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**To** Katherine Mansfield

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**Company** HM Treasury

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**Email** katherine.mansfield@hm-treasury.gsi.gov.uk

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**From** Stephen Shergold **T** +44 (0)20 7320 6770

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**Our ref** SZS/54321.00001 **F** +44 (0)20 7320 6651

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**Email** stephen.shergold@dentonwildeapte.com

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Dear Sirs

### Carbon Capture and Storage: A Consultation on Barriers to Commercial Deployment

This letter comprises Denton Wilde Sapte's response to the HM Treasury consultation document "Carbon Capture and Storage: A consultation on barriers to commercial deployment" (the **Consultation**).

This response considers in particular the legal and regulatory issues relating to carbon capture and storage (**CCS**). It addresses the questions raised in the Consultation under the heading "Regulation, liability and public acceptance".

### Barriers to Deployment

We identify a number of barriers, summarised below:

- A Strategic Environmental Assessment Directive will be required to consider any significant environmental effects from a programme of CCS projects (paragraph 1.1(a));
- Individual CCS projects will require Environmental Impact Assessments (paragraph 1.1(b));
- CO2 destined for storage, where it is not being used for enhanced oil recovery, will be categorised as waste and subject to the waste permitting framework (paragraph 1.2);
- Regulation governing waste permitting will be required for the UK Continental Shelf (paragraph 1.2 and 1.5.4);
- Disposal of liquid CO2 into geological formations is a prohibited activity under the Landfill Directive (paragraph 1.5.4)
- The consent of the Secretary of State will be required for the construction of onshore pipelines for the transportation of CO2. Consent will probably also be required for the construction of offshore pipelines (paragraphs 1.3 and 1.4);
- Change in use for existing pipelines to adapt them to carry CO2 will require DTI endorsement (paragraph 1.4.6);

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## Email attachment

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- Injection of CO<sub>2</sub> for storage, where it is not being used to enhance oil recovery is currently prohibited under international law unless it is piped directly from the shore to seabed repositories (paragraph 1.5.2);
- Application of the precautionary approach could lead to CCS for any purpose being prohibited (paragraph 1.5.2(b));
- Currently CCS is not recognised by the International Panel on Climate Change and so is of limited use in terms of meeting Kyoto commitments (paragraph 1.5.3);
- A new regulatory framework is required to monitor CCS projects. This must fit in with existing UK, European and international regulatory regimes (paragraph 2.1);
- A new regulatory body may be required in the UK, combining powers in relation to health and safety, the environment, industrial permits and enforcement (paragraph 2.3);
- Long term and short term liabilities will arise in relation to CCS – these must be allocated before commercial deployment is possible (section 3 and 4).

These barriers are considered in more depth in the following sections;

1. What scope is there to develop and use CCS within the current regulatory framework?
2. What regulatory framework would need to be put in place to support the development of CCS technology while also ensuring protection of human health and the environment?
3. What additional costs and considerations are created by the long-term liability implications attached to CCS, and how can these be best managed?
4. What issues arise concerning (short term) liability for CO<sub>2</sub>, at particular points in the CCS process? Are there costs associated to these and what are they?

### **1 What scope is there to develop and use CCS within the current regulatory framework?**

This section includes our understanding of the current legal and regulatory framework that will affect CCS at all stages in the process, from capture through to transport and storage. In doing this we identify a number of potential barriers to deployment under the existing framework. The issues surrounding long-term liability are dealt with at section 3.

#### **1.1 Before CCS projects are approved – Strategic Environmental Assessment requirements**

There are two EU Directives that require the UK Government to assess the effects of certain plans and programmes on the environment before they can be authorised:

- (a) The Strategic Environmental Assessment Directive<sup>1</sup> sets out a process to ensure that significant environmental effects arising from proposed plans and programmes are

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<sup>1</sup> EU Directive 2001/42/EC

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## Email attachment

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identified, assessed, subjected to public participation, taken into account by decision-makers, and monitored; and

- (b) The Environmental Assessment Directive<sup>2</sup> requires that the environmental consequences of projects are identified and assessed before authorisation is given, in particular the direct and indirect effects of a project on the following factors:
- (i) human beings, fauna and flora;
  - (ii) soil, water, air, climate and the landscape;
  - (iii) material assets and the cultural heritage; and
  - (iv) the interaction between the factors mentioned above.

