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CARBON CAPTURE
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# Case studies on the implementation of Directive 2009/31/EC on the geological storage of carbon dioxide

## United Kingdom

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# Foreword

## The CCLP EU Case Studies Project

The Carbon Capture Legal Programme launched the 'EU Case Studies Project' in January 2010. The project analyses the implementation of Directive 2009/31/EC on the geological storage of carbon dioxide ('CCS Directive') in selected European jurisdictions - the United Kingdom, Germany, Poland, Romania, Spain and Norway. Each jurisdiction, for distinct reasons, provides an example of different approaches to the transposition and to CCS in general.

The objective of the project is to identify some of the more subtle nuances in different legal cultures and to provide a better understanding of the rationale for national decisions in specific aspects of the implementation of the Directive. In particular, the focus is on those areas where the Directive leaves room for Member States' discretion or is ambiguous or silent. The project also considers the policy and political context within which the national legal and regulatory framework for CCS has emerged. The studies are deliberately designed to move beyond formal transposition measures to reveal more of the underlying dynamics and tensions involved in national implementation. Such elements are often crucial in driving domestic legal developments. The way in which EU Directives are implemented often reflects distinct legal and administrative traditions, and the case studies seek to present these in order to provide better insights on the development of CCS regulation.

The outcome of the project is a series of reports from the six jurisdictions, based on key legal and policy questions and on a critical reading of the CCS Directive. The CCLP has coordinated the overall research and has carried out the UK case study. Independent experts have been commissioned to carry out research in Germany, Poland, Romania, Spain and Norway.

## Background on the EU transposition process[1]

EU Member States have an obligation to adopt all appropriate measures to ensure the fulfilment of the obligations arising out of the Treaties governing the European Union or resulting from acts of the institutions of the Union.[2]

Directives are binding on Member States but only with respect to a result to be achieved, leaving considerable discretion to Member States as to the choice of form and methods to be used for their implementation. In contrast to regulations, the provisions of directives do not automatically become part of the national legal system, but require a national transposition process before doing so. In their transposition, Member States may rely upon existing law; amend existing legislation or pass wholly new legislation.

Each directive will specify a time limit for transposition, normally two years but sometimes three where complex administrative or legal changes are involved. The CCS Directive specified the date of 25 June 2011, which is just over two years after its coming into force.

The European Commission is in charge of ensuring the application of the treaties and the legal acts adopted by the institutions pursuant to the treaties.[3] To fulfil this duty, the Commission enjoys enforcement powers against Member States, which are carried out by means of an infringement proceeding.[4]

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[1] This paragraph is the extended version of a CCLP contribution to the International Energy Agency Carbon Capture and Storage- Legal and Regulatory Review- Edition 2 (May 2011). Available at www.iea.org/Papers/2011/ccs_legal.pdf.

[2] Treaty on European Union, Article 4.3. OJ C 191, 29.7.1992.

[3] Treaty on European Union, Article 17.

[4] Treaty on the Functioning of the European Union, Article 258. OJ C 115, 9.5.2008 (ex European Community Treaty, Article 226).

With respect to the transposition of directives, the Commission distinguishes between three categories of infringement proceedings:

(a) non-communication cases, where a Member State fails to communicate to the Commission national laws or other measures transposing a directive within the specified time limit;
(b) non-conformity cases, where the Commission considers a Member State's transposition of a directive into national law to be incomplete or incorrect;
(c) 'bad application' cases, where the Commission feels that there has been a failure to apply a directive in practice, even though there has been correct transposition.

The formal stages of the infringement procedure consist of three phases:

(a) a letter of formal notice from the Commission to the Member State, which then has two months to reply (pre-litigation);
(b) a reasoned opinion issued by the Commission if the Member State's reply is not satisfactory, setting the details of the infringement and establishing a new deadline for compliance; and
(c) referral to the Court of Justice of the European Union, if the non-compliance persists.

The Commission enjoys wide discretion as to when and whether to start an infringement proceeding, and a good deal of informal negotiation takes place to resolve the issue during the various stages of the process. In practice, however, once the deadline for transposition has passed without communication from the Member State, the Commission will automatically start an infringement proceeding based on a formal failure to communicate any national measures.

The vast majority of cases are settled without the need to refer them to the Court. If a case is brought before the Court and the Court rules against the Member State, the State must take all necessary measures to comply with the judgement.[5] If the non-compliance persists, the Commission can refer the case to the Court again, recommending a financial penalty. The Court then has the power to impose financial sanctions on the Member State. Further to amendments made under the Lisbon Treaty coming into effect in 2010, non-communication has been given increased priority, since the Commission is now entitled to request the application of such sanctions upon the first referral to the Court.[6]

[5] Treaty on the Functioning of the European Union, Article 260.2. (ex European Community Treaty, Article 228).
[6] Treaty on the Functioning of the European Union, Article 260.3. (ex European Community Treaty, Article 228).

## Key findings of this report:

- International and domestic climate change policy, energy security concerns, and the business opportunities are the key drivers for deploying CCS in the UK.

- By adopting mandatory requirements for CCS, committing to fund four commercial-scale CCS demonstrations projects and setting up a range of financial mechanisms to incentivise CCS, the UK is considered a model by other EU Member States willing to deploy CCS. Despite implementing issues and delays, the UK remains a leader in the European Union with respect to the design of policy instruments and incentives to support CCS deployment.

- The UK implementation of the CCS Directive has occurred by integrating CCS within the existing oil and gas legislation, rather than creating an independent new system. The provisions of the Directive have been transposed within the Energy Act 2008 and by means of dedicated regulations and amendments to existing laws. The UK approach to public participation and access to information on CCS mirrors the Directive and relies on existing legislation.

- As of June 2011, the UK transposition process had yet to be concluded. As a result, technically the UK was not able to meet the deadline set by the Directive for its transposition into national law (25 June 2011). In July 2011, the European Commission issued a letter of formal notice for non communication of transposition measures to the UK. This is somewhat ironic given that the Energy Act 2008 was deliberately passed before the adoption of the Directive**.** In theory, this placed the UK in a stronger position, compared with other Member States, to meet the deadline, but such advantage has been partially lost due to the complexities of the UK transposition process.

- The main competences for CCS are assigned to the Secretary of State or the Scottish Ministers, depending on the area where the activity takes place. An important role is given to The Crown Estate, a unique commercial organisation responsible for granting a lease to undertake $CO_2$ storage activities in the UK continental shelf. The environment agencies, the Health and Safety Executive and the Infrastructure Planning Commission are also involved in a permitting process for CCS operations.

- As a result of the devolution process, CCS regulation lies at the intersection between a number of generally reserved matters and areas that are devolved. Could a devolved administration ban CCS in its territory? The legal answer depends on the grounds for the ban and the extent of its devolved powers.

## The Author

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# 1 General Aspects

## 1.1 Rationale for CCS deployment in the UK

Three main drivers make carbon capture and storage (CCS) a technology of interest for the United Kingdom: international and domestic climate change policy; energy security concerns; and the business opportunities presented by the availability of domestic storage capacity and technical expertise.

