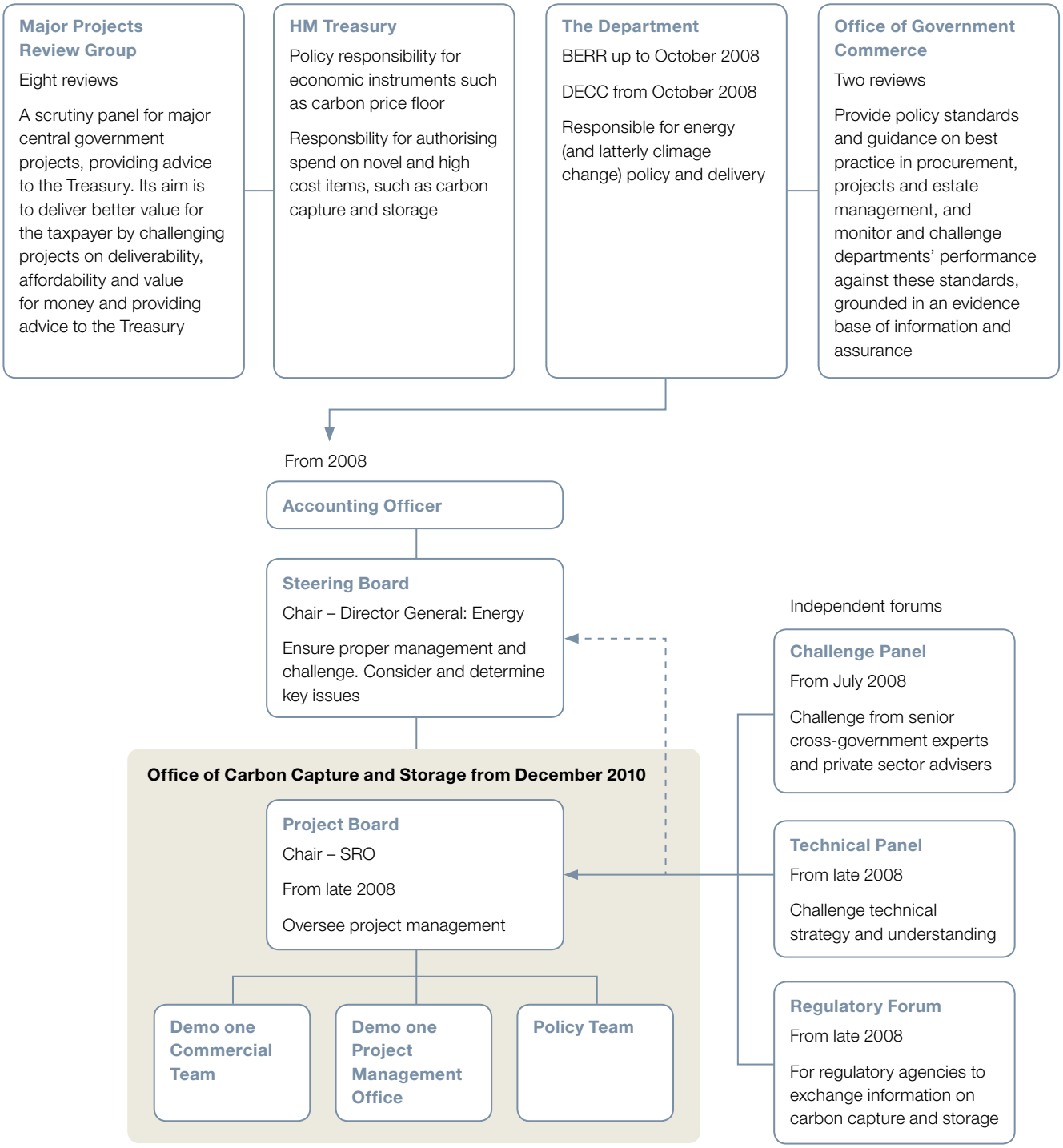
1.12 The Government has confirmed that carbon capture and storage is one of the forty priority areas for UK infrastructure investment identified within its National Infrastructure Plan. The Government expects the energy market to drive the most efficient investment strategy for power generation. For the short to medium term, however, the Government recognises there need to be market mechanisms to support emerging low carbon technologies, including carbon capture and storage, to reach a level of maturity at which they can fully contribute to meeting the Government's vision for energy. The Government is committed to resolving barriers to investment in these forty priority areas and to overseeing progress.

