

Developing Carbon Capture and Storage (CCS) Infrastructure:

Consultation on Implementing the Third Party Access Provisions of the CCS Directive and Call for Evidence on Long Term Development of CCS Infrastructure

URN: 10D/989

December 2010

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Foreword



Carbon Capture and Storage (CCS) encompasses technologies for capturing carbon dioxide that would otherwise be emitted to the atmosphere, transporting and storing it deep underground in geological formations where it will be permanently contained. The deployment of CCS on a global

scale will be crucial to meeting the challenge of climate change in the most cost effective way. It will also create global business opportunities. In the UK alone these could be worth in excess of £3bn a year by 2030.

While there is widespread acceptance that CCS is technically viable, there is still much to be learnt about the application of the suite of technologies (capture, transport and storage) on a commercial basis. The Government is committed to playing a leading part in the global effort to demonstrate CCS at an industrial scale. In the 2010 Spending Review we announced £1bn to support what is expected to be one of the world's first demonstrations of CCS on a commercial power station. This should have completed construction by 2014/15. We are also committed to providing public support for a further three demonstration projects, and have recently widened the scope for this programme to include gas fired power stations.

But we cannot stop there. We also need to anticipate and encourage the wider deployment of CCS in the economy. We are soon to be consulting on reforms to the electricity market intended to drive investment in clean power. We also need to anticipate, as far as we are able, the enormous investment that will be required to deploy CCS in the future. This consultation is a crucial first step in helping us develop our ideas on one important aspect of this – how, as a country, we can ensure that we make best use of our promising storage assets, and how we can organise and make best use of the investments in the transport infrastructure we will need. The consultation is also aimed at helping us decide how best to implement EU requirements for third party access to carbon dioxide pipelines and storage sites in a way that balances the interests of the owners and potential users of those facilities.

These are big questions, and this consultation is the start of a process to answer them. The views we receive will be crucial to developing our future policy in this area. I hope very much that you will contribute.

Charles Hendry
Minister of State, Department of Energy and Climate Change

Aim of this Document

This consultation asks for views on two issues likely to affect the future development of Carbon Capture and Storage (CCS) infrastructure (carbon dioxide pipelines and storage sites) – third party access and how best to organise long-term investment.

Section 1 outlines the purpose of the document and sets out some of the background.

Section 2 sets out our proposals for transposing into UK law third party access requirements of an EU CCS Directive¹. The Directive requires Government to introduce arrangements that enable third parties to access infrastructure on a fair and transparent basis. UK legislation already includes similar arrangements for pipelines (including those carrying carbon dioxide). Our proposed approach is therefore to extend those legislative principles so that they also cover carbon dioxide storage sites. We will then modify these principles so that they also meet the transparency requirements of the CCS Directive. We believe that this is the minimum necessary to comply with the obligations in the Directive. We are consulting on this proposed approach, including the accompanying draft Impact Assessment and the draft Regulations intended to bring these changes into effect.

Section 3 asks for ideas and views on what, if any, additional steps Government might take to develop the investment framework for CCS infrastructure. Two approaches are identified. The first involves enhancements to the ‘regulated decentralised’ approach (sometimes called mercantilist) on which the arrangements in Section 2 are based. The second takes a more ‘centralised’ approach (sometimes called monopolistic). This involves creating a single entity which has responsibility for the development of infrastructure within a defined region.

This part of the document is not a formal consultation although we would nevertheless welcome your views on the issues raised.

Responding to this Document

We would welcome comments on all the issues raised in this document, although particular questions on which we are seeking feedback are highlighted in the relevant sections. We would also be happy to discuss the issues raised in this document with stakeholders and interested parties (contact details are at the end of this section).

To meet the deadline set by the EU for the transposition of the CCS Directive we are asking for responses to Section 2 (on third party access) no later than 4 February **2011**. This is shorter than the 12 weeks usually set aside for consultations. However, we believe it is justified given our intention to do the minimum required to

¹ Directive on the Geological Storage of Carbon Dioxide. 2009/31/EC. 23 April 2009.

implement the requirements of the CCS Directive, which has been in the public domain for some time and was consulted on extensively during its negotiation.

The ideas in Section 3 have not previously been subject to consultation, are less time-constrained, and potentially have a wider impact. Responses are therefore not required until 4 March 2011.

How to respond

Section 2 will close 8 weeks after publication on 4 February 2011. The closing date for Section 3 is 12 weeks after publication on 4 March 2011. When responding, please state whether you are responding as an individual or representing the views of an organisation. Please make it clear in your response who the organisation represents, and where applicable, how the views of members were assembled.

All responses should be sent to: occs@decc.gsi.gov.uk

Alternatively, please send hard copy responses by post to:

CCS Infrastructure Consultation
OCCS
Department of Energy and Climate Change
Area 4B
3 Whitehall Place
London SW1A 2AW

Please feel free to respond in the format that suits you best.

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http://www.decc.gov.uk/en/content/cms/consultations/ccs_3rd_party/ccs_3rd_party.aspx

Confidentiality and data protection

Your response may be made public by the Government. If you do not want all or part of your response or name to be made public, please identify the information which you do not wish to be disclosed. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

You should be aware that information provided in response to the consultation including personal information, may be subject to publication or disclosure in access to information regimes (principally the Freedom of Information Act 2000 (FOIA), the

Data Protection Act 1998 (DPA) and the Environmental Information Regulations 2004).

If you want information that you have provided to be treated as confidential please be aware that under the FOIA there is a Statutory Code of Practice with which public authorities must comply and which deals with, amongst other things, obligations of confidence.

In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances.

The Department will process your personal data in accordance with the DPA and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties.