The UK is considered a leader in the global fight against climate change at both European and international levels. This is proven by its ambitious $CO_2$ emissions reduction targets and commitment towards a swift transition to low-carbon technologies. At the international level, the UK is obliged to reduce its greenhouse gas (GHG) emissions by 12.5 per cent below 1990 levels in the first commitment period (2008-2012) of the Kyoto Protocol.[7] At the domestic level, the 2008 Climate Change Act sets a legally binding target to reduce GHG emissions by at least 80 per cent by 2050 against the 1990 baseline.[8]

In its 2011 annual report, the UK Committee on Climate Change (CCC)[9] stressed the need to accelerate the UK carbon reduction path in order to meet its 2050 targets. In this context, the Committee recognised that CCS projects 'remain an urgent priority' in order to achieve the country's annual carbon budget.[10] However, the Committee highlighted that 'there is a slippage on [CCS], which should be addressed if this potentially important technology is to be developed for roll-out in the 2020s'.[11]

Discussions about the advantages of CCS in the UK have also emerged in the debate around energy security, mainly defined as availability and affordability of energy supply. The UK is primarily reliant (90 per cent) on fossil fuels for its total energy supplies (e.g. transport, domestic and industrial uses), with 28 per cent of total supplies imported. Electricity accounts for 17.5 per cent of final energy consumption. Within that, in 2010, 47 per cent of the net electricity supply was generated from gas, 28 per cent from coal, 16 per cent from nuclear and only 7 per cent from renewable sources.[12] Crucially, a large proportion of the UK's existing electricity generation capacity will need to be replaced by 2020 in order, inter alia, to comply with EU requirements.[13]

Diversity in the energy mix is widely seen as vital for the UK, and a complete abandonment of fossil fuels would risk compromising its ability to meet energy demand. Deploying CCS could provide a way to maintain fossil fuels within the energy mix, while ensuring GHG emissions reductions.[14] Due to the increasing role of gas in the UK, in 2010 the CCC advised the

[7] Annex II of Commission Decision of 14 December 2006 determining the respective emission levels allocated to the Community and each of its Member States under the Kyoto Protocol pursuant to Council Decision 2002/385/EC.
[8] Climate Change Act 2008, Art 1 (c 27).
[9] The CCC is an independent advisory body on climate change matters established by the Climate Change Act 2008.
[10] UK Committee on Climate Change, *Meeting Carbon Budgets - 3rd Progress Report to Parliament* (30 June 2011) 33.
[11] Ibid at 9.
[12] DECC, *Digest of the United Kingdom Energy Statistics (DUKES)* (2011) 122.
[13] Such obligation stems from the requirements set in the Large Combustion Plants Directive (LCPD – Directive 2001/80/EC) and the Industrial Emissions Directive (IED- Directive 2010/75/EC). See also DECC, *Overarching National Policy Statement for Energy (EN-1)* (July 2011).
[14] Select Committee on Energy and Climate Change's Inquiry: *The UK's Energy Supply, Security or Independence*? (February 2011).

government to demonstrate CCS not only at coal-fired power stations, but also at natural gas combined cycle gas turbine (CCGT) power plants.[15]

The UK also benefits from the large and accessible storage capacity of the North Sea and the East Irish Sea. Despite remaining uncertainties, the storage capacity of depleted oil and gas reservoirs on the UK continental shelf has been estimated at between 7 and 10 gigatonnes (Gt) of $CO_2$, while estimates of capacity in saline aquifers range between 20 and 200 Gt, providing an overall storage potential for 100 or more years.[16] It has also been suggested that the $CO_2$ storage capacity in the UK North Sea continental shelf might exceed the UK's needs and provide storage opportunities for other Member States.[17] However, more detailed research is needed in this field.

The UK has a great deal of technical expertise in offshore oil and gas activities and availability of infrastructure that will prove crucial to supporting $CO_2$ transport and storage operations. Therefore, new business opportunities from deploying CCS activities will be appealing to UK companies with this expertise.

## 1.2 Early CCS policy and political support

From an energy policy perspective, the UK began to look into the potential of CCS technologies in 2002, in the context of the Energy Review.[18] The Review informed the 2003 Energy White Paper, which conveyed the UK's interest in the technology. CCS was deemed to have a 'potentially significant strategic role […] in longer-term energy security'.[19] However, the White Paper highlighted a series of barriers and legal constraints to CCS deployment and emphasised the need for increased research efforts in this field. Several studies were conducted between 2003 and 2005 to explore the CCS deployment potential and strategies for the UK.[20]

In 2006, the government launched a more substantive review of its energy policy framework, which considered the role and potential of CCS. The review mainly stressed the need to: stimulate pre-commercial demonstration and its financing; amend the international legal framework;[21] develop proposals for adequate regulation of CCS; advocate the recognition of CCS within the EU Emissions Trading System (ETS); and continue working with international partners.[22] These objectives were reflected in the UK's leadership in providing legal measures both internationally (ie amendments to international marine legislation and adoption of the EU $CO_2$ storage Directive[23]) and in the implementation of CCS legislation at national level.

At present, there is shared political agreement on CCS deployment in the UK. In 2007, the then Labour government started promoting CCS within the context of UK energy policy and launched

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[15] UK Climate Change Committee, *Meeting Carbon Budgets – Ensuring a Low-Carbon Recovery* (June 2010).

[16] HM Government, *Clean Coal: An Industrial Strategy for the Development of Carbon Capture and Storage Across the UK,* March 2010, 11. These estimates for the storage capacity in the UK continental shelf are based on a figure of 178Mt per annum in 2007. However, more recent figures show that, in 2010, the UK's net $CO_2$ emissions were provisionally estimated to be much higher (491.7 Mt). DECC, *Statistical Release* (31 March 2011).

[17] Ibid at 10.

[18] Cabinet Office, *The Energy Review - A Performance and Innovation Unit Report* (February 2002).

[19] UK Department of Trade and Industry (DTI), *Energy White Paper, Our Energy Future - Creating a Low Carbon Economy* (February 2003).

[20] DTI, *Review of the feasibility of Carbon Capture and Storage in the UK*, September 2003; DTI, *Implementing a Demonstration of Enhanced Oil Recovery Using CO2 in the North Sea*, May 2004; DTI, *A Strategy for Developing Carbon Abatement Technologies (CAT) for Fossil Fuels* (June 2005).

[21] 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes at Sea and other matter, (London Protocol) and 1992 Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR Convention).

[22] DTI, *Energy Challenge. Energy Review - A Report* (June 2006) 109.

[23] Directive 2009/31/EC on geological storage of carbon dioxide [hereinafter 'CCS Directive'].

the first CCS competition for public funding for the first demonstration project. The current coalition government (Conservative and Liberal Democrat) is committed to supporting three additional demonstration projects. The funding of four CCS plants (with a commitment of around £1 billion per plant) was included in both the Labour and Conservative parties' manifestos at the 2010 general election. Though supportive of CCS, no indication of such numbers was provided in the Liberal Democrats' manifesto. However, due to the current financial crisis, the conservatives' recent position on the prohibitive costs of investing in low carbon technologies (including CCS) suggests that the necessary financial incentives might not be provided.[24]

Of the opposite view is the Green Party (with currently just one Member of Parliament), which believes that 'CCS is the wrong technology for the UK'[25] and opposes the use of public funding for its deployment. The Green Party's position is that renewable technologies would provide more jobs sooner than the still-embryonic CCS industry and will reduce both energy dependence on imports and the vulnerability to potential price fluctuations in energy supply costs. Nevertheless, the political influence of the Green Party in the UK is quite limited, compared to its weight in other EU Member States, such as Germany, Belgium or the Netherlands.