1.13 The Department is developing an alternative programme to achieve cost-effective deployment of carbon capture and storage in the 2020s, taking account of the lessons it has learned. It plans to publish a 'carbon capture and storage roadmap' in the first quarter of 2012. The Department plans to support a portfolio of projects (including commercial scale projects) to be operating in 2016-2020, which could include full- and part-chain carbon capture and storage projects. The Department has approval from the Treasury to spend the previously agreed £1 billion on its new programme and, subject to Treasury approval, expects the reformed electricity market to support investment in the projects. The Department intends to support some companies' applications for EU new entrant reserve funding subject to appropriate value-for-money tests. In December 2011, the Department appointed a new Expert Chair to its Office of Carbon Capture and Storage, to give independent strategic and expert guidance to ministers, the departmental board and officials.

Responsibilities for the project

1.14 The Department for Business, Enterprise and Regulatory Reform initiated the carbon capture and storage demonstration competition. Responsibility transferred to the Department of Energy and Climate Change when it was created in October 2008 (**Figure 4** overleaf). The Treasury has had significant involvement, through agreeing a budget for the project, and through its policy responsibility for economic instruments affecting the energy industry, such as the carbon price floor.

Figure 4
Responsibilities, assurance and governance



NOTE

1 BERR is the Department for Business, Enterprise and Regulatory Reform; DECC is the Department of Energy and Climate Change; CCS is carbon capture and storage; SRO is senior responsible owner.

Source: National Audit Office, using information provided by the Department of Energy and Climate Change

Study scope and methods

1.15 This study identifies lessons that should be learned from the first carbon capture and storage demonstration project and makes recommendations for minimising the risks to the Department's future programme. We examine:

- project set-up (Part Two); and
- how the Department managed progress (Part Three).

1.16 To assess value for money and identify lessons learned, we compared project set-up against the National Audit Office's 'initiating successful projects framework',[18] and considered the quality of information used to inform key decisions. Our evidence involved an extensive review of the Department's documents; interviews with stakeholders in industry and trade associations; and interviews with officials within the Department, other government departments and advisory bodies. We used the Department's own high-level lessons-learned research in our study. Further information on our methods is in Appendix One.

Part Two

Project set-up

2.1 In 2007, when the Government designed and developed its plans, demonstrating the integrated capture, transportation and storage chain on a commercial scale was an innovative and high-risk venture for both government and industry. This section examines the Department's and its predecessor's[e] approach to designing, initiating and managing the project, in light of this uncertainty.

The quality of project initiation predicts project success

2.2 In the last three years the National Audit Office has examined some 40 major government projects, from which we have identified criteria that signify the potential for success. In this chapter, we review the carbon capture and storage project against these criteria. Our conclusions are summarised in **Figure 5**.

Figure 5
Initiating successful projects

Key element	Situation at launch of the project
Purpose	The Department for Business, Enterprise and Regulatory Reform had not considered alternative approaches for meeting its policy objectives.
Affordability	The Department for Business, Enterprise and Regulatory Reform did not have a clear strategy or timetable to secure funding.
Pre-commitment	The Department for Business, Enterprise and Regulatory Reform did not have a clear strategy to address commercial risks.
Project set-up	The set-up and procurement approach provided useful structure for the project but imposed some restrictions.
Change and variation management	Governance arrangements were strengthened after the Department for Business, Enterprise and Regulatory Reform launched the competition.

Source: National Audit Office, Initiating Successful Projects, December 2011

e Initially the Department for Business, Enterprise and Regulatory Reform and then following machinery of government changes, from October 2008, the Department of Energy and Climate Change.

The Department for Business, Enterprise and Regulatory Reform launched the demonstration project without considering alternatives for meeting its policy objectives

2.3 Delivering public sector projects involves aligning the, often conflicting, aspirations and interests of a wide variety of stakeholders. Setting out clearly at the outset the overarching policy objectives avoids confusion. Formal assessment of the different ways of achieving the objectives ensures that the most appropriate individual projects and outputs are selected and designed; and enables monitoring of progress on outputs and towards achievement of objectives.

2.4 The Department of Trade and Industry published its energy review in July 2006.[19] The review stated that the next step for carbon capture and storage would be a commercial-scale demonstration project, alongside work to investigate the regulatory framework and advancing international cooperation. At the launch in 2007, the Department for Business, Enterprise and Regulatory Reform, the Department's predecessor, aimed to establish the UK as a global leader in developing and commercialising carbon abatement technologies, including carbon capture and storage. It also wanted the project to enhance the prospects for the commercial deployment of carbon capture and storage both in the UK and internationally, particularly in countries with significant future energy needs.[20] However, at launch, the Department's predecessor was unclear about the required project outputs, such as specific knowledge or intellectual property rights, and how the project would contribute to the wider deployment of technology and meet policy objectives.