Help with queries

If you want to discuss the content of this document then please contact:

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If you have any comments or complaints about the way the Consultation has been conducted, these should be sent to the DECC Consultation Coordinator:

DECC Consultation Coordinator
3 Whitehall Place
London SW1A 2AW
Email: consultation.coordinator@decc.gsi.gov.uk

Timing and Next Steps

Subject to the outcome of the consultation the intention is to introduce regulations necessary to implement the arrangements summarised in Section 2 as soon as Parliamentary time allows. We will feed the views we receive on Section 3 into the thinking on the development of a CCS roadmap. The intention is to publish the roadmap in Spring 2011.

Territorial Extent

The draft regulations accompanying Section 2 cover areas of devolved competence in Scotland. Scottish Ministers will be informed by the results of this consultation. In order to make clear to consultees how these arrangements would apply throughout

Great Britain and offshore, the draft regulations have been prepared on the assumption that they extend to Scotland as well as England and Wales. Before laying the final regulations on a Great Britain and offshore basis, the Government will secure the agreement of the Scottish Ministers. This does not prejudice decisions that Scottish Ministers might take to regulate independently in this area.

Consultation Questions

Consultation Question	
1.	Do you agree with our proposed approach to implementing the third party access requirements of the CCS Directive? If not, then what other measures do you think we should take? What would be the benefits of this alternative approach compared with the one we are proposing?
2.	Are the proposed conditions attached to the exercise of the powers of the authority a reasonable balance between the interests of the parties? If not, what additional points should be included and why?
3.	Do you have any comments on the draft Impact Assessment that accompanies this Consultation? Do you think our estimate of the regulatory impact of these measures is reasonable?
4.	Do you have any comments on the draft Regulations that accompany this Consultation?
5.	Do you think any of the measures suggested in the NERA Report would make the regulated decentralised model more effective in encouraging the development of CCS infrastructure that anticipates future demand? Can you provide evidence that would help us assess their likely costs and benefits to CCS?
6.	Are there any further steps we should consider that would make the regulated decentralised model more effective in encouraging the development of CCS infrastructure that anticipates future demand? Can you provide evidence that would help us assess their likely costs and benefits to CCS?
7.	What are your views on the creation of a centrally controlled approach to CCS infrastructure? Do you think you think we have identified the main advantages and disadvantages in this document? Do you see any advantages or evidence to support a public sector approach compared with a regulated private monopoly?
8.	Are there other funding and financing models we should be considering for the development of CCS infrastructure? Please include the advantages and disadvantages of these models in your response.

Section 1: Introduction

This section outlines the purpose of this document and provides background to the issues discussed within it.

1.1. The rationale for supporting the development of CCS is a clear and compelling one. Fossil fuels play a vital role in providing energy in the UK and globally and will continue to do so for the foreseeable future. But the use of fossil fuels for power generation makes up some 30% of domestic carbon dioxide emissions and around 70% of global emissions².

1.2. The International Energy Agency (IEA) has forecast that global electricity consumption will nearly double by 2030 with over 40% of electricity provided by coal generation³. It is clear that if we are to meet the challenge of climate change, ensuring continued security of supply as well as increasing our use of low carbon technologies such as renewables and nuclear, we need to develop the technologies to decarbonise fossil fuel generation. CCS will allow us to continue to use fossil fuels for the generation of electricity, while reducing carbon dioxide emissions to the atmosphere by 90%. The same technologies could also be used to capture carbon dioxide from other large point source emitters such as steel, petrochemical and cement works.

1.3. CCS involves three key steps:

- capturing carbon dioxide from power plants and other industrial sources;
- transporting carbon dioxide to storage sites;
- permanently storing carbon dioxide in geological sites such as depleted oil and gas fields or deep saline formations.

1.4. The individual processes involved in CCS are not novel, but the full chain of technologies (capture, transport, and storage) has yet to be demonstrated together at commercial scale on a power station.

1.5. The scale of the challenges involved in the demonstration of CCS at commercial-scale, together with the increased costs and risks associated with these 'first of a kind' demonstration projects, means that the market will not deliver deployable CCS within the timeframe required to meet carbon reduction targets. This is why the Government committed to a programme to 'Continue public investment in carbon capture and storage (CCS) technology for four coal-fired power

² *Towards Carbon Capture and Storage. A Consultation Document* (BERR, London 2008) p12

³ *Energy Technology Perspectives. Scenarios and Strategies to 2050* (IEA, Paris, 2008) pp 251-52

stations⁴. This Demonstration Programme is the UK Government's contribution to the global effort to stimulate the commercialisation of CCS.

The CCS Demonstration Programme

1.6. The UK CCS Demonstration Programme will be the main source of learning and experience about the different carbon capture and storage technologies in the UK. From the Demonstration Programme we will learn how best to construct these plants, what they will cost (to build, maintain and operate), what their operational reliability and flexibility will be, as well as identifying the main areas for improvement.

1.7. The Demonstration Programme will also increase our experience of the processes associated with the transportation and injection of carbon dioxide. The storage sites will act as test cases for the licensing and later monitoring and verification process. They will also showcase UK offshore storage potential.

1.8. In addition to demonstrating the technical and commercial viability of CCS, the Demonstration Programme will also be the first opportunity to invest in CCS infrastructure (pipelines and storage sites). There is currently no infrastructure in the UK for the large scale transportation and storage of carbon dioxide.

1.9. The Demonstration Programme is intended to kick-start a range of CCS technologies. In the 2010 Spending Review we announced £1 billion to support the first demonstration project, which will be post-combustion capture on a coal-fired power station and should have completed construction by 2014/15.

1.10. The Government is also committed to providing public sector investment for a further three demonstration projects. In July 2010 we launched a market sounding⁵ aimed at potential project developers to understand more about the market appetite for participating in the demonstration programme. The findings from this exercise are being used to inform the design and selection process of the Demonstration Programme (2-4). We have already used the evidence provided through this process, along with the Committee on Climate Change analysis and our own further analysis, to inform our decision to allow CCS projects on gas-fired power stations to be part of the Demonstration Programme. We aim to set out further details regarding our proposals by the end of 2010.