The category of projects does not specifically mention CCS but does include pipelines for the transport of gas, oil or chemicals and installations for storage of petroleum, petrochemical, or chemical products with a capacity of 200,000 tonnes or more. Depending on the categorisation of CO<sub>2</sub> as a chemical either of these may apply.

### 1.2 Capture Phase – is CO<sub>2</sub> waste?

- 1.2.1 The Waste Framework Directive (**WFD**) regulates the treatment of waste. The application of this Directive to CCS hinges on whether CO<sub>2</sub> falls within the definition of 'waste'. This definition also impacts on the treatment of captured CO<sub>2</sub> under other EU Directives by virtue of the EU's umbrella Waste Framework strategy.
- 1.2.2 If the CO<sub>2</sub> is being used for Enhanced Oil Recovery (**EOR**), it may be considered a by-product and therefore not waste<sup>3</sup>. A substance may be a by-product if it results from a production process and its reuse is certain (without further processing) in the continuing process of production. Therefore, where captured CO<sub>2</sub> is to be used for EOR, waste regulation may not apply.
- 1.2.3 However, if CO<sub>2</sub> were to be captured prior to emission into the atmosphere and is intended solely for storage, it may fall within the WFD's scope and be regulated as waste. This means that establishments or undertakings carrying out waste transportation related to CO<sub>2</sub> would require permits under Articles 9 and 10 with requisite conditions.
- 1.2.4 Other EU Directives that may impact on the CCS process include the Habitats Directive, Water Framework Directive, EU Monitoring Guidelines, and the Environmental Liability Directive. The Government's Marine Bill is also currently under consultation.

### 1.3 Transport phase – Onshore Pipelines

#### 1.3.1 The Pipe-lines Act 1962 (as amended by Deregulation (Pipe-lines) Order 1999)

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<sup>2</sup> Directive 85/337/EEC as amended by 97/11/EC

<sup>3</sup> A series of judgments by the European Court of Justice (*Palin Granit*, *Avesta Polarit*, *Saetti*, *Kingdom of Spain*) have established circumstances in which a substance other than the primary product of a production process will be a by-product and not a waste. Each case must be considered on its facts though and so the circumstances set out by these cases are not definitive (*Niselli*).

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## Email attachment

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The principal legislation that is relevant is the Pipe-lines Act 1962. Under the Act, construction of cross-country pipelines must be authorised by the Secretary of State. A cross-country pipeline is a pipeline exceeding or intended to exceed 16,093 kilometres in length. The construction of a local pipe-line (i.e. less than 16,093km) needs the authorisation of the local planning authority that may impose conditions when granting consent in addition to requirements regarding interference with local transportation and communication services.

The Act applies to pipelines in land that includes the foreshore (the land between high and low water marks) and partially enclosed areas of the sea such as bays, estuaries and harbours.

The Secretary of State's authorisation may contain provisions relating to deviation, modification, diversions from the proposed route of a pipeline (this also depends on the intended length of the diversion or deviation). It should be noted, however, that the authorisation does not confer rights to enter or carry out works in land. It is the responsibility of the pipeline owner to obtain the necessary rights from landowners.

### 1.3.2 The Coast Protection Act 1949

Under this Act, the consent of the Secretary of State is required for work connected with pipeline construction that causes or might result in obstruction or danger to navigation. This means a separate application has to be made to the Marine Division of the Department of Environment, Transport and Regions for consent to construct any part of a cross-country or local pipeline that is to lie between high and low water marks or across bays and estuaries. This is contrasted with an application for works authorisations for submarine pipelines where the Department of Trade and Industry obtains this consent on behalf of the applicant.

### 1.3.3 Miscellaneous Regulations

The Electricity and Pipe-line Works (Assessment of Environmental Effects) Regulations 1990 (SI 1990 No. 442) are made under the European Communities Act 1972 and implement Council Directive 85/337/EEC.

The Directive lays down the general manner in which environmental impact assessments for oil and gas pipelines should be prepared. The Regulations apply the Directive to all cross-country pipelines. The Regulations are soon to be amended to implement the requirements of Council Directive 97/11/EC which amends Council Directive 85/337/EEC.

The Pipeline Safety Regulations 1996 (SI 1996 No 825) consolidates various regulations in relation to pipeline safety.