2.5 The Department's predecessor did not review the case for a commercial-scale demonstration project against other alternatives such as exploring the risks of operating and integrating elements of the technology in different locations or using different technologies. The Department's predecessor also did not consider alternatives to competitive procurement as the preferred means, such as establishing a design and costing competition, or a fund awarding grants to develop the project in stages. Without clear articulation of outputs and consideration of alternatives, the Department and its predecessor had no intermediate metrics or comparators for subsequently assessing the progress of the project and its value for money.

2.6 Without having articulated how the chosen project would deliver its policy objectives the Department's predecessor set a restrictive specification for the competition. The competition was limited to projects able to demonstrate post-combustion carbon capture technology on a coal-fired power station. This technology could be retrofitted to coal power stations, such as those being built in emerging economies, and so could support the Government's international policy objective. However, the specification restricted the demonstration to a specific part of the UK generation sector and limited, at an early stage, the number of viable projects that could compete for government support.

2.7 In April 2008, the Department's predecessor produced a revised business case, including revised project objectives that placed increased emphasis on the importance of delivering specific knowledge that could be used in other subsequent projects in the UK and internationally. It also developed its approach to securing knowledge transfer. This began to clarify how the project would contribute to the Government's policy objectives.

2.8 In June 2009, the Department began to develop a wider programme of carbon capture and storage demonstration projects to deliver its policy objectives. It announced plans to support up to three further demonstration projects which potentially could address technologies not covered by the first project, such as pre-combustion carbon capture and capture technology applied to gas-fired power stations.

The Department for Business, Enterprise and Regulatory Reform launched the competition without a clear strategy or timetable to secure funding

2.9 Public sector projects must be delivered within pre-set budgets. It is important at the outset to establish what funds are available, so that realistic decisions can be made about a project's potential scope and specification and contract terms. The funds available will inform the 'walk-away price' (the cost limit, above which a competition would be cancelled). This is particularly important where the benefits and risks from a project are hard to value.

2.10 At the launch of the competition, the Department for Business, Enterprise and Regulatory Reform, the Department's predecessor, proposed to fund up to 100 per cent of the additional capital and operating costs incurred in successfully demonstrating the technology. However, it had not agreed with the Treasury how the project would be financed or the amount of finance that would be available. At the launch, the Department's predecessor's best estimate was that the total project cost would be between £500 million and £700 million (discounted to 2007 values). This was at the lower end of the range of estimates from its advisers earlier in the year, which noted that the cost of a carbon capture and storage project could be up to £2.6 billion (discounted to 2007 values).

2.11 Without a formal funding commitment from the Treasury, in January 2009 the Department set itself a walk-away price of £2.9 billion to inform its negotiations. The walk-away price was based on the most costly alternative source of energy – offshore wind – increased by 60 per cent to take account of the additional costs involved in developing first-of-a-kind projects and to reflect the fact that electricity generation from wind is intermittent. It was appropriate to determine a walk-away price, but difficult to determine a suitable methodology for doing so, as there was a very broad range of alternatives to the demonstration project. For example, public funds might have been used to support other approaches to carbon capture and storage, or other ways of reducing carbon from the energy generation system, or for initiatives to reduce demand. In practice, the Department's early estimates of bidders' costs fell within the walk-away price and, by the time the Department began negotiations with bidders on costs in 2011, the walk-away price had been replaced by the agreed capital spending limit.

2.12 Following extensive discussions between the Department and Treasury officials, the April 2009 budget announced the Government's continued commitment to the demonstration project. However, the budget confirmed that the Treasury would determine what funds were available in the Spending Review in 2010. Alongside this, the Treasury announced that it would make £90 million available in 2010-11 for the engineering and design studies. It also announced that it would put in place a funding mechanism to support carbon capture and storage demonstration projects.[21] In June 2009, the Department confirmed that this would be a levy on energy suppliers that would be passed on to consumers and would fund the demonstration projects including, potentially, the first one.[22]

2.13 The Government reached a decision on affordability for the demonstration project in the Spending Review in October 2010. It decided that the project would be funded with 'up to £1 billion'[23] of capital investment from direct taxation and not through a levy. At this time, a decision on how the long-term operating costs of the project might be met was deferred pending further work on reforms to the electricity market. The Department was not therefore in a position to negotiate with bidders the full cost and risk allocation.