1.11. Beyond the demonstration phase the deployment of CCS is expected to be driven largely by economic and regulatory considerations, within the context of reforms being considered as part of a wider review of the electricity market. In the Annual Energy Statement to Parliament on 27 July 2010 it was announced that Government will publish a consultation on electricity market reform, with a White Paper in 2011. With significant challenges ahead for the energy sector and a need for substantial new investment, this will review the way that market design choices affect investment decision in generating capacity.

⁴ Coalition Programme for Government. May 2010. <http://programmeforgovernment.hmg.gov.uk/>

⁵ http://www.decc.gov.uk/en/content/cms/consultations/mktsound_ccs/mktsound_ccs.aspx

Section 2: Consultation on Third Party Access Provisions of the CCS Directive

This section outlines how the Government is proposing to transpose the third party access provisions of the EU CCS Directive. We begin by briefly outlining the Directive and the current regulatory framework in the UK. We then examine the gaps and set out how we are intending to address these. Accompanying this Consultation document is the draft Impact Assessment and draft Regulations intended to put these changes into effect.

Introduction

2.1. The CCS Directive requires Member States to ensure that third parties are able to obtain fair and open access to transport networks and storage sites. The Directive requires the arrangements to be transparent and non-discriminatory. They must also ensure that if an operator refuses to give access to a third party on grounds of lack of capacity, or lack of connection, then the operator makes the necessary enhancements where it is economically viable, or when a potential customer is willing to pay for these enhancements, providing doing so does not have a detrimental impact on the integrity of the pipeline or storage site.

2.2. The CCS Directive also allows access to be refused where there is incompatibility in technical specifications which cannot reasonably be overcome, or where there is insufficient current or likely future capacity. The relevant Articles of the CCS Directive can be found at Appendix A.

2.3. The Directive does not stipulate any specific actions that Member States should take to meet these obligations. However, the Directive does require Member States to set up independent arrangements to resolve disputes about access should they arise.

Current UK Legal Framework

2.4. The UK already has a legal framework which covers third party access to pipelines. This is set out in the Petroleum Act 1998 (offshore pipelines) and the Pipeline Act 1962 (long distance onshore pipelines) in combination with the Planning Act 2008. While this legislation is not specific to carbon dioxide, it does extend to pipelines carrying carbon dioxide (as well as those carrying most other fluids). In our view these arrangements already go a long way to fulfilling the Directive's requirements. However, there is currently no equivalent legislation for storage sites. Provisions in the Energy Act 2008 for permitting the storage of carbon dioxide do not include arrangements for securing third party access.

2.5. The existing legislation on pipelines:

- prohibits the construction of a pipeline without consent;

- allows the relevant authority to require the modification of the design of a pipeline to provide additional capacity to convey the same, or similar material, or for an offshore pipeline, to change its route;
- allows the relevant authority to determine the financial arrangements for any modification;
- provides for the relevant authority to be able to secure access by a third party to an existing pipeline designed for the purpose of conveying the substance in question; and set the conditions under which that access should be granted.

2.6. Under these arrangements the onus is on the parties to reach agreement in the first instance on a voluntary basis. However, if the process of negotiated access fails then, at the request of the party seeking access, the consenting authority has the power to intervene to ensure fair access.

2.7. The Acts also include arrangements to protect the legitimate rights of pipeline owners. For example, under the Pipe-lines Act 1962, modifications to a proposed pipeline (by way of conditions in a pipeline construction authorisation), can only be required where the consenting authority is satisfied that there is evidence of demand existing or likely to arise over the same or similar route. When imposing requirements related to third party access to an existing pipeline the consenting authority must be satisfied that granting such access would not prejudice the proper and efficient operation of the pipeline for the owners use.

2.8. There is no equivalent legislation for carbon dioxide storage sites. In order to complete the transposition of the Directive's obligations we intend to introduce arrangements which build on the existing legislation and practice for pipelines.

Proposed Regulations on CCS Infrastructure

2.9. The intention is to reflect the principles of existing pipeline regimes (under the Pipe-lines Act 1962 and the Petroleum Act 1998) in a new uniform set of Regulations for all CCS infrastructure, including on- and offshore pipelines, storage sites and associated infrastructure (e.g. pumps and interim storage facilities). It is not the intention to extend these arrangements to capture facilities. (We would welcome your comments on the draft Regulations that are being published as part of this consultation).

2.10. These build on the existing consenting arrangements for carbon dioxide pipelines and storage sites, by creating new powers that will enable the relevant authority to impose conditions related to the development of new infrastructure and for securing access to existing infrastructure. The Regulations are summarised below.

New infrastructure – requirements on capacity, design, connections and route

2.11. The draft Regulations provide for the relevant authority, in some circumstances, to impose conditions on consents for new infrastructure, requiring it

to be constructed to a greater capacity, with design modifications or (in the case of pipelines only) on a different route.

2.12. The authority will only be able to exercise these powers if it is satisfied that there is evidence of demand (or likely demand) for further infrastructure and that demand (in the case of pipelines) would be for pipelines following a similar route for at least part of their length. The authority will also have to be satisfied that the conditions it imposes will not compromise the safety and environmental integrity of the infrastructure or its efficient operation.

2.13. The authority will be able to exercise these powers on its own initiative although, in most cases, we expect that it will do so in response to representations made by third parties who want to use the infrastructure.