### 1.3.4 Does the Pipe-lines Act 1962 apply to pipelines for the transportation of CO2?

The definition of "Pipe-line" in this Act provides that a pipeline can convey "any thing other than air, water, water vapour or steam". As such, a pipeline conveying CO2 is clearly within the scope of the legislation. Furthermore, a number of exclusions from the definition set out in the legislation do not apply.

This Act does not apply to small pipes and other certain specific pipelines. These exclusions do not affect the application of this Act to the envisaged project.

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## Email attachment

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### 1.4 Transport phase - Offshore Pipelines

#### 1.4.1 Petroleum Act 1998

The principal legislation is the Petroleum Act 1998. This provides that the construction and use of a pipeline in UK territorial waters requires authorisation (a Pipeline Works Authorisation) from the Secretary of State.

Under the Petroleum Act 1998 a pipeline is defined as a pipe or system of pipes "for the conveyance of anything, together with any apparatus and works associated with such a pipe or system". This includes pipelines used for the conveyance of hydrocarbons, water, chemicals, apparatus for the supply of energy for operations, hydraulic control lines or umbilicals. "Controlled waters" means the UK territorial sea and any part of the sea on the UK continental shelf.

A Pipeline Works Authorisation (which may not be issued to a person other than a body corporate) may specify conditions as to the route of the pipeline, its construction, capacity and dimensions.

#### 1.4.2 Crown Estate consent

Consent is required from the Crown Estate for all oil and gas pipelines that cross the seabed within territorial waters. The consent of the Crown Estate is granted in the form of a lease of easement which provides a set of standard terms and conditions, as agreed in the Memorandum of Understanding with the United Kingdom Offshore Operators Association.

#### 1.4.3 Does the Petroleum Act 1998 apply to pipelines for the transportation of CO<sub>2</sub>?

"Pipeline" as defined in this Act can convey "any thing". As with the Pipe-lines Act 1962, the definition excludes drains and sewers. However, the part of this Act which relates to submarine pipelines does not contain any other relevant exclusions.

The DTI guidance on the definition of pipelines states that the definition includes pipelines used for the conveyance of hydrocarbons, water and chemicals. This is not particularly helpful (unless we are satisfied that CO<sub>2</sub> is a "chemical"). The DTI list is not intended to be exhaustive.

We understand that Norway has adapted pipeline legislation to cater for CO<sub>2</sub>, and that the Netherlands plans to adopt the same approach.

#### 1.4.4 Who will be liable for decommissioning costs at the end of the pipeline's life?

Under the Petroleum Act 1998 (specifically section 34), any person who at any time has had an interest in a pipeline could, in theory, be liable for decommissioning costs. In practice, the primary sources of liability are the current owners together with the DTI, jointly and severally. As such, indemnity arrangements with the previous owners should be considered although the scope of the legislation means any of the owners at any time may be liable for costs.

The Secretary of State can issue a notice (a Section 29 Notice) requiring an abandonment programme to be prepared. In practice, the DTI may withdraw this notice and release a party from liability – this release does not have legislative backing.

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## Email attachment

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The intention behind the legislation is to give extremely wide reaching powers to the Government and to establish a wide net to minimise the possibility that the Government itself would have to undertake decommissioning at public cost.

### 1.4.5 How does the legislation applicable to decommissioning affect re-use?

With regard to decommissioning costs, in obtaining a pipeline the current owners may need to be offered an inducement as an incentive to allow re-use. The new owners would, as stated, carry primary liability for final decommissioning but the contingent liability of a past owner continues to exist with a likely increase in the risk as a result of new use and extended lifespan.

### 1.4.6 Is consent required for the transfer in ownership of a pipeline?

Any new use will require DTI endorsement.

## 1.5 Storage phase – current regulatory framework

### 1.5.1 Overview

Most of the UK's resources for storing CO<sub>2</sub> in geological formations are located offshore. CCS straddles two distinct bodies of international law designed to protect the global environment: protection of the hydrosphere, and protection of the atmosphere. CCS may be a crucial answer to atmospheric problems, the key questions relate to the harm it may cause to the hydrosphere.