The Department for Business, Enterprise and Regulatory Reform did not have a clear strategy to address commercial risks

2.14 At the outset of a major project, it is important to assess the risks and review in detail whether the project cost is realistic and feasible and whether the proposed means of delivery is the most appropriate. From the outset a project's commercial strategy should address the risks explicitly and identify the ways risks affect costs. The commercial strategy should separately address project costs, costs arising from acceptance of risks, and returns. Clarity over risks and their costs can help identify whether the project is affordable or whether a decision is needed to stop and reconsider alternatives.

2.15 Before launching the competition, in 2006 and 2007, the Government built up its commercial understanding of the case for the project. The Treasury consulted with industry on commercial barriers to carbon capture and storage deployment[24] and the Department for Business, Enterprise and Regulatory Reform (the Department's predecessor) commissioned analysis of costs of a commercial-scale project.[25] The consultation identified technical, commercial and regulatory challenges, including:

- the technical difficulty of integrating technologies at commercial scale and practical obstacles to retrofitting carbon capture to existing power stations;
- the complexity of balancing different commercial interests through the technology chain; and
- the inadequacy of the existing regulatory framework to transport and store carbon dioxide.

The Department's predecessor concluded from its analysis that companies would not bring forward a project without government support in current market conditions. It expected to improve its understanding of risks as the competition proceeded.

2.16 The Department's predecessor designed and launched the competition in 2007 without a detailed assessment of the costs, benefits and risks of proceeding with the chosen specification decisions. These included specifying the capture technology as post-combustion, defining 'commercial' scale at 300–400 megawatts of plant output and setting the time frame for delivery of the project at 2014. The risks included that bidders might not maintain a continued interest in coal as part of their commercial portfolio and the need to progress the project over a timescale where regulatory risks could not be removed.

2.17 Prior to launch, the Department's predecessor did not subject the project to its standard internal challenge process, and launched despite external reviewers recommending it should be delayed. In October 2007, the Major Projects Review Group advised delay highlighting serious shortcomings in the preparations for the project, including in the commercial capability of the project team and the commercial strategy for delivering the procurement. With the Treasury's support, the Department's predecessor launched the competition on the existing timetable but planned to address the shortcomings noted by the Major Projects Review Group before advancing the procurement beyond the pre-qualification stage.

2.18 The Department's predecessor responded to the external reviewers' concerns by appointing a full-time senior responsible officer with commercial experience in January 2008, building up its project team and revising its commercial strategy. The revised commercial strategy included an additional engineering and design stage, to help address the cost risk. Following the conclusion of discussions with the Treasury leading up to Budget 2009 on how best to fund the project, the Invitation to Negotiate, was sent to bidders in July 2009, 14 months later than initially planned.

The set-up and procurement approach provided a useful structure for the project but imposed some restrictions

2.19 It is important at the outset of a major project to ensure there are appropriate processes and resources to enable the right judgement on scope and to establish an appropriate procurement approach. Without these, there is an increased risk of pursuing an approach that cannot deliver its objectives and may place value for money at risk.

2.20 The Department for Business, Enterprise and Regulatory Reform's chosen design for the competitive procurement was based on its analysis of different procurement options. Its financial and legal advisers recommended the 'negotiated procedure' approach because it was most likely to align with EU regulations and provided opportunities to adjust the specification after selecting the preferred bidder. The Department's predecessor concluded that the flexibility in the negotiated procedure was necessary, given the innovation required in bidders' designs and solutions.

2.21 In practice, the procurement approach provided useful milestones and structure to the negotiations and gave the Department and its predecessor a clear process to compare the status of the respective bids. The procurement timetable and the development of bidders' solutions also helped inform the Department's policy and regulatory work. For example, it enabled the Department and other government bodies to identify where existing regulation, such as on carbon dioxide transportation and storage consenting, needed to be amended to facilitate deployment.

2.22 However, competitive procurement also imposed restrictions. The Department and bidders found that the process constrained communication, preventing quick resolution of queries. Having set a narrow specification, the Department also found that the competition rules prevented bidders from developing alternative, more affordable, technical solutions. For example, during final negotiations with the ScottishPower consortium, the Department was aware that options for altering the technical solution – such as reducing the plant size the technology would operate on – would contravene the original specification and might prompt legal challenge, should a contract be awarded.

Governance arrangements were strengthened after the Department for Business, Enterprise and Regulatory Reform launched the competition

2.23 Major projects inevitably encounter changes and unexpected circumstances arise. It is therefore important to establish good project management and clear review points, when progress can be reviewed and earlier decisions revisited. This is particularly the case when undertaking innovative projects and there is considerable uncertainty, and where understanding of the risks improves as the project proceeds.