2.14. The power to impose conditions will be linked to existing consent regimes. The consents to which conditions may be attached include:

- a works authorisation under *s.14 of the Petroleum Act 1998* for an offshore pipeline;
- a construction authorisation under *s.1 of the Pipelines Act 1962*, or development consent under *s.31 of the Planning Act 2008*, for cross-country pipelines or nationally significant infrastructure;
- a storage permit for a storage site, under the Energy Act 2008 and associated Regulations.

2.15. Where the pipeline will require development consent under the Planning Act 2008, we intend to provide that the developer must consult the Secretary of State about potential increases to the pipeline's capacity and associated access requirements during the pre-application stage. This consultation will inform the developer's application. This will mean that third parties with an interest in the modification of a planned pipeline will need to make that interest known to the Secretary of State during the Planning Act pre-application stage, when the developer has notified the IPC of its intention to make an application. Because these arrangements will apply to all nationally significant pipelines the intention is that the necessary regulations to achieve this will be brought forward independently of these third party access regulations for carbon dioxide pipelines. The Government has announced its intention to abolish the IPC subject to the passage of the necessary legislation through Parliament.

2.16. Where the relevant authority exercises these powers, it will also be able to serve a notice in relation to the additional costs that the owner will incur as a result of increasing capacity, or modifying the design or route. The authority can require those additional costs to be borne by a person who has made representations about the need for the infrastructure to have greater capacity, a modified design or a different route. Before imposing such costs, the authority must give the third party an opportunity to apply for access to the modified pipeline.

Applying for access

2.17. A third party may also apply for access to existing transport and storage infrastructure. Those seeking such access must (in general) first seek an agreement with the owner on commercial terms. If they cannot reach agreement, the applicant can apply to the authority for a notice granting access rights. The authority may only consider such an application if it is satisfied that the applicant and the owner have had a reasonable time in which to reach agreement.

2.18. If the authority decides to consider an application for access further, it will be required to take account of specified factors:

- the capacity of the pipeline or storage site that can reasonably be made available;
- difficulties and incompatibilities in technical specification that cannot reasonably be overcome;
- the reasonable needs of the owner (and its associates) for transport and storage, and;
- any potential negative impact on the environmental security of the infrastructure.
- the interests of all users and owners of the relevant infrastructure;
- the proportion of the UK's carbon reduction obligations under international agreements and EU legislation that will be met through capture and geological storage of carbon dioxide.

2.19. The authority may only give a notice granting access rights if it is satisfied that this will not prejudice the efficient operation or environmental security of the pipeline or storage site, or the use of the pipeline or owner, its associates or other parties with rights to use the infrastructure.

2.20. Where the authority is considering an application from a third party for access rights, it also has the power to require modifications to the infrastructure in question, to increase its capacity or provide junctions for the connection of another pipeline.

2.21. If the authority grants access rights and requires modifications under the Regulations then it will also have the power to determine the charges that can be made for access and ancillary rights and the costs of the modifications that should be borne by the third party. In setting the terms of access between the parties, the authority will be bound by its general duty to act reasonably. The Regulations set out the requirements for the authority to give the relevant parties the opportunity to be heard before it makes a decision.

2.22. In setting out the terms of access we would expect that the authority will ensure that the terms reflect a fair payment for the costs and risks faced and/or forgone by the owner, including the impact on liabilities and contingent liabilities.

2.23. If the consenting authority is required to determine the financial terms for access or modification for either pipelines or storage sites, then they would be guided by principles similar to those already used in the upstream oil and gas sector. In particular the arrangements will recognise that infrastructure owners and developers have a key role to play in the development and deployment of CCS, and that too narrow a focus on setting terms on a cost-reflective basis would reduce the incentive for them to bear risk, keep their infrastructure in operation and available, invest in innovative solutions and offer added value services. Any determination will be made on its merits, but for example we would expect that:

- **Where infrastructure has been built as part of an integrated development** where provision has already been made for capital costs and spare capacity can be made available to a third party, then it is anticipated that the authority would normally set terms reflecting the incremental costs and risks imposed on the infrastructure owners.
- **Where infrastructure has been built oversized or maintained with a view to taking third party business** the terms set by the authority would normally provide for the recovery of capital costs incurred in the expectation of third party business, and be set at a level, taking account of the risks involved, to earn the owner a reasonable rate of return on the costs incurred.
- **Where there is competition for limited capacity** then the authority is unlikely to require the owner to make the capacity available to a prospective user who values the capacity less than other prospective users.

2.24. The terms determined by the authority would also reflect the risks borne by the parties. For example, one of the issues that will have a significant impact on the cost of storage is the extent to which the contingent liabilities are shared between the storage site owner and the originator of the carbon dioxide.

2.25. The CCS Directive makes the storage site permit holder legally responsible for such contingent liabilities. However, this would not stop the emitter and the storage site operator reaching agreement to share the cost in the unlikely event that such liabilities materialised. The extent that such guaranteed risk sharing is practical will depend on the financial strength of the parties involved and the availability of risk transfer instruments, such as insurance.

2.26. Clearly the balance of risk in such circumstances would have a significant impact on the commercial terms of storage. Any determination by the consenting authority where one of the parties assumed contingent liabilities would be very different from the terms in circumstances where those risks are guaranteed to be shared. The consenting authority would have to use its judgement in such circumstances having regard to the specific commercial, financial and technical circumstances of the projects that come forward for determination.

Variation and assignment

2.27. The parties may agree between themselves to vary or set aside a notice given by the authority. The authority will also have the power to vary the notice, if one of

the parties on which the notice was served applies for this. The authority must be satisfied (as when first giving the notice) that this will not prejudice the efficient operation or environmental security of the pipeline or storage site, or the use of the storage site by the owner, its associates or other parties with rights to use the infrastructure. This mechanism is intended to accommodate changes in circumstances, rather than to be used to require the authority to reconsider a decision to which one party objects.