# 2 Current policy framework and financial incentives for CCS

## 2.1 CCS competition

In 2007, the government launched a CCS competition for public funding for the UK's first full-scale CCS demonstration plant,[26] though the extent of the financial commitment (up to £1 billion) was not declared until 2010.[27]

The winning project is required to demonstrate the full-chain of CCS technologies at commercial scale on a coal-fired power station, with $CO_2$ stored offshore. Only post-combustion technologies qualify for the competition process. The plant must have at least 300 megawatt electric (MWe) of net generating capacity and capture at least 90 per cent of the $CO_2$. The competition allows for a phased approach, providing that the project starts demonstrating the full chain of CCS by 2014.[28] The project has to be based upon the results of a full Front End Engineering and Design (FEED) analysis and information sharing is also required.

This first competition has been widely criticised for causing undue delay to the deployment of the technology.[29] For instance, BP, which was working on an advanced project at Peterhead (Scotland), announced that it was impossible to wait until the end of 2008 for the announcement of the winning candidate and decided to abandon the project. Among other things, this was due to the fact that, although the project was the most advanced, its high costs compared to the other competitors (£500 million) reduced its chances of winning government funding. There was also disappointment with the government decision to limit the competition to post-combustion

[24] T Macalister, D Carrington, 'Flagship Green Energy Project Faces Axe' *The Guardian* (6 October 2011). In his speech at the Conservative Parties Conference 2011, the Chancellor of the Exchequer, George Osborne, declared: 'We're not going to save the planet by putting our country out of business. So let's at the very least resolve that we're going to cut our carbon emissions no slower but also no faster than our fellow countries in Europe' (Conservative Party Conference 2011: George Osborne full speech, *The Telegraph* (3 October 2011). However this position has not been confirmed by a government policy measure yet.

[25] S Fitz-Gibbon, *No Public Funding for Carbon Capture, Say Green Party* (23 April 2009).

[26] The competition was first announced in March 2007 within the 2007 Budget. Details were formalised in the *Energy White Paper – Meeting the Energy Challenge* (May 2007), but the competition was officially launched on 19 November 2007.

[27] HM Treasury, *Spending Review 2010* (October 2010) 61.

[28] BERR press notice 2007/073, *CCS Demonstration will put UK Ahead in Global Race for Clean Coal* (9 October 2007).

[29] House of Lords Debate, Energy-Fossil Fuels (2 July 2007). See A Chipman, 'Contest Puts Brakes on Carbon Capture' *Nature* Vol 447 pp 1044- 1045.

capture rather than expand it to include other capture technologies (ie pre-combustion and oxy-fuel).[30] A large portfolio of already well-understood and developed pre-combustion and oxy-fuel projects was therefore excluded from the selection process. The government defended its decision to limit the competition to post-combustion technologies, in the light of their versatility and recent technology choices in other jurisdictions (ie Norway and the US).[31] It was also argued that demonstrating pre-combustion would prove more advantageous from a commercial point of view, as countries like China are likely to become more interested in such technologies in the future.

In November 2008, four companies[32] pre-qualified for the competition, but by 2010, only one project – the Longannet project – was left in the competition, as the other three had withdrawn. The initial deadline for selecting the winner was the end of 2009, but, as of September 2011, the decision on the winning project had yet to be announced. As a result, despite the government's efforts, the first competition has effectively fallen short of providing the expected financial incentive to the demonstration. This opinion would be reinforced if recent information about the Longannet consortium (Shell, Scottish Power and National Grid) having pulled out from the competition will be confirmed.[33]

As the UK is committed overall to four demonstration projects, a second competition to select three other projects is being developed. Eligible projects must include full-chain CCS technologies with storage offshore. This competition has a wider scope than the previous one. They must be at a commercial scale (around 300-400 MWe net generating capacity depending on the capture technology). They can either be connected with the electricity network or to an industrial installation. All capture technologies are now eligible for the competition. Following the CCC's advice, projects at both gas-fired and coal-fired plants can apply. Plants can be new build, refurbished or existing generation plants. Projects will need to be operational by 2018. The competition is also open to EOR projects as far as they can meet the eligibility requirements.[34] Financial support for these other projects was initially envisaged as via a new CCS levy established under the authority of the Energy Act 2010. However, in the last Spending Review, this possibility was dropped in favour of funding from general taxation. Not surprisingly, this turnaround has revealed the precariousness of the government provisions on financing for CCS in the Energy Act 2010 and has been considered as seriously undermining industry's confidence in the government's ability to support the demonstration projects and as a negative signal to potential developers.[35] Following engagement with stakeholders and industry, DECC plans to formally launch a call for proposals later in 2011. The revised scope of the second competition seeks to overcome the limitations of the first one, in order to accelerate financial support for the UK demonstration process.

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[30] CCSA press release, *BERR Announcement on CCS Competition 9 October 2007 – Government Fails to Deliver on CCS Market Potential* (10 October 2007); WWF-UK, *Carbon Choices - Options for Demonstrating Carbon Capture and Storage in the UK Power Sector* (May 2009).

[31] 'Clueless Chancellor Robbed us of our Rewards', letter from Malcom Wicks, *Daily Telegraph* (15 October 2007).

[32] BP Alternative Energy International; E.On UK with a project at Kingsnorth; RWE - together with Peel Power and Dong - with a project at Hunterston; and Scottish Power with a project at Longannet.

[33] See T Macalister, D Carrington, 'Flagship Green Energy Project Faces Axe' *The Guardian* (6 October 2011). After this report was finalised, on 19 October 2011 the UK Department of Energy and Climate Change decided not to proceed with Longannet, but remains committed to pursue other projects with £1 billion. It seems too early to assess the real impact of this decision on the UK CCS demonstration programme. See DECC Press Notice 11/084 (18 October 2011); 'Longannet Carbon Capture Scheme Scrapped' *BBC News* (19 October 2011) [available at www.bbc.co.uk/news/uk-scotland-north-east-orkney-shetland-15371258]; Statement from Scottish Power on Carbon Capture and Storage Competition (19 October 2011) [available at www.scottishpower.com/PressReleases_2231.htm].

[34] DECC, *UK Carbon Capture and Storage (CCS) Commercial Scale Demonstration Programme- Delivering Projects 2-4 (Further Information)* (December 2010).

[35] CCSA, *A Strategy for CCS in the UK and Beyond* (September 2011) p 28.

While the early CCS policy has acknowledged the opportunity for the UK to be a world leader and first-mover in the technology, the competition process has not yet managed to translate the UK commitments to CCS into a concrete incentive. But while, on the one hand, the UK seems to have been losing its advantage in an ongoing competition process, on the other hand, such a public funding mechanism is still unique compared to other Member States, such as, for example, Germany and Romania, which have yet to establish equivalent domestic incentives.