2.24 A review by the Major Projects Review Group prior to launch expressed concerns about project management arrangements, noting that the current project team was small for a project of this scale and complexity and that governance arrangements were unclear. Between November 2007 and October 2011, the competition was subject to seven further assessments for the Major Projects Review Group and one by the Office of Government Commerce. These reviews examined the status of the project, identified sources of risk to the successful completion of the procurement and provided advice. They did not analyse in detail the range of options open to the Department or make recommendations to the Department or the Treasury to halt the procurement and re-evaluate the project against alternative options.

2.25 From March 2008, the competition was also subject to an increased level of internal challenge. A project steering board met monthly to discuss emerging risks to the competition. The project was also challenged periodically by an advisory or challenge panel, made up of senior officials from across government and advisers from the private sector. In 2011, the Department developed a set of criteria to use to challenge itself on whether a contract was likely to deliver value for money. These criteria provided a sound basis on which to assess the likely value for money of a contract once negotiations were completed. However, they were not designed to monitor progress during the competition as they did not address the Department's position on sharing risk and the probability of agreeing mutually acceptable commercial terms with bidders. From May 2011, the project was also subject to challenge by the Department's newly established internal approvals board, which met three times to review progress with negotiations and assess the value-for-money risks of a potential contract with the last remaining bidder. The Department's management of the project through its key stages is addressed further in Part Three.

Part Three

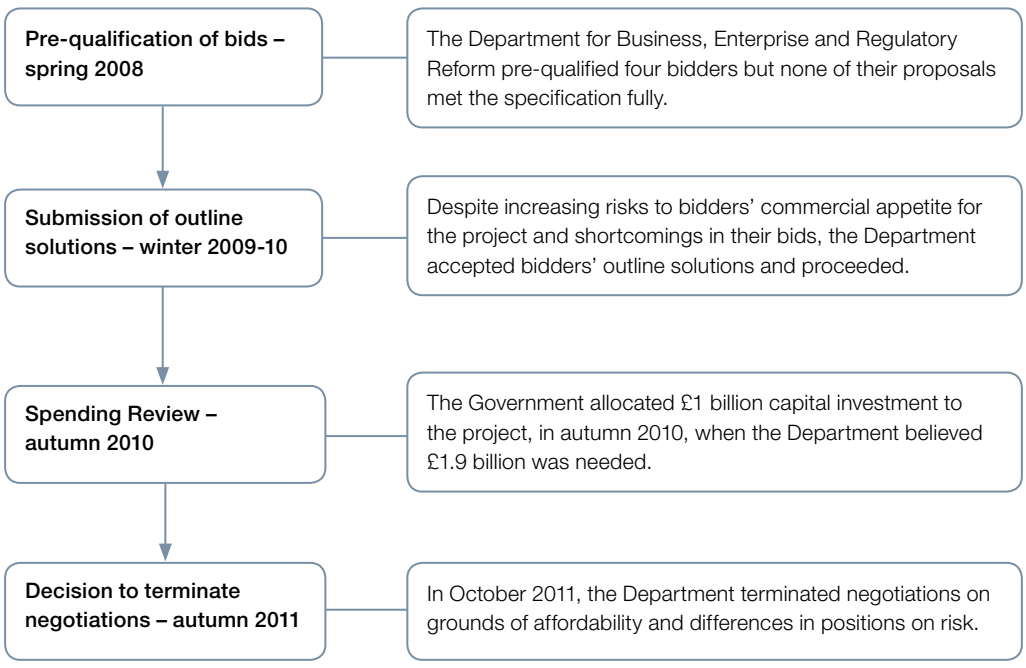
Managing progress on the project

3.1 From the project's launch, in 2007, the procurement process set out four key milestones. These were the pre-qualification of the bidders; considering outline solutions; considering detailed solutions; and contract award (Figure 1). This Part examines how the Department considered risks and progress at these stages and at two other important points in the project:

- In autumn 2010, when only the ScottishPower consortium[f] remained in the competition.
- In early 2011, when the Department considered the heads of terms of the contract.

The findings are summarised in **Figure 6** and set out in more detail below.

Figure 6
Key project stages



Source: National Audit Office

f Other members of the consortium, besides ScottishPower, included National Grid, to operate the onshore carbon dioxide transportation process, and Shell to run the storage process.

The Department for Business, Enterprise and Regulatory Reform pre-qualified four bidders but none of their proposals met its specification fully

3.2 The competition required potential bidders to submit expressions of interest and provide information on their technical capacity and ability, and their economic and financial standing, by March 2008. The Department for Business, Enterprise and Regulatory Reform (the Department's predecessor) aimed to select at least three bidders capable of entering into negotiations. This stage of the competition did not involve a judgement on the bidders' proposed projects.