2.28. The intention is that access rights granted by the authority may be assigned if the terms of the notice allow this. In general we would expect the authority to allow such rights to be assigned.

Enforcement

2.29. It is intended that the parties will be able to enforce access rights and modification requirements (and associated payment obligations) against each other in the same way as if these rights and obligations were contractual. Constructing new infrastructure without complying with conditions imposed on the relevant consents will have the same consequences as any other non-compliance with the conditions of such consents.

2.30. The provision of false information to the authority will be an offence in certain circumstances.

Transparency

2.31. While we are satisfied that the arrangements described above are sufficient to implement the majority of the requirements of the CCS Directive, in our view they do not satisfy the requirement for transparency.

2.32. To give effect to this requirement our intention is that key information about the pipeline and storage site should be published. Subject to the outcome of this consultation, our intended approach is for the Regulations to require owners of CCS pipelines and storage sites to publish annually information about the available capacity of the pipeline or storage site. In the event that capacity is available then the infrastructure owners would also be required to publish details of technical specifications (such as dryness and impurities) that must be met in order to secure access.

2.33. Any capacity estimate produced by the owner will be able to take account of their reasonably foreseeable needs (and those of their associates and other parties with rights to use the pipeline or storage site in question). For pipelines sized with a particular source or sources of carbon dioxide in mind, we would therefore normally expect the available capacity to be zero except where, for instance:

- there has been speculative investment in additional capacity;
- an existing pipeline has been re-used for carbon dioxide transport; or

- where the original emitters planned requirements have reduced for some reason.

2.34. We have considered whether the transparency requirement should also extend to the main commercial terms for access. However, we have concluded that this would be inconsistent with the negotiated access approach on which these arrangements are based. Moreover, such information would be meaningless unless it was also accompanied by assumptions about risk sharing which would be difficult to stipulate in advance and unnecessarily constrain the scope for commercial solutions on these points. We therefore do not consider it necessary to require publication of the main commercial terms for access.

Consultation Question	
1.	Do you agree with our proposed approach to implement the third party access requirements of the CCS Directive? If not, then what other measures do you think we should take? What would be the benefits of this alternative approach compared with the one we are proposing?
Consultation Question	
2.	Are the proposed conditions attached to the exercise of the powers of the authority a reasonable balance between the interests of the parties? If not then what additional points should be included and why?
Consultation Question	
3.	Do you have any comments on the draft Impact Assessment that accompanies this consultation? Do you think our estimate of the regulatory impact of these measures is reasonable?
Consultation Question	
4.	Do you have any comments on the draft Regulations that accompany this consultation?

Section 3: Call For Evidence On The Long-term development of CCS Infrastructure

This section asks for views on possible changes to the arrangements on which Section 2 is based. It is not a formal consultation on proposals from Government, but seeks views on the advantages and disadvantages of a number of different investment models for CCS infrastructure. We begin by outlining possible changes we could make to the ‘regulated decentralised’ approach on which the arrangements in Section 2 are based. We then consider two alternative ‘centralised’ approaches involving a monopoly provider of infrastructure. Finally, we invite ideas to other alternative models and how they might apply to CCS.

Introduction

3.1. This section asks for views on the steps the Government could take to increase the likelihood that investments made in infrastructure as part of the Demonstration Programme anticipate, as far as it is efficient to do so, the likely future demand for the transport and storage of carbon dioxide once CCS is a commercially deployable technology.

3.2. The widespread deployment of CCS is unlikely until it has been commercially demonstrated and the cost and performance of the technology together with the prevailing market conditions are such that it is a commercially viable proposition. However, there are some benefits if the arrangements governing investment in CCS infrastructure were able to anticipate potential future demand. This is particularly the case for pipelines where there are significant benefits of scale. However, there are also risks to such anticipatory investments and the risk of stranded assets (ie. CCS infrastructure not fully utilised). These costs would be reflected in those of the underlying business.

3.3. This section focuses primarily on how investment in CCS infrastructure might best be organised and regulated. We recognise that this is only part of a much wider policy framework that will impact on the location, scale and timing of investment in CCS infrastructure. The Government is also taking action in these other areas.

3.4. For example, the revised draft Energy National Policy Statement (ENS-1)⁶ requires the Infrastructure Planning Commission to take account of the future deployment of CCS when considering applications for planning consent for CCS pipelines.

⁶ <https://www.energynpsconsultation.decc.gov.uk/overarching>

3.5. The intention of this measure is to ensure that when a developer seeks permission to construct a pipeline that may be of greater capacity than would be required for demonstration, or that travels along a modified route in order to optimise future interconnection with other sources of carbon dioxide, the developer is not prohibited from doing so by planning arrangements.

3.6. The Government has also taken steps to reduce the financial risk of investing in additional pipeline capacity. A project securing support as part of the Demonstration Programme for example will be able to invest in additional pipeline or storage site capacity at marginal cost, providing this does not increase the overall risk to the public sector funds invested in the project. This could, for example, enable a pipeline to be constructed of sufficient capacity for an additional emission source in the vicinity of a Demonstration Programme power station at marginal cost to the developer.

3.7. Given the high proportion of fixed costs in pipeline construction, this significantly reduces the risks of such an investment. For example internal work undertaken for DECC suggests that a typical pipeline serving multiple sources of carbon dioxide totalling 25M tonnes a year, would cost about twice that of a pipeline sized to handle the carbon dioxide from a single source of 2.5M tonnes a year. So, on the assumption that the single source pipelines costs £250m increasing the capacity by a factor of 10 would cost an additional £250m. Put another way the marginal cost of the additional 90% of capacity would be about the same as the 10% of the capacity that is part of the Demonstration Programme. On the assumption that those costs are spread over 20 years this equates to transport costs for the multiple source approach which are about 10-15% (on a cost per tonne basis) of those for the single source.