The international law which will affect the injection of CO<sub>2</sub> into geological formations can be split into two broad categories;

#### (a) Legislation protecting the hydrosphere:

This legislation is designed to protect the marine environment from the dumping of matter;

- (i) The United Nations Convention on the Law Of the Sea (**UNCLOS**) provides the umbrella legal framework, obliging other International Organisations and States to introduce 'global rules and standards';
- (ii) The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters 1972 (the **London Convention**). The principal aim of the London Convention is to promote the effective control of all sources of pollution in the marine environment;
- (iii) The 1996 protocol to the London Convention (the **1996 Protocol**). The 1996 Protocol entered into force on 24 March 2006 and now binds the UK Government;
- (iv) The Convention for the Protection of the Marine Environment of the North East Atlantic 1992 (the **OSPAR Convention**). OSPAR's restrictions on marine pollution are more rigorous than the London Convention.

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## Email attachment

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### (b) Legislation protecting the atmosphere

The Climate Change framework aims to restrain manmade emissions of greenhouse gases, consisting mainly of the United Nations Framework Convention on Climate Change (**UNFCCC**) and the Kyoto Protocol. The UNFCCC does not create binding obligations upon states to reduce their CO<sub>2</sub> emissions, but the Kyoto Protocol does so by a system of emission quotas. The Convention on Environmental Impact Assessment in a Transboundary Context (ESPOO) has been implemented in the EU through the European Union Environmental Impact Assessment Directive.

It is also important to follow through the implications of disposing of CO<sub>2</sub> as waste under European Law.

### 1.5.2 Legislation protecting the hydrosphere

#### (a) What barriers to CCS do the 1996 Protocol and the OSPAR Convention provide?

OSPAR fulfils the requirements in the London Convention and the 1996 Protocol for Contracting Parties to create regional agreements which further their objectives. It is more rigorous in its approach than either the London Convention or the 1996 Protocol, and as it is more specifically applicable to the waters around the UK, will prevail where its terms differ with other treaties. The OSPAR Convention and the 1996 Protocol are similar and can usefully be considered together in the barriers they present to commercial implementation of CCS.

As with other international treaties, neither was drafted with CCS in mind. However, when its provisions are applied to the CCS process, both treaties pose barriers to commercial implementation. Furthermore, where there is legal ambiguity, this in itself may serve as a disincentive, if not a barrier, to commercial implementation.

#### Prohibition on dumping of waste

In essence, dumping of waste is prohibited under both treaties, except for materials on an approved list. The definition of dumping is broadest in the OSPAR Convention, which includes:

"any deliberate disposal in the maritime area of wastes and other matter:

From vessels or aircraft;

From offshore installations"

The definition of maritime area includes "the bed of all those waters and its sub-soil".

Waste is not defined in the OSPAR Convention, other than to exclude human remains, offshore installations, offshore pipelines and fish processing waste. In the 1996 Protocol it is defined to include "material and substance of any kind form or description" with a list of permitted wastes annexed. It is unlikely that CO<sub>2</sub> could fall within any of the permitted wastes.

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## Email attachment

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Therefore, the general prohibition on dumping would probably include all forms of CCS which are currently envisaged. However, there are a number of potential exclusions which may permit CCS in certain circumstances:

**(i) CCS where the captured CO2 is being used solely for EOR**

The prohibition on dumping specifically excludes "the placement of matter for a purpose other than the mere disposal thereof," provided that such placement is not contrary to the aims of the Protocol or the OSPAR Convention<sup>4</sup>. This is a crucial distinction. Where the purpose of injecting CO2 is to provide enhanced oil recovery (EOR), the CCS may be permitted under this exclusion.

The prohibition on dumping in the 1996 Protocol also excludes the disposal of wastes or other matter directly arising from, or related to the exploration, exploitation and associated off-shore processing of seabed mineral resources<sup>5</sup>. Again, this might apply to EOR processes which are clearly related to the exploitation of seabed mineral resources. It could not however apply to CO2 generated in onshore processing, and then piped to the storage field.

A slightly different exclusion in the OSPAR Convention means that discharges and emissions from offshore sources<sup>6</sup> are not prohibited. There is debate as to how this would apply to EOR, given that CO2 generated on an offshore platform may be considered a discharge. It clearly could not apply to CO2 piped from an onshore site.