3.3 Nine companies submitted proposals. The Department's predecessor judged in June 2008 that four were qualified to remain in the competition because they had the necessary technical ability and capacity, and economic and financial standing to develop, fund and deliver a project of this type and scale. They were ScottishPower, E.ON, Peel Power and BP Alternative Energy International.

3.4 None of the four qualifying bidders proposed to fully meet the requirement that they operate the technology from 2014 on a modern efficient (supercritical)[g] coal power station. The Department's predecessor notified bidders that they would, however, also accept proposals to operate the technology initially on less efficient plant. The ScottishPower bid proposed to use an existing but not supercritical power station from 2014, replacing it with a new efficient power station at a later date. The other bids involved new power stations that had not received government consents and had not received company investment approval, and therefore were unlikely to be operational by 2014.

3.5 The Department could not proceed further to invitation-to-tender stage until April 2009 because of the lack of confirmation of funding from the Treasury. In March and April 2009, the Treasury proposed that the Department consider cancelling the first demonstration competition and develop an alternative approach to supporting carbon capture and storage. This was on the grounds that the costs of the projects in the existing competition presented unacceptable risks to the public finances. The Department did not, however, undertake a detailed examination of the costs, benefits and risks of cancelling the competition or alternative options. The Department and the Treasury agreed to continue the first demonstration competition, and to fund the engineering and design stage to reduce uncertainty on project costs. They also agreed to examine the levy funding option and to make a final judgement on affordability in the Spending Review in 2010. This decision would be after bidders submitted outline solutions and the award of engineering and design contracts.

g The Department for Business, Enterprise and Regulatory Reform specified that the project should preferably be on an efficient supercritical power station. A power plant is defined as supercritical when the main steam temperature is above 374°C and the pressure is above 220 bar g. Department for Business, Enterprise and Regulatory Reform, *Competition for a Carbon Dioxide Capture and Storage Demonstration Project, Project Information Memorandum,* November 2007.

Despite increasing risks to bidders' commercial appetite for the project and shortcomings in their bids, the Department accepted bidders' outline solutions and proceeded

3.6 During 2009, uncertainty within industry over the case for commercial investment in new coal-fired power stations in the UK was exacerbated by new government proposals for curtailing emissions from electricity generation. Between June and November 2009, the Department developed and announced proposals requiring any new coal-fired power station to have a commercial-scale carbon capture and storage demonstration, and have the technology operating on full generating capacity by 2025.[26] The three remaining bidders' proposals (BP left the competition in October 2008) were all still dependent on decisions to invest in updating and/or building new coal-fired power stations, a small part of which would be used to demonstrate carbon capture and storage technology. So the viability of the bids was heavily dependent on the power companies' assessment of the commercial risks and returns from investing in coal power stations. The Peel consortium, which included Peel Energy, RWE and Dong Energy, withdrew from the competition by not submitting an outline solution in November 2009. This followed RWE's decision earlier in the year not to build a power plant at Tilbury, which was to have hosted the carbon capture and storage demonstration plant. ScottishPower and E.ON submitted proposals but indicated that they had not yet committed to investing in new coal-fired power stations (at Longannet in Fife and Kingsnorth in Kent, respectively).

3.7 The Department could see from the outline solutions submitted by E.ON and ScottishPower that the proposals did not yet meet its procurement requirements. This stage of the procurement process involved assessing whether proposed solutions would meet policy requirements, carbon dioxide requirements, deliverability, knowledge transfer and other qualitative factors. The Department's scoring of bids at the outline solution stage focused on the bidders' technical proposals, giving less weight to their commercial proposals, and did not consider the cost of the bidders' solutions. One bid scored 42 out of 100 and the other 51 out of 100. For both bids, contractual arrangements for geological storage of the carbon dioxide and the terms of consortium members' involvement in delivering the project had still to be finalised.

3.8 As part of the outline solution stage, the Department required bidders to comment on the Department's draft project contract and identify separately how they expected to share risk with the Department. The outline solution submissions clearly indicated that the bidders' commercial terms differed from the Department's assumptions. The Department's assumptions were based on standard contract terms, which allocate the majority of project-specific risk (including those relating to project cost, performance and programme) to the bidder. The two bidders strongly objected to taking in full the design and performance risk and the change of law risk, which included laws unrelated to the project, such as corporate tax rates and employment law. Bidders also wanted to limit their liability concerning potential leakage of carbon dioxide. The 2009 EU Directive on the geological storage of carbon dioxide states that operators of the storage site are responsible for any liabilities until all available evidence indicates that the stored carbon dioxide will be completely and permanently contained, from which point responsibility transfers to national governments. The liability for leakage is potentially very costly, as it could require purchasing of EU emissions allowances for carbon dioxide that leaks from the site.[27]