3.8. The assumption in this document is that the conditions described in the above paragraphs will remain the same whatever approach to channelling investment is adopted. That is to say, pipeline construction will be subject to the same planning conditions and be able to secure the same financial support under the Demonstration Programme, whatever approach is adopted. It is therefore unlikely that such factors will be important in distinguishing between the alternative models.

3.9. There has been a considerable amount of research into identifying geographical concentrations of carbon dioxide emissions suitable for CCS and mapping these onto potential carbon dioxide storage sites. This work also confirms considerable projected savings in the capital and operational costs of pipeline networks when they are scaled to meet the foreseeable demand in a region.

3.10. However, to make reasonable assumptions about the timing and scale of future investments in CCS infrastructure this analysis has to be accompanied by an appreciation of the timing and extent of future deployment of CCS. This in turn depends critically on assumptions made about the rate of deployment of CCS in the economy.

3.11. Until such time as the commercial viability of CCS is demonstrated, the development of CCS infrastructure will necessarily have to take place against this backdrop of uncertainty. Put another way, investment in CCS infrastructure will

require those utilising that infrastructure to commit to its future use, or at least to speculative investment that such future use will be forthcoming in due course. This in turn creates a risk of stranded assets - investments made in anticipation of demand that does not materialise. These risks are not materially different if the investment in infrastructure is privately or publicly financed.

3.12. One assumption we are making in this document is that a decentralised approach to informing decisions about when and where to invest in CCS infrastructure will be as effective in determining the nature and scale of investment as a more centralised approach. We think this is a reasonable assumption, unless the central body is better informed about the likely future timing and scale of investments in the infrastructure than the market in general.

3.13. It is also the case that the Demonstration Programme will require no more than four pipelines and only then if there is no sharing of infrastructure between the projects successful in securing support. Consequently the opportunities for network integration and strategic planning are likely to be limited during the demonstration stage.

The Decentralised Model

3.14. Section 2 sets out the current pipeline and storage site authorisation arrangements and how we intend to modify these in order to implement the third party access requirements of the CCS Directive. We consider these changes to be the minimum necessary to incorporate the CCS Directive's requirements into our existing legislation. While these changes would be expected to facilitate investment in CCS infrastructure that anticipates future demand, this is not their primary purpose.

3.15. Under the model in Section 2, the integration of individual investments into a network and the expansion of that network would take place over time as demand develops. The assumption is that investment will be provided to meet demand, and the design, operation and integration of CCS infrastructure can similarly be left to market forces. Investment in capacity over and above that needed to fulfil immediate demand will be a trade-off between the additional costs involved and the discounted value of foreseeable additional demand. This is an approach that was used to develop oil and gas infrastructure in the North Sea.

3.16. CCS infrastructure is likely to have similar spatial characteristics to the offshore oil and gas network: for example in terms of the number of entry and exit points. However, oil and gas infrastructure is typically sized to accommodate peak load which reduces over time as production tails off. This creates 'ullage' which other parties are able to utilise. Carbon dioxide pipelines are unlikely to have the same pattern of use over time. Volumes from a particular source are likely to remain constant (or increase in a predictable way) over the lifetime of a facility, with aggregate volumes expected to increase over time as CCS becomes more widely deployed in the economy.

3.17. DECC commissioned research from NERA Economic Consulting in 2009⁷ on possible future regulatory models for CCS pipelines. This research suggested that further reforms could be introduced to improve the decentralised model's effectiveness in terms of anticipating future demand and network creation. These are set out in detail in Chapters 4, 5 and 6 of the NERA report and summarised in Appendix B.

3.18. The main recommendations from the NERA work include:

- Creating formal open season arrangements (Para 4.3 of NERA report). An open season is an obligation on a developer to make its plans known to other parties prior to finalising design and applying for consent. There is limited opportunity for other parties to make their interest known in joint developments as part of the existing pipeline consenting arrangements. However, the opportunity available to those that might have an interest in joint ventures is relatively constrained.
- Providing an obligation to provide taps and interconnections to existing pipelines on request (Para 5.1). The intention is to allow anyone to build additional pipeline capacity needed to reinforce existing capacity. This is a power available to the authority under the arrangements outlined in Section 2.
- Unbundling transport and storage from the production of carbon dioxide (Para 6.1).
- Regulated tariff structures (Para 6.2) - controls over the basis of charging especially for pipeline access.
- Secondary Capacity trading (Para 6.3) – a secondary market in pipeline capacity intended to ensure efficient utilisation of pipelines capacity through periods of peaks and troughs in demand.

3.19. We would welcome your views on these and the other ideas put forward in the NERA report, including the extent to which they could be extended to storage sites as well as pipelines.

Consultation Question

5. Do you think any of the measures suggested in the NERA Report would make the regulated decentralised model more effective in encouraging the development of CCS infrastructure that anticipates future demand? Can you provide evidence that would help us assess their likely costs and benefits to CCS?

⁷ Developing a Regulatory Framework for CCS Transportation Infrastructure, NERA, 2009. Website link: http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Carbon%20capture%20and%20storage/1_20090617131338_e_@@_ccsreg1.pdf

3.20. We would also be interested in any other ideas you have for making the regulated decentralised model more effective. Some possibilities that have occurred to us include:

- A power for the consenting authority to determine on any relevant ancillary issues affecting access to an existing or new pipeline or storage site, not just the specific matter referred to them;
- Setting a statutory timetable for the resolution of commercial negotiations between parties.

Consultation Question

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| 6. | Are there any further steps we should also be considering that would make the regulated decentralised model more effective in encouraging the development of CCS infrastructure that anticipates future demand? Can you provide evidence that would help us assess their likely costs and benefits to CCS? |
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The Centralised Model

3.21. The decentralised approach is essentially market led. Alternative models for funding and financing infrastructure also exist in the UK and elsewhere. They typically involve a single organisation which has responsibility for some or all aspects of the network including its design, investment and operation. Under this type of arrangement the owner of the network also has an obligation to develop the infrastructure to meet the demand of users and is usually required to provide access to the system on a non-discriminatory and transparent basis.