**(ii) CCS where the CO2 is piped to repositories accessed from land only**

The prohibition on pollution from land based sources (Annex I of the OSPAR Convention) would permit the transportation of CO2 by pipeline from land directly to sub-sea storage beds provided it were authorised. However, if this process is considered to be at odds with the general principle of OSPAR, or if the OSPAR Commission passes a decision prohibiting it, then it would be prohibited.

A more stringent interpretation would apply to the dumping of waste from offshore installations (Annex II of the OSPAR Convention). Therefore the disposal of CO2 which is piped to an offshore installation and then injected into sub-sea storage beds would be prohibited.

**(iii) CCS where the CO2 is partly used for EOR and partly for storage purposes**

Even where the volume of CO2 injected to a storage chamber exceeds that which is required for EOR purposes, this process may still be permitted as it is for a purpose other than mere disposal.

**(iv) CCS where the CO2 is injected for storage purposes only**

CCS where the purpose is for storage alone, and not for EOR, would not be permitted under the treaties.

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<sup>4</sup>Article 1 (g) (ii) of the OSPAR Convention and Article 1 (4) (2) of the 1996 Protocol

<sup>5</sup>Article 1 (4) (3) of the 1996 Protocol

<sup>6</sup>Annex III Article 3 of the OSPAR Convention

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## Email attachment

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### (b) The Precautionary Approach

Even if these exclusions could apply, both treaties employ what is known as the "precautionary approach" as a general obligation. This requires that appropriate preventative measures are taken when there is reason to believe that wastes or other matter introduced into the marine environment are likely to cause harm (to human health or to marine ecosystems), even when there is no conclusive evidence to prove a causal relation between inputs and their effects.

It is important, therefore, that there is a high degree of certainty relating to the long-term safety of CCS before it is employed. Even CCS for the purposes of EOR must carry no, or negligible, risk of adverse effects to humans or to the marine environment.

### (c) The IMO and CCS

The International Maritime Organisation (**IMO**) has provided that one of the first key issues for discussion under the 1996 Protocol is likely to be a review of the compatibility of CCS in sub-seabed geological structures, as part of a suite of measures to tackle the challenge of climate change and ocean acidification. In preparation for the discussion on how best to facilitate and/or regulate such activities under the Protocol (and the London Convention), a number of options will be developed - to clarify and, if appropriate, amend the Protocol - at an intersessional meeting on the related legal and administrative aspects to be held at IMO (proposed for April 2006).

### (d) OSPAR Report on CCS

The OSPAR Commission published in March 2006 a report, "Placement of CO<sub>2</sub> in Subsea Geological Structures", which looks at the technical aspects of CCS in geological structures under the seabed. The report found that CCS in sub-seabed geological structures is technically feasible, and that the North-East Atlantic offers significant potential for CCS. The report recommends that evaluation of any proposed sites needs to take account of the risks to the marine environment as well as the benefits in mitigating climate change and acidification of the oceans. Monitoring will be important and the report describes how seismic and gravimetric techniques can be used.

The report concludes that guidelines or a framework for risk management for the storage of CO<sub>2</sub> are needed. OSPAR is putting work in hand to produce these.

## 1.5.3 Legislation protecting the atmosphere

Neither the UNFCCC (1992) nor the Kyoto Protocol (1997) expressly include CCS as an encouraged or permitted emission reduction device giving rise to emission credits. They do though emphasise and encourage CO<sub>2</sub> reduction by sequestration (Kyoto Protocol article 2.1(a) (iv)).

Until such time as CCS is recognised by the International Panel on Climate Change (**IPCC**) as capable of contributing to Annex 1 parties' emission reductions, the absence of support will act as a barrier to development. The IPCC published a special report on CCS in 2005. Chapter 9 of the special report discusses the implications of CCS for greenhouse gas inventories and accounting. It is clear that further work is required before the IPCC will recognise CCS.

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## Email attachment

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### 1.5.4 European law

As explained in section 1.2, CO<sub>2</sub> storage in the absence of EOR will be a waste disposal activity. The WFD requires that Member States have a permitting system in place to regulate such activities.

Regimes already exist for land based activities (Environmental Protection Act; Pollution Prevention and Control Act) and up to 12 nautical miles offshore (Food and Environment Protection Act), however, no regulatory regime exists that governs disposal of waste in a landfill beyond 12 nautical miles from the shore. Such a regime would be a requirement of the WFD if CO<sub>2</sub> is to be stored on the UK Continental Shelf.