3.9 In January 2010, the Department deemed both bids to be of 'sufficient quality' to proceed in the competition and to move to negotiating and awarding engineering and design contracts. This was following:

- a qualitative review of whether to proceed with one, both or neither bids by the project steering board in December 2009. The Department considered the costs, benefits and risks of pursuing the competition but did not review alternative options or the opportunity cost of the delay in developing alternatives if the competition failed to result in the award of a contract;
- advice from legal, technical and financial advisers involved in evaluation, in December 2009, that there were no grounds to advise excluding either bid; and
- the Department's initial review of bidders' proposals for engineering and design studies, to confirm there was merit in proceeding to negotiate awarding engineering and design contracts for up to £30 million each for the two bidders – to keep competitive tension and to provide better costings and value for money before awarding the contract.

The Department's decision to proceed was then also endorsed by the Major Projects Review Group in February 2010.

3.10 The Department awarded engineering and design contracts to E.ON for £12 million and to the ScottishPower consortium for £30 million in March 2010 to cover 75 per cent of the costs of the work. The bidders agreed to carry out specific technical studies and deliver agreed knowledge transfer, and to fund 25 per cent of the costs of the work. The Department recognised that the studies would not result in bidders agreeing to price certainty at future contract award stage. It considered, however, that the studies would provide detailed knowledge that would represent value for money even if a contract was not subsequently awarded. The Department developed a detailed monitoring regime to assess the bidders' engineering and design outputs. The engineering and design studies cost the Department £40 million, 5 per cent less than its initial estimate. The Department

has made the documentary outputs publically available on its website and held workshops with industry to disseminate the information. It considers the outputs are excellent value. Industry stakeholders have welcomed the availability of such detailed information and have indicated that it may make future engineering and design studies less costly and easier to conduct.

The Government allocated £1 billion capital investment to the project, in autumn 2010, when the Department believed £1.9 billion was needed

3.11 In July 2010, a Major Projects Review of the project, as part of a review of all ongoing major projects, did not advise cancellation of the competition. It noted the significant strategic benefit of developing the technology and the risks that cancellation would have a negative impact on the development of subsequent demonstration projects; leave the Government relying on progress in other countries for eventual commercial deployment in the UK; and risk losing EU funding. The reviewers rated their confidence in the deliverability of the project as 'amber', meaning that successful delivery appeared feasible but significant issues existed. They also advised that there was no existing commercial or economic rationale for the private sector to take any material risk on the development or operation of carbon capture and storage.

3.12 Over summer and autumn 2010, the Department and the Treasury discussed the funding available to the project through the Spending Review. This resulted in agreement on a capital budget of up to £1 billion. The Department and the Treasury deferred a decision on the amount of funding for the long-term operating cost of the project, pending further work on reforms to the electricity market. The Department understood however that funding would be made available either through a levy or through general taxation. By this time, there were a number of risks to the success of the competition:

- The Department had received an indication from E.ON, in October 2010, that it intended to withdraw from the competition, leaving one bidder and removing competitive tension.
- The Department identified the level of capital support required for the project at £1.9 billion. This preliminary figure was based on data provided by the ScottishPower consortium before its engineering and design work had been completed and included an adjustment for optimism bias, in line with standard Treasury guidance.
- The Department estimated the revenue support required at £2.3 billion spread over the lifetime of the project.
- Despite further development of the regulatory framework for carbon capture and storage it was evident that it was unlikely to be in place before awarding the contract and that this would leave bidders unwilling to agree to take on associated risks.

- Environmental and emission regulations, to mitigate the effect of coal-fired power generation, threatened to undermine the case for investing in and operating coal-fired power generation.[h]
- There continued to be a significant distance between the commercial terms that the Department and the ScottishPower consortium were likely to find acceptable.

In October 2011, the Department terminated negotiations on grounds of affordability and differences in positions on risk

3.13 A ministerial negotiating team was formed to engage with the ScottishPower-led consortium, including ScottishPower's Spanish parent company, Iberdrola, at a senior level and to explore the potential for achieving a deal. The ministerial negotiating team sought to reach heads of terms for the contract by March 2011. The consortium members' heads of terms documents, supplied on 2 February 2011, did not represent any significant change from positions expressed at the outline solution stage in November 2009. The documents continued to highlight that any deal would require the Government to accept material risks resulting from a change of law and from events which the consortium deemed beyond their control. The Department also found that it could not agree with the consortium on how individual members would share risk through an integration agreement.