3.22. There is a high level of transparency and access under such arrangements. This is usually underpinned by well-developed financial and technical standards which set the conditions for access to the network. It also creates a central body whose responsibility is to develop and operate the infrastructure on a monopoly basis either nationally or within a region.

3.23. Generally the application of this model in the UK now involves a monopoly private-sector owner/operator whose activities and investments are independently regulated in order to ensure that this monopoly position is not abused.

3.24. This arrangement requires the regulator to be in a position to assess an appropriate rate of return for a specific investment or portfolio of investments taking account of the risks to the developer. This rate of return, and the extent to which it provides for under-utilised investments, determines the investment appetite of the infrastructure provider.

3.25. One difficulty in applying this approach to CCS at the present time is that there is, as yet, no established value chain for CCS. This means that there is no basis against which to establish a benchmark for a financial return on CCS infrastructure which strikes a fair balance between current and future need.

3.26. Amongst the perceived key benefits a centralised approach could bring is the strategic planning of CCS infrastructure. This in turn could have a positive impact on public trust for what might eventually become the development of new infrastructure on a significant scale. However, in practice the centralised approach will only be more effective in taking decisions about the scale and timing of investments if the organisation making those investments is better informed about the future deployment of CCS than the market more generally. Given the nature of the uncertainty about future CCS deployment we think this is unlikely to be the case.

3.27. The creation of such a central body might also be expected to add impetus to the development of CCS infrastructure, for example through the development of alternative funding sources, such as private-public partnership arrangements. The Government's approach to infrastructure investment in general was most recently set out in the National Infrastructure Plan 2010⁸. The Plan sets out the measures the Government is taking to enable targeted public sector investment where this is justified, including the establishment of a Green Investment Bank and a number of measures aimed at enabling local infrastructure solutions including a Regional Growth Fund and Tax Incremental Financing – new borrowing powers to enable local authorities to borrow against predicted growth in their locally raised business rates to fund key infrastructure projects.

3.28. A central body could also have a role in contracting with pipeline and storage site providers/operators on the one hand, and those producing carbon dioxide on the other. This may simplify the contractual relationships within the CCS value chain. This is likely to be attractive to those responsible for carbon dioxide emissions. However, it could also create bottlenecks in the timing of connection to CCS infrastructure, particularly in circumstances where the central organisations investment capital is insufficient to meet total demand and there is no alternative supplier of the required capacity.

3.29. It is also possible that the prospect of establishing a central authority could impact upon the decisions of other organisations that are considering entering the market for carbon dioxide transport and storage. This could in-turn make the timetable for CCS demonstration dependent on the establishment and effectiveness of one or more of these central organisations, or at the very least create uncertainties for investors in demonstration projects.

3.30. If one or more central organisations were to be formed then one of the practical issues that will need to be addressed is how any pre-existing infrastructure (for example that funded under the Demonstration Programme) would be acquired by the central organisation once created. Similar issues have had to be addressed

⁸ National Infrastructure Plan 2010. October 2010. hm-treasury.gov.uk

when incorporating early investors in offshore electricity networks into the longer-term arrangements.

3.31. The working assumption is that any such acquisition would in principle be on commercial terms and reflect the size of the investment of the existing infrastructure owner. For a project funded as part of the Demonstration Programme any change in ownership could also affect the progress and continuation of the project. These difficulties are likely to become more significant as the Demonstration Programme progresses. Thus, it is likely to be considerably more straightforward to implement a central approach either before or after the Demonstration Programme has completed.

3.32. One specific suggestion made by some stakeholders is to establish a publicly owned monopoly (the National Carbon Storage Authority)⁹. The Authority's primary function would be to facilitate the movement of carbon dioxide from point sources to storage sites by developing a network of onshore pipelines from dispersed point sources to coastal hubs, where they would interface with an offshore system of pipelines and storage sites.

3.33. The role envisaged for the Authority would be to commission the acquisition or construction of carbon dioxide pipelines and storage capacity with a view both to meeting the demand from the Demonstration Programme and planning for the future deployment of CCS. The Authority would also have a duty to offer fair access to those wishing to dispose of carbon dioxide subject to operational constraints. This could include determining minimum system specifications and capacity utilisation.

3.34. The Authority would not necessarily own the assets under its direction, but could enter into long-term commercial relationships with asset owners to make that capacity available.

3.35. The suggestion made by those advocating this approach is that the costs of developing and operating the network would be met through public funds and recovered over time through network charges.

3.36. While the Government recognises the potential attractions of a more centralised public sector approach to developing CCS infrastructure over the long-term we would need to be persuaded that specific challenges could be overcome, including:

- realising any additional benefits over a regulated private sector monopoly in striking a fair balance between foreseeable future demand and speculative investment;
- a loss of incentives to maximise efficiency by establishing a body in the public, rather than the private sector, where profit maximising incentives would apply;

⁹ http://www.ucl.ac.uk/ccip/pdf/Oxburgh_thinkpiece-1.pdf

- inconsistency with the approach to funding investment elsewhere in the energy sector and more broadly in the economy;
- increased pressure on public finances, as the public sector body would need capital funding in order to build CCS infrastructure

Consultation Question

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| 7. | What are your views on the creation of a centrally controlled approach to CCS infrastructure? Do you think you think we have identified the main advantages and disadvantages in the above summary? Do you see any advantages or evidence to support a public sector approach compared to a regulated private monopoly approach? |
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Other Approaches

3.37. The centralised and decentralised approaches covered in this document are extremes of a number of different organisational approaches to infrastructure development and investment in the UK and elsewhere. A number of these are summarised in Volume 2 of the NERA report mentioned earlier¹⁰. Other approaches such as collective and cooperative type arrangements also exist. We would be interested in receiving any information about the effectiveness of these arrangements, how they are developed, and how they might apply to CCS.