## 2.2 Carbon Capture Readiness and CCS demonstration requirements

In addition to the competition for funding, the UK CCS policy framework has mainly been implemented around the conditions for granting government consent for generating stations, in order to facilitate the deployment of CCS. The policy is twofold.

First, this has resulted in the inclusion of a Carbon Capture Readiness (CCR) requirement for all new commercial scale combustion power stations. Since April 2009, new combustion power stations at or over 300 MWe of net generating capacity in England and Wales can only be issued consent ('development consent') if they are Carbon Capture Ready (CCR).[36]

The CCR requirement has been implemented through the development consent procedure for the construction, extension and operation of generating stations under Section 36 of the Electricity Act 1989.[37] In practice, this means that the proposed plant must satisfy the following requirements in order to be issued development consent:

(a) sufficient space is available on or near the site to accommodate carbon capture equipment in the future;
(b) it is technically feasible to retrofit carbon capture technologies;
(c) a suitable offshore storage site exists;
(d) it is technically feasible to transport the captured $CO_2$ to the storage site; and
(e) it is economically feasible to link the plant to a full CCS chain within its operational life.

This requirement transposes the CCR provision of the CCS Directive (Article 33). The UK was the first Member State to implement this element within its national law, and did so in a surprisingly stringent manner compared with what is required by the Directive.[38]

Second, in November 2009, the CCR policy was supplemented by a longer-term policy framework to enable the transition to clean coal.[39] All new and upgraded coal-fired power stations in England and Wales must now demonstrate the full chain CCS at commercial scale (at or above 300 MWe or, if the generating capacity is lower, at their full generating capacity) in order to obtain development consent.
This policy aims to assess the economic, technical, environmental and safety status of the technology. This assessment will be conducted jointly by the environment agencies, the CCC and other expert bodies by means of a review process to be concluded in 2018 ('rolling review'). Provided that the rolling review on progress is successful, CCS is expected to be ready for wider deployment by 2020.

[36] See DECC, *Towards Carbon Capture and Storage: Government Response to Consultation* (April 2009); See DECC, *Carbon Capture Readiness- A Guidance Note for Section 36 of the Electricity Act 1989 Consent Applications* (November 2009); DECC, *Overarching National Policy Statement for Energy (EN-1)* (July 2011).
[37] See DECC, *Guidance on Carbon Capture Readiness and Applications under Section 36 of the Electricity Act 1989- A consultation* (April 2009). Development consent under S 36 of the Electricity Act is now issued as a single procedure under the Planning Act (see Planning Act s 33).
[38] See details in section 5.19, below.
[39] DECC, *A Framework for the development of clean coal-Consultation Response* (November 2009).

In this case, from 2020 onwards, new coal-fired power plants will be expected to be fully equipped with CCS 'from day one'. All power stations built today as part of the CCS demonstration programme will eventually be retrofitted with CCS by 2025, if the technology is proven to be technically and economically viable. If the conclusion on the technical and economic feasibility of CCS is negative, alternative GHG emissions reduction strategies will be proposed. An equivalent policy, on both CCR and CCS demonstration, was then adopted in Scotland.[40] Northern Ireland is expected to consult on CCR in the future.

These mandatory requirements are one of the most interesting features of the UK CCS policy and confirm a firm commitment to the deployment of the technology in the coming years. This distinctive approach has not been followed thus far by any other EU Member States.

## 2.3 CCS Roadmap

Thus far only Scotland has published a CCS roadmap rolling out to 2030.[41] No Roadmap has yet been published for the whole of the UK, and this is one of the key tasks of the Department for Energy and Climate Change (DECC)'s Office for CCS. The UK-wide CCS roadmap was due for publication by spring 2011 but has been postponed until the autumn, in order to include: lessons learned from the current consultation on Electricity Market Reform; allowing the conclusion of the FEED studies for the first demonstration project (ie Longannet); determining the approach for the other three demonstration projects; and evaluating the other seven projects that were submitted to the European Investment as part of the selection process for the New Entrants' Reserve (NER300) funding in May 2011. [42]

## 2.4 Financial incentives for CCS

Financial support for CCS in the UK has been through various stages and initiatives, yet there are still concerns from industry about delays, lack of clarity in the timetable and uncertainties associated with it.[43]

The main available mechanisms are:

- EU funding (European Economic Plan for Recovery (EEPR)[44] and NER300[45]), for which the UK has proposed the highest number of projects compared with other Member States. The Don Valley project (formerly the Hatfield Project) has already received funding under the EEPR and has now also applied for the first call of the NER300 initiative. Another nine projects have applied to the NER300 mechanism, of which two have since withdrawn.

- Up to £1 billion of funding for the first UK CCS demonstration project from the General Spending Review 2010.[46] The second competition (for three additional projects) was initially intended to be funded by a CCS levy on electricity suppliers, which would have provided a stable and long-term mechanism. However, this method was dropped in favour of financial support through general taxation.

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[40] Scottish Government, *Thermal Power Stations in Scotland* (March 2010).
[41] See *Carbon Capture and Storage- A Roadmap for Scotland* (March 2010).
[42] DECC, Press Release 11/013 (17 February 2011). Information from OCCS on the prospective CCS Roadmap are available at www.decc.gov.uk/en/content/cms/emissions/ccs/policy/roadmap/roadmap.aspx.
[43] See CCSA, *A Strategy for CCS in the UK and Beyond* (September 2011).
[44] On 9 December 2009, € 1.5 billion funding was granted to six CCS and nine offshore wind energy projects under the EEPR funding mechanism.
[45] See details in M Doppelhammer, 'The CCS Directive, Its Implementation and the Co-financing of CCS and RES Demonstration Projects under the Emissions Trading System (NER 300 Process)' in I Havercroft, R Macrory and RB Stewart (eds), *Carbon Capture and Storage –Emerging legal and regulatory issues*, (2011), 100-103.
[46] HM Treasury, *Spending Review 2010* (October 2010), 61.

- A package of measures (including: carbon price floor, feed-in tariffs,[47] an emissions performance standard (EPS) of 450g $CO_2$/kWh, and a capacity mechanism) has been included in the Electricity Market Reform White Paper 2011 to drive investments in low-carbon technologies, such as renewables, nuclear and CCS.[48] Legislation implementing such measures is expected to be adopted by spring 2013, to enable the first projects to benefit from 2014 onwards.[49]

By adopting mandatory requirements for CCS and setting up a range of financial mechanisms to incentivise CCS, the UK is considered a model by other EU Member States willing to deploy CCS. But some crucial issues remain, such as: the arguable failure of the first the competition; delays and uncertainties in timetables and funding; and a shifting regulatory landscape. While these might have reduced its advantage on CCS deployment compared to some years ago, the UK remains a leader in the European Union with respect to the design of policy instruments and incentives to support CCS deployment.

# 3. Overview of the legal and regulatory framework for CCS

## 3.1 The Energy Act 2008

The 2008 Energy Act implements the UK policy commitment to CCS by establishing, inter alia, a licensing framework for offshore $CO_2$ storage activities largely based upon the existing licensing regime for offshore oil and gas activities.[50] The Act was adopted shortly before the CCS Directive, constituting one of the first dedicated pieces of CCS legislation worldwide, but providing sufficient legislative flexibility to transpose the Directive which was already being negotiated when the British legislation was passed.