Furthermore, the EU Landfill Directive prohibits the landfilling of 'liquid waste', and it is possible that CO<sub>2</sub> will be injected into geological cavities in liquid form. The Court of Appeal in the UK held that the disposal of liquid waste via injection into a borehole 1000 metres below sea level is covered by the Landfill Directive, and therefore it was held to be a prohibited activity.

## 2 What regulatory framework would need to be put in place to support the development of CCS technology while also ensuring protection of human health and the environment?

2.1 Any new regulatory framework will need to fit in with existing UK and European regulatory regimes, which include;

- (a) Environmental Protection Act;
- (b) Integrated Pollution Prevention and Control (IPPC) framework;
- (c) Food and Environment Protection Act;
- (d) Health and Safety legislation;
- (e) Dangerous goods legislation;
- (f) 1996 Protocol requirements for Contracting Parties to establish a system of permits and reporting for authorised dumping of waste (Article 9);
- (g) Major Accident Hazards legislation; and
- (h) Monitoring and reporting of greenhouse gas emissions, based on the Emissions Allowance Trading Directive<sup>7</sup>.

2.2 In particular, standards will be needed to

- (a) guide the selection of suitable geological storage formations and locations to minimise the risk of leakage;

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<sup>7</sup> Directive 2003/87/EC

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## Email attachment

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- (b) monitor potential leakage of CO<sub>2</sub> during transport and injection;
- (c) monitor any seepage during storage;
- (d) regulate the operation of a storage site, for example to ensure that it is operated and sealed in a way that does not reduce its integrity.

2.3 In the UK, CCS crosses the jurisdiction of a number of different government agencies, including Defra, the Environment Agency, the DTI and the HSE. The establishment of a dedicated agency (similar to the Nuclear Decommissioning Authority?) with a wide range of powers in relation to health and safety, the environment, industrial permits and enforcement, may be more appropriate than a cross-agency approach.

2.4 One potential method of supporting the development of CCS would be to establish a link between physical reductions from carbon abatement technologies and allowances under the EU Emissions Trading Scheme (**EU ETS**). The government is yet to include geological sequestration in national and international greenhouse gas inventory and trading schemes such as the EU ETS. At present, the Kyoto protocol does not expressly include CCS as an encouraged or permitted emission reduction device giving rise to emissions credits. The International Panel on Climate Change is though considering the issue. The European Commission will only consider sequestered carbon dioxide in emissions trading schemes once they are convinced that the technology, and its impact, is fully proven.

### **3 What additional costs and considerations are created by the long-term liability implications attached to CCS, and how can these be best managed?**

3.1 Long term liabilities include public health impacts and environmental and ecosystem damage as a result of CO<sub>2</sub> leakage.

3.2 The Environmental Liability Directive places strict liability on 'operators' for the prevention and remediation of environmental damage to protected species, natural habitats, water or land resulting from a range of listed 'occupational activities'. As the processing of waste is included as a listed activity, this is likely to include CCS. The Directive is now in force and must be transposed into national law by 30 April 2007. However, it does not impose liability if more than 30 years have passed since the emission, event or incident resulting in the damage occurred.

3.3 The potential for leakage of CO<sub>2</sub> injected into geological formations will persist for several centuries. This raises the question of the long-term ownership of the storage site and the organisation responsible for taking remedial measures should leakage occur. One option is for ownership to transfer to the state after an agreed period. Questions that arise include;

- (a) When should the transfer take place? After the site has been filled and sealed and is being left for long term monitoring?
- (b) What liabilities will remain with the original operator (e.g. negligence)?
- (c) Will operators be required to contribute to funding of the body?

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**Email attachment**

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3.4 Any consideration of costs will need to take into account the impact CCS activities may have on an installation's allowances for the purposes of emissions trading under the EU ETS.

**4 What issues arise concerning (short term) liability for CO<sub>2</sub>, at particular points in the CCS process? Are there costs associated to these and what are they?**

4.1 Short term liabilities may arise in relation to the capture, transportation and initial injection of the CO<sub>2</sub>. These would include human health risks, environmental damage and remediation from accidental release. Civil and criminal liability, arising both under statute and under the common law, may arise for operators in any of these areas.

Yours faithfully

**Denton Wilde Sapte**