Consultation Question

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| 8. | Are there other funding and financing models we should be considering for the development of CCS infrastructure? Please include the advantages and disadvantages of these models in your response. |
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¹⁰ *Ibid.*, Nera: 2009.

Appendix A

Relevant Articles of the CCS Directive on the Geological Storage of Carbon Dioxide

Article 21 Access to transport network and storage sites

1. Member States shall take the necessary measures to ensure that potential users are able to obtain access to transport networks and to storage sites for the purposes of geological storage of the produced and captured CO₂, in accordance with paragraphs 2, 3 and 4.

2. The access referred to in paragraph 1 shall be provided in a transparent and non-discriminatory manner determined by the Member State. The Member State shall apply the objectives of fair and open access, taking into account:

(a) the storage capacity which is or can reasonably be made available within the areas determined under Article 4, and the transport capacity which is or can reasonably be made available;

(b) the proportion of its CO₂ reduction obligations pursuant to international legal instruments and to Community legislation that it intends to meet through capture and geological storage of CO₂;

(c) the need to refuse access where there is an incompatibility of technical specifications which cannot be reasonably overcome;

(d) the need to respect the duly substantiated reasonable needs of the owner or operator of the storage site or of the transport network and the interests of all other users of the storage or the network or relevant processing or handling facilities who may be affected.

3. Transport network operators and operators of storage sites may refuse access on the grounds of lack of capacity. Duly substantiated reasons shall be given for any refusal.

4. Member States shall take the measures necessary to ensure that the operator refusing access on the grounds of lack of capacity or a lack of connection makes any necessary enhancements as far as it is economic to do so or when a potential customer is willing to pay for them, provided this would not negatively impact on the environmental security of transport and geological storage of CO₂.

Article 22 Dispute settlement

1. Member States shall ensure that they have in place dispute settlement arrangements, including an authority independent of the parties with access to all relevant information, to enable disputes relating to access to transport networks and to storage sites to be settled expeditiously, taking into account the criteria referred to in Article 21(2) and the number of parties which may be involved in negotiating such access.

2. In the event of cross-border disputes, the dispute settlement arrangements of the Member State having jurisdiction over the transport network or the storage site to which access has been refused shall be applied. Where, in cross-border disputes, more than one Member State covers the transport network or storage site concerned, the Member States concerned shall consult with a view to ensuring that this Directive is applied consistently.

Appendix B

Summary of the Conclusions and Recommendations from Developing a Regulatory Framework for CCS Transportation Infrastructure (Volume 1 of 2) June 2009. NERA Economic Consulting. (URN09D/596)

Open seasons: The existing offshore oil and gas regime allows for coordination between investors in the planning stages of pipeline projects. It works by allowing third parties to request capacity on other developers' projects in return for the incremental cost of capacity. Whether or not this rule is appropriate for the offshore oil and gas sectors, it may create incentives not to be an "early mover" in developing CO₂ pipeline infrastructure, which may delay investments. Instead, it would be better to impose a requirement that all developers of new pipelines hold open seasons. After publicising the project and negotiating with potential participants, the developers would award long-term point-to-point capacity contracts to bidders who offer to pay at least the incremental costs of the capacity they request. (This is the minimum condition for participation. In practice, the participants in any project would need to agree a fair allocation of total costs among themselves that met legal requirements for non-discrimination.) The obligation to hold open seasons would facilitate the formation of coalitions to exploit economies of scale in the provision of CO₂ pipelines. The open seasons would exist to inform the market of potential pipeline developments and to facilitate the widest possible participation among those willing to commit funds to the project.

Planning rules: To promote efficient choices between building onshore and offshore pipelines, the government may need to incorporate CO₂ pipelines into its existing policies on planning used for other kinds of energy sector infrastructure.

Obligations to provide taps: US interstate gas pipelines are required to provide taps (i.e. connections) to competitors' pipelines on request. The obligation to provide taps removes the ability of incumbent pipeline operators to prevent new entrants from constructing new pipeline capacity. It also ensures that capacity is developed by the party who can provide it at the lowest cost, by enabling pipeline developers to compete with each other for the right to construct pipelines; without this rule, incumbents may be able to foreclose the market for new pipelines.

Unbundling: Unbundling requirements for gas and electricity networks have been imposed by energy regulators and antitrust authorities in the EU and US to prevent vertical foreclosure of up/downstream markets by vertically integrated incumbents. Unbundling improves efficiency in cases where network capacity needs to be transferred between users. It allows a market price for capacity to emerge, which would prevent disputes regarding access pricing in the future, such as those seen in the English and Welsh water industry. Also, it would prevent incumbent pipeline operators from obtaining any perceived advantage in the eyes of pipeline users over the quality of transport capacity they can offer.

Tariff structures: One way of improving the efficiency with which CO₂ pipelines are used would be to require that pipeline operators recover only their variable usage costs and not their fixed costs (e.g. financing costs) through variable usage charges. Pipeline operators would cover their fixed costs through fixed capacity charges to ensure they retain the full benefit of their investment.

Secondary capacity trading: Finally, requirements on CO₂ pipeline operators to provide trading platforms for capacity on their pipelines, and to publish information about tariffs, pipeline ownership, and usage and capacity availability promote the efficient usage of pipelines in cases where transfer of capacity between users is feasible. It also improves the efficiency of investment by allowing neighbouring CCS generators to share pipelines where they have non-coincidental peak requirements for pipeline capacity.

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