The Act extends the sovereign rights of the UK to explore and exploit the seabed, its subsoil and waters above it within the UK's 200 mile zone,[51] to include the storage of carbon dioxide. These rights are vested in the State ('the Crown') and can be exercised within the territorial sea as well as within a newly designated area called the Gas Importation and Storage Zone (GISZ).[52] The Act requires a $CO_2$ storage licence granted by the Secretary of State as well as a lease or agreement from The Crown Estate to undertake such activities (see details on The Crown Estate lease in section 4.3 below). The specific licensing requirements and conditions for the licence to be granted, such as eligibility, application process, relevant information, application fees, financial security requirements and liability are established by secondary legislation (see next section).

The Act applies Part 4 of the Petroleum Act 1998 concerning abandonment of offshore installations to offshore structures installed for the purpose of $CO_2$ activities. Decommissioning of such installations is required in a timely manner after the end of the operations, and the Petroleum Act requires a detailed programme of plans and approvals for it ('abandonment programme'). Finally, it extends to $CO_2$ storage installations the requirement under the

[47] Since April 2010, feed-in-tariffs are also into force for renewable electricity and renewables heat and gas.
[48] DECC, *Planning our Electric Euture: a White Paper for Secure, Affordable and Low-Carbon Electricity* (July 2011).
[49] See R Macrory,'Weighing Up the Performance' (2001) *Journal of Environmental Law,* 23:2, 311-317.
[50] Energy Act 2008 (c 32)
[51] UNCLOS Article 56.
[52] See the Gas Importation and Storage Zone (Designation of Area) Order 2009 – into force 6 April 2009. As opposed to other States, the UK has never proclaimed an Exclusive Economic Zone under the United Nations Convention on the Law of the Sea (UNCLOS), but usually proclaims its sovereign rights for the purpose of selected activities within 200 nautical miles, establishing dedicated zones (eg Renewable Energy Zone established for offshore renewable energy production). The GSIZ serves this purpose with respect to CCS.

Petroleum Act to establish safety zones around offshore oil and gas installations. These elements reconcile the provisions of the CCS Directive with the wider UK regime for oil and gas.

## 3.2 CCS Regulations

Between 2010 and 2011, secondary legislation was passed providing the details of the licensing regime for offshore $CO_2$ storage and associated activities in the UK to partially implement the CCS Directive.[53] Regulations have also been enacted to transpose the provisions of the Directive on the transfer of responsibility after closure of the storage site, financial contribution.[54] and third-party access.[55]

There are peripheral, but important, issues being addressed under the new Energy Bill 2011, upon which both the Scottish Government and DECC are currently working. These are: orders for compulsory acquisition of land for $CO_2$ pipelines, decommissioning of offshore infrastructure to be converted for CCS demonstration projects,[56] and the inspection regime.

## 3.3 Development consent under the Planning Act 2008

The mandatory requirements for CCR and CCS demonstration have been integrated within the new development consent process for energy projects. In accordance with the Planning Act 2008, development consent for Nationally Significant Infrastructure Projects (NSIPs) in England and Wales and the offshore renewable energy zone is issued by (a) the Infrastructure Planning Commission (IPC), where a relevant National Policy Statement (NPS) has been adopted, or (b) the Secretary of State, if no such Statements are in place. NSIPs include energy, transport, water and waste projects.

After lengthy consultations, two newly designated NPSs on energy[57] establish the criteria to be used by the IPC to grant development consent for new fossil fuel power plants over 50 MW generating capacity under the Planning Act 2008. The criteria include the mandatory CCR requirement and the obligation to demonstrate CCS for all new coal-fired power plants. This inclusion triggers IPC competence to grant development consent for such facilities, previously under the Secretary of State.[58] The evaluation and decision will be in consultation with the Environment Agency as to technical and economic feasibility as well as suitability of the storage site. If this assessment is negative, consent will not be given. The IPC will consult the Health and Safety Executive in the event that the project is likely to need hazardous substance consent.

The IPC has no authority with respect to applications related to Scotland or Northern Ireland, where consent is given by the Scottish Ministers or the Northern Ireland Executive respectively. It will, however, examine applications for cross-country oil and gas pipelines that cross into Scottish territory from England or Wales.[59] In any case, even though energy policy is a matter of reserved competence, the NPS could be of guidance for planning in Scotland.[60]

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[53] The Storage of Carbon Dioxide (Licensing etc) Regulations 2010 [SI.2010/2221]; [hereinafter 'Licensing Regulations']; The Storage of Carbon Dioxide (Licensing etc) (Scotland) Regulations 2011 [SSI.2011/24].
[54] The Storage of Carbon Dioxide (Termination of Licences) Regulations 2011 [SI.2011/1489] [hereinafter 'Termination Regulations'].
[55] The Storage of Carbon Dioxide (Access to Infrastructure) Regulations 2011 [SI.2011/2305] [hereinafter 'Access Regulations'].
[56] After this report was finalised, the new Energy Act 2011 received royal assent on 18 October 2011. Its sections 107 and 108 address compulsory acquisition of land for $CO_2$ pipelines (amending the Pipe-line Act 1962) and decommissioning of offshore infrastructure to be converted for CCS demonstration projects (amending the Energy Act 2008), respectively.
[57] DECC, *Overarching National Policy Statement for Energy (EN-1)*, July 2011 and DECC, *National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (EN-2)*, July 2011.
[58] $CO_2$ pipelines are also covered by the Planning Act 2008 under section 14(1)(g), but, in the absence of a specific NPS, are outside IPC competence.
[59] Planning Act 2008 Section 21 (c 29).
[60] See DECC, *Overarching National Policy Statement for Energy (EN-1)* (July 2011) 4.

The adoption of the prospective Localism Bill will change the system again. This Bill, which reforms the planning system, would abolish the IPC. The Commission would be replaced by a new Major Infrastructure Planning Unit (MIPU) within the Planning Inspectorate. The decision-making power on applications for major energy infrastructure projects would come back to the Secretary of State, who would receive a report and simple recommendations on each application from MIPU. The NPSs will remain the policy documents informing consent decisions.

# 4. Characteristics of the UK implementation of the CCS Directive

As of June 2011, the UK transposition process had almost been concluded, but some adjustments had yet to be made. As a result, technically the UK was not able to meet the deadline of 25 June 2011 set by the CCS Directive for its transposition into national law. In July 2011, the European Commission issued a letter of formal notice for non-communication of transposition measures to the UK, together with 24 other Member States. This procedure is the first step of the EU infringement procedure and, once the Commission will have assessed the replies received from the Member States concerned, it will decide what action has to be carried out in conformity with the EC Treaty. Only Spain has thus far been considered in full compliance, while Romania is still under assessment.[61]

This is somewhat ironic given that the Energy Act 2008 was deliberately passed before the adoption of Directive**,** due to concerns that the European process might have encountered hurdles and prevented the UK from becoming a first-mover on the technology. In theory, this placed the UK in a stronger position, compared with other Member States, to meet the deadline, but such advantage has been partially lost due to the complexities of the UK transposition process.