3.14 The Department presented its response to these heads of terms in March 2011, but the consortium's engineering and design study confirmed that its capital cost estimate for the project had not changed significantly, at £1.3 billion, potentially rising to £1.5 billion because of estimating uncertainty, which was well above the £1 billion Treasury limit. These estimates included £195 million to cover project contingencies but did not include the return that consortium members might seek on their investment.

3.15 To prevent negotiations collapsing, in March 2011, to maintain impetus in the project design work and to reduce cost uncertainty further, the Department agreed with the consortium members that it would fund an extension to the engineering and design studies. On 30 March 2011, the Treasury published detailed proposals for a carbon price floor, effective from 1 April 2013, which would impose a minimum charge on power stations emitting carbon dioxide. Although the section of the plant fitted with carbon capture for the demonstration project would receive relief from the charge, the carbon price floor would increase the cost of operating the rest of the Longannet power station. ScottishPower considered that this raised a risk that it would not recoup the investment required to guarantee the operation of its power station for the duration of the demonstration project. In response, ScottishPower delayed committing to carry out further engineering and design work. The Department identified with the consortium aspirational savings of £252 million which it considered could have reduced the capital cost of the demonstration project to £1.1 billion. The consortium could not commit to these savings without further development work and ScottishPower considered that the

h For example, the EU's Large Combustion Plant Directive and the Industrial Emissions Directive, as well as UK Government proposals for Emissions Performance Standards and a carbon price floor.

changes required would have been a breach of the procurement specification and could have prompted legal challenge. The Department planned to seek advice on whether this was a significant risk had negotiations advanced further.

3.16 Between May 2011 and September 2011, the Department continued to seek resolutions to the cost and risk issues outstanding without success. A review by the Major Projects Authority, in March 2011, rated the project 'red-amber', meaning that successful delivery of the project was in doubt. A follow-up review by the Major Projects Review Group, in June 2011, further emphasised strong doubts that an acceptable outcome could be achieved from negotiations. The Department nevertheless undertook further discussions with the consortium on a draft project contract to try to agree contract terms before the end of July but did not succeed. The Department's internal approvals board reviewed progress in July and discussions with the consortium, including ScottishPower's parent company Iberdrola, continued over the summer. By September, the Department considered it had not achieved sufficient progress. The consortium's best estimate of project capital cost remained about £200 million above the Department's capital budget, excluding any return the consortium might seek as part of the contract price.

3.17 The Department considered that, to protect value for money, it should cancel the procurement. On 19 October, the decision not to continue with negotiations was publically announced, following advice from the project's Senior Responsible Officer endorsed by the Department's approvals board that:

- the project could not be funded within the £1 billion capital limit;
- there was no additional funding available to help ScottishPower meet the potential cost of the carbon price floor on Longannet power plant operations for the period of the demonstration project; and
- there was no prospect of agreeing with all individual consortium members appropriate contractual terms for the project.

Appendix One

Methodology

The main elements of our fieldwork, which were undertaken between November 2011 and January 2012, were:

Selected method	Purpose
Assess the Department for Business, Enterprise and Regulatory Reform's project set-up documents against good practice (NAO, Initiating Successful Projects, 2011).	To understand the Department for Business, Enterprise and Regulatory Reform's approach to management of the competition – including its rationale for the design and conduct of the procurement, analysis of feasibility and cost risks and use of options appraisal to inform decision-making.
Review external challenge assessments by the Office of Government Commerce, the Major Projects Review Group and the Major Projects Authority that report on project progress and risks to the competition.	To inform how project management progressed during the competition and to contextualise the Department and its predecessor's understanding of risks and decision-making at key points.
Review of key competition documents and bid evaluations.	To understand the design and operation of the Department's competition and methodology for selecting bids.
Review of programme governance and risk management documentation: including minutes of steering boards and departmental approvals board, financial data, risk registers, cost and time estimates and walk-away price analysis and internal progress reports.	To understand how the programme was managed, and risks and progress assessed. To understand how negotiations with the final bidder were handled and progressed.
Review of Front-end Engineering and Design (FEED) monitoring and evaluation reports.	To understand how the Department managed the FEED process and establish the outputs from the studies.
Semi-structured interviews with current and former officials in the Department and its predecessor and departmental advisers.	To understand how the competition was managed, and risks assessed.
Stakeholder interviews with other government bodies; participants in the competition; industry associations and expert commentators.	To identify key risks to delivery as perceived by industry and consumer stakeholders and how these have been reflected in the Department's decision-making.

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