The UK legal and regulatory instruments implementing the Directive have been designed with the object of integrating CCS within the existing legal and administrative framework, rather than creating an independent new system. This is common practice for the UK and has shaped its choices in implementing the Directive. Compared with other Member States, such as Spain or Romania, the transposition process in the UK is less of a literal 'transplant'[62] and more of a 'infusion.'

Two aspects emerge in this context: on the one hand, the UK is adapting well-established and familiar frameworks and procedures (oil and gas legislation) to regulate a new technology, thus reassuring stakeholders; on the other hand, there is wide acknowledgement of the importance of a 'learning-by-doing' approach, not just to the technical aspects of the technology, but also the legal and regulatory framework, which has been very common in UK oil and gas regulation in the past. In this respect, the CCS legal and regulatory regime is likely to develop through an elaboration and adaptation of legislation, regulations and guidelines, similar to the one experienced in the oil and gas industry.

Some legal difficulties, though, have been encountered with respect to new legal questions arising from the novelty of the technology, such as the nature of $CO_2$, its ownership and the application of common law liabilities to CCS. Overall, a novel challenge posed by CCS is the integrated scale of the CCS projects requiring very close cooperation and interaction between very different commercial entities (e.g. utilities and oil and gas companies) across every phase of the developments. Ensuring an integrated legal and regulatory response is the key issue for

[61] Information kindly provided by Mr Isaac Valero-Ladron, EU Spokesperson for Climate Action (2 October 2011). A European Commission Press release is expected in due course.
[62] M Jozon, 'Case Studies on the Implementation of Directive 2009/31/EC on the Geological Storage of Carbon Dioxide' in *EU Case Studies Project* by the Carbon Capture Legal Programme, UCL (Nov 2011).

the UK. Although there is generally good coordination between government departments, agencies and devolved administrations, the fragmentation of competences may not rest easily with the integrated nature of the CCS chain.

## 4.2 Devolution and implementation of the Directive

As a result of the 1999 devolution process, law-making powers on selected matters ('devolved matters') are attributed to the Scottish Parliament, Welsh Assembly and Northern Ireland Executive. Westminster has retained legislative powers for the remaining matters ('reserved matters').

There is, however, asymmetrical devolution in the UK. While the Scottish Parliament and the Northern Ireland Executive have the power to pass primary legislation in devolved matters, including the environment, the Welsh Assembly at present can only pass secondary legislation based upon primary legislation adopted by the UK Parliament. However, a referendum in May 2011 expanded the Assembly's legislative powers. This might have a significant impact upon its decision-making regarding key decisions, including those associated with CCS deployment in the region.

The UK Government is responsible for ensuring that EU legislation is implemented and complied with in all the national territory of the UK, as the obligations to transpose and comply with EU law fall on the UK as the single EU Member State. However, devolved administrations are directly responsible for observing and implementing EU obligations concerning devolved matters. Because the UK as a whole is ultimately responsible for the transposition process, UK Ministers retain the power to act in order to ensure implementation of such obligations, if the devolved administration fails to do so.[63]

In the event of an infringement procedure launched against the UK for failure of a devolved administration to implement or apply EU law on devolved matters, the UK Government is directly responsible, and will be accountable for any fine imposed by the European Court of Justice for such a failure.[64] Under internal governmental agreements, devolved administrations will, however, contribute to the fines in relation to any devolved matters.[65] The UK is also responsible for the compliance with EU law of Gibraltar, the Isle of Man and the Channel Islands. [66]

There are a series of challenges when it comes to implementing the CCS Directive. CCS is a novel technology and its regulation lies at the intersection between a number of generally reserved matters (energy, climate change) and areas that are devolved (planning, environment, electricity). Even then the picture is not the same across the UK. For instance, within wider energy policy, which is reserved, electricity is devolved in Northern Ireland, but not in Wales.

Could a devolved administration ban CCS in its territory? The legal answer depends on the grounds for the ban and the extent of its devolved powers. If, for example, Scotland decided on a policy against granting planning permission to CCS plants in its territory in the light of its devolved power on planning, this would be permitted and amount to a factual ban. A precedent is available with respect to nuclear power in Scotland, where the Scottish Parliament has effectively banned new nuclear power plants on this

[63] See, for example, s 28(7) and s 57(1) Scotland Act 1998. For a recent review of actual practice, see A Ross, C Reid C and N Nash 'The Implementation of EU Environmental Law in Scotland' (2009) *Edinburgh Law Review* vol 13, pp 224-251.

[64] See 'Devolution: Memorandum of Understanding and Supplementary Agreements between the United Kingdom Government, the Scottish Ministers, the Welsh Ministers, and the Northern Ireland Executive Committee' (March 2010) *Concordat on Coordination of European Union Policy Issues*.

[65] See, for example, Scottish Government, *Handling EU Obligations - A Guide for Scottish Government Officials* (2009), available at www.scotland.gov.uk/Publications/2009

[66] TFEU Article 355(3).

ground.[67] Similarly, following the 2011 referendum, Wales now has legislative powers on environmental protection matters,[68] which means that in principle it could ban CCS within its territory on the basis that CCS could have harmful effects on the environment. In terms of the real possibility of a ban on CCS, this is unlikely in the UK, as opposed to other Member States' approaches, largely influenced by strong public opposition to the technology (eg Germany). However, in Gibraltar, it seems that a prohibition of CCS under the licensing regime will be implemented because of the lack of physical sites to carry out CCS in its territory.[69]

In any event, even a factual ban would be consistent with the provision of the Directive allowing Member States to decide not to allow for CCS within their territory (and therefore also in parts of it), once the obligation to fully transpose the Directive has been complied with.

### 4.3 Administrative arrangements

The Energy Act 2008 establishes that the competent authorities for licensing offshore $CO_2$ storage and associated activities are the Secretary of State or the Scottish Ministers, depending on the area where the activity takes place. They are mainly responsible for implementing the licensing requirements of the Directive (ie granting, revocation and withdrawal of the licence and storage permit; granting of the termination of licence). Long-term responsibility will be transferred to these authorities once the storage site is closed and the conditions of the Directive have been fulfilled.

However, the UK CCS regulatory regime includes the involvement of a wider series of bodies and agencies, which have the power to grant other permits and regulate activities that are instrumental to or associated with the deployment of the technology.

The Crown Estate is one of these bodies. It is a unique commercial organisation, whose constitution is set out in statute, with almost no equivalent in any other jurisdiction worldwide.[70] The Crown Estate manages a portfolio of estates (ie urban, rural, Windsor and marine) throughout the UK. At present, relevant to CCS activities are The Crown Estate's marine estate and the property rights associated with it, as these cover:

(a) over half of the UK's foreshore;[71]
(b) virtually all the UK's seabed and sub-seabed up to 12 nautical miles (territorial seabed);
(c) the rights claimed by the UK outside its territorial sea up to 200 nautical miles within the renewable energy zone (REZ)[72] and the gas importation and storage zone (GSIZ)[73], according to the provisions of the United Nations Convention on the Law of the Sea (UNCLOS); and
(d) rights to explore and exploit natural resources (excluding hydrocarbons)[74] in the UK continental shelf under UNCLOS and the Continental Shelf Act 1964.

The Energy Act 2008 requires operators to obtain property rights from The Crown Estate in order to undertake $CO_2$ storage activities in the UK continental shelf. The Crown Estate can issue two types of permits: an Agreement for Lease (AfL) or a full lease. The first provides for a time limited exclusive option to apply for a full lease once all conditions are met. Under an AfL,

[67] For details on this decision, see www.scotland.gov.uk/Topics/Business-Industry/Energy/Facts/faqs.
[68] Part 1(6), Schedule 7 Government of Wales Act 2006 defining the matters within the 'environment'.
[69] Legislative details of this intension are not yet available. (Information kindly provided by Mr Peter Soiza, Gibraltar Environment Agency).
[70] Crown Estate Act 1961, s1(1)
[71] Foreshore in England, Wales and Northern Ireland is defined as the land between mean high water and mean low water. See www.thecrownestate.co.uk/schedule_of_properties_rights_and_interests.pdf.
[72] Energy Act 2004 Section 84 (c 20).
[73] Energy Act 2008 Article 1.
[74] The 1936 Petroleum Act reserved the Government's ownership of hydrocarbons and the regulation of the exploitation of oil and gas.

the operator has the right to conduct exploration activities in order to develop a storage plan to support his application for a lease.

The second provides the operator with the right to use the relevant area of the marine estate (ie the subsurface space for storage (3D area) and the seabed for the installation) for the purpose of $CO_2$ storage offshore and associated activities, such as the installation, commissioning, operation, maintenance of storage infrastructure and permanent storage of $CO_2$. The lease also covers closure, decommissioning and post-closure monitoring obligations.[75] The Crown Estate is also responsible for the grant of a pipeline lease for any $CO_2$ pipeline to be laid on the UK seabed within territorial waters (12 nautical miles). Granting of any AfL or lease by The Crown Estate is conditional upon an applicant obtaining a licence and other necessary permits from DECC or the Scottish Ministers. A constructive dialogue has been conducted between DECC, the Scottish Government and The Crown Estate to solve possible difficulties with such coordination and ensure the process is as smooth as possible.

So far, in the demonstration phase, The Crown Estate has declared that property rights for storage of $CO_2$ will only be granted to 'storage projects that form part of a credible full CCS value chain and for which competitively awarded funding has been received'.[76] This is based on the fact that the rights issued by The Crown Estate are exclusive and would prevent another party's access to the same areas. That justifies the need to grant property permits only to projects with realistic expectations of success. The Crown Estate is currently committed to awarding an exclusive lease option to the winner of the first CCS competition and to any recipient of European funding under the EEPR mechanism. The same approach will be taken for UK projects competing for NER300 funding and CCS demonstration projects 2-4.

The Department for Energy and Climate Change (DECC) is the UK government department responsible for, inter alia, CCS activities and their coordination within the wider government's low-carbon technology strategy. Within DECC, CCS falls under both the remit of both the Energy Development Unit (EDU), which is the regulator for offshore oil and gas activities, and the Office for CCS (OCCS), which is especially tasked with: the delivery of the demonstration projects (except for the one under the first competition); the review of business models for CCS commercial deployment; the design of a UK-wide CCS roadmap until 2030; and the linkages with the European Union's initiatives to stimulate CCS demonstration, including funding. OCCS is also responsible for public engagement associated with CCS demonstration projects in the UK.

A series of other independent agencies and regulators are involved in the implementation of other aspects of the Directive and the enforcement of CCS-specific legal and regulatory requirements, including in areas of devolved jurisdiction. These include in particular: the environment agencies (the UK Environment Agency (EA), the Scottish Environmental Protection Agency (SEPA) and the Northern Ireland Environment Agency (NIEA)), the Health and Safety Executive and the Infrastructure Planning Commission.

The EA and SEPA are responsible for the protection and monitoring of the status of the environment in England and Wales, and Scotland respectively. They enforce environmental regulations and issue environmental permits. The EA also keeps the Emissions Trading Scheme (ETS) register on behalf of DECC. They are also statutory consultees for the planning applications for new onshore CCS infrastructure ($CO_2$ pipelines, facilities for bulk storage or ship loading facilities), for the CCR requirements under Section 36 of the Electricity Act 1989 and for environmental impact assessment (EIA) procedures. The NEIA's responsibilities with respect to the development of the technology mirror those of the EA and SEPA.

[75] However, these activities are primarily dealt with by DECC.
[76] Information available on the $CO_2$ storage section of The Crown Estate website, available at www.thecrownestate.co.uk/co-2-storage.

The Health and Safety Executive is an independent regulator for health and safety at work in the UK. It enforces the Health and Safety at Work, Act 1974 and the pipeline regulations, including the major hazard pipeline (COMAH[77], Pipeline Safety Regulations[78] and Offshore regulations). $CO_2$ is not a hazardous substance under the COMAH regulations, but the HSE has recommended that early developers implement the principles of COMAH regulations in the design, construction and operation of the capture and compression element in the context of the CCS competition. The HSE has also stated that it will treat all $CO_2$ CCS pipelines as major hazard pipelines until it has concluded its assessment of the hazards they pose.[79] Developers also need to provide health and safety information to the HSE along the entire life of the project.

This administrative and regulatory system for CCS appears rather fragmented, but cooperation seems thus far to have been quite effective. Issues of coordination could arise in the future once the projects are effectively up and running.

## 4.4 Preference for $CO_2$ storage and transport

The policy preference in the UK is for $CO_2$ storage offshore. This is supported by both favourable geology in the North Sea and the East Irish Sea, and familiarity with offshore oil and gas activities and infrastructure. Despite its higher costs, offshore storage might also prove more publicly acceptable than onshore storage, as has generally been demonstrated with other technologies, such as wind farms. However, the government has declared that its decision to limit the demonstration programme to offshore storage would not prevent the extension to onshore in the future, provided an adequate legal framework is in place.

The Energy Act 2008 enables offshore $CO_2$ storage activities and partially transposes the CCS directive into domestic law, but it does not cover onshore $CO_2$ storage. In order to fully transpose the Directive, Member States must ensure that their transposition laws apply to both onshore and offshore. As a result, amendments are in the process of being adopted to extend the scope of the Energy Act to onshore storage.[80]

The UK does not at present have a dedicated transport infrastructure network for $CO_2$, and export of $CO_2$ to other countries is unlikely due to sufficient domestic offshore storage capacity. Instead there is a potential for the UK storage sites to receive other States' $CO_2$ for the purpose of permanent storage, though this does not seem to be an imminent prospect as European CCS projects remain at the demonstration stage.

## 4.5 Ownership of the pore space and conflicting uses of the storage site

As explained above, sovereign rights over the seabed and the sub-seabed within the GSIZ are vested in the State ('the Crown') and managed by The Crown Estate. For the purpose of offshore CCS activities, such rights can be the subject of a 'Crown lease' to be issued by The Crown Estate, which gives the tenant the exclusive rights to use and enjoy the leased area.[81] Onshore sub-surface mineral rights are normally vested in private owners of the surface land, except for coal, gas, oil,[82] gold and silver which are owned by the State ('the Crown') and may also be subject to lease. The Crown is assumed to remain the owner of the pore space after exploitation of these onshore mineral rights, but no express rule is established in this sense.

The UK regime allows a $CO_2$ storage licence to be granted for an area which is already subject to a petroleum licence or is overlapping such development, provided that the storage activities

[77] Control of Major Accidents Hazards (COMAH) Regulations 1999 [SI 1999/743].
[78] Pipeline Safety Regulations 1996 [SI 1996/825].
[79] HSE, *HSE Regulation of Emerging Energy Technologies* (15 December 2010) Annex 2, p 3.
[80] After this report was finalised, on 11 October 2011 the Storage of Carbon Dioxide (Amendment of the Energy Act 2008 etc.) Regulations [SI.2011/2453] were enacted to implement such amendments.
[81] Section 18 (4) of the Energy Act defines a 'Crown lease' as 'a lease of property forming part of the Crown Estate, or an authorisation to exercise rights forming part of that Estate […]'.
[82] Ownership of these minerals was transferred to the State ('the Crown') under the Petroleum Act 1936.

do not prejudice the pre-existing rights of the petroleum licence holder. Both The Crown Estate and DECC clarified that the co-existence of such uses will only be permitted when 'there is evidence that suitable liability and operational liability arrangements are in place'.[83] This means that, if the $CO_2$ storage is intended to be carried out in an area subject to a pre-existing petroleum licence, The Crown Estate will not grant the lease, unless the applicant has entered into an agreement with the petroleum licence holder to allow the development of the storage site.

The issue of conflicting use is also dealt with under the Secretary of State's licensing powers, currently exercised by DECC. A licence will be granted only if DECC 'is satisfied that there is a technically feasible and safe way forward which will allow both developments to co-exist without material disadvantage to the activities already authorised'.[84] While this is not specifically mentioned in the UK regulations (see below), this well-coordinated position of DECC and The Crown Estate makes this aspect clear and is in compliance with the Directive which expressly requires that no conflicting uses of storage sites are permitted.[85] The Directive, though, does not clarify what 'conflicting uses' means and how to avoid them, while the UK regime seems generally more protective of pre-existing petroleum activities than of other uses.

# 5. UK choices in implementing Directive 2009/31/EC[86]

## 5.1 Limitations

The Energy Act is clear on the geographical scope of its CCS provisions. Storage can only occur in, under or over the territorial sea or waters in a Gas Importation and Storage Zone. In this respect the Act does not cover onshore storage and is therefore more restricted in jurisdictional scope than the Directive (Article 2). Despite leaving discretion to Member States to determine the areas from which storage sites may be selected, including their right not to allow any storage in parts or in the whole of their territory[87], the Directive governs $CO_2$ storage 'in the *territory* of the Member States, their exclusive economic zones and on their continental shelves within the meaning of the United Nations Convention on the Law of the Sea.'[88]

Although there is no current policy to deploy CCS onshore, the UK has acknowledged that the existing limitation does not formally comply with its EU transposition duties. Regulations to extend the scope of the Energy Act 2008 to onshore storage have been adopted in Scotland,[89] and equivalent regulations will soon be made to apply the Act onshore in England, Wales and Northern Ireland.[90] But there remains the question whether these adjustments will be sufficient to ensure an equivalent regime for onshore storage or whether it will require a wider series of consequential amendments to effectively enable onshore storage under the Energy Act.

The UK CCS regulations follow the Directive in prohibiting $CO_2$ storage in the water column, but do not contain the exclusion in the Directive for activities 'with a total intended storage below 100 kilotonnes, undertaken for research, development or testing of new products and processes'.[91]

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[83] DECC, *Government Response to the Consultation on the Proposed Offshore Carbon Dioxide Storage Licensing Regime* (31 August 2010) Para 18.
[84] DECC, *Government Response to the Consultation on the Proposed Offshore Carbon Dioxide Storage Licensing Regime*, Para 23.
[85] CCS Directive Article 6(1).
[86] In this section, references to the Licensing Regulations will merely refer to the example of the UK statutory instruments applicable to England, Wales and Northern Ireland, as the Scottish instruments are virtually equivalent.
[87] Article 4(1) CCS Directive.
[88] Ibid, Article 2(1) [emphasis added].
[89] The Energy Act 2008 (Storage of Carbon Dioxide) (Scotland) Regulations 2011 [SSI 2011/224].
[90] See above n 80.
[91] CCS Directive, Article 2(2).

The provisions of the Energy Act concerning $CO_2$ storage do not apply to enhanced oil recovery (EOR) activities unless the Secretary of State makes an Order extending their application to EOR.[92] Doing this would allow EOR operators to benefit from the regime applicable to CCS under the revised EU ETS directive,[93] which from 2013 will remove the obligation to surrender allowances under the scheme where $CO_2$ emissions have been verified as captured and transported for the purpose of permanent storage under the CCS directive.[94] However, a $CO_2$ storage licence and The Crown Estate lease would still be necessary for EOR activities.[95]

The UK's approach to EOR activities within the context of CCS legislation is interesting. The Preamble to the Directive states that enhanced hydrocarbon recovery activities can only be included in the scope of the Directive, 'if combined with geological storage of carbon dioxide'.[96] In the UK context, the extending Order would presumably define the conditions for these activities to take place, but no express indication is given under the Act that it must be combined with permanent storage of $CO_2$. Conversely, EOR without permanent storage of $CO_2$ is licensable by DECC, but remains outside the CCS regime.

## 5.2 Selection of the storage site

At present the UK has decided to implement the Directive only offshore and therefore enjoys its right under the Directive not to allow storage onshore. The licensing regulations provide that the grant of the storage permit is conditional, inter alia, on the competent authority being satisfied that:

- 'the storage complex and surrounding area have been sufficiently characterised and assessed in accordance with the criteria set out in Annex I to the Directive' and that
- under the proposed conditions for use of the storage site, there is no significant risk of leakage or of harm to the environment or human health.[97]

These conditions transpose the requirements for site selection under Article 4 of the Directive. However, the licensing regulations do not clarify difficult concepts, such as 'storage complex', 'significant risk of leakage' or 'significant environmental or health risk' associated with the selected formation. Many of these concepts (ie 'storage complex', 'significant risk', 'leakage') are simply said to have the meaning given by Article 3 of the Directive.[98] Guidelines can be found in the guidance documents published by the European Commission on site characterisation, but no reference to their status has been made by the UK regulations.

## 5.3 Exploration permit

The Directive requires that, where Member States consider that exploration activities are necessary to obtain information for the selection of the site, an exploration permit is mandatory (Article 5). The UK regulations leave the decision about the need for exploration activities to the applicant at the time of licence application.

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[92] Energy Act 2008, Section 33.
[93] Energy Act 2008, Explanatory Notes.
[94] Article 1(15)(b) Directive 2009/29/EC of the European Parliament and the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community.
[95] Energy Act 2008, Explanatory Notes Section 33. Interestingly, the Act also permits an extension of the $CO_2$ storage regime rules to EOR operations carried out in an area of the continental shelf which is located 'outside any area designated as a Gas Importation and Storage Zone'. This gives a broader geographical scope to such operations than for $CO_2$ storage projects carried out on their own.
[96] CCS Directive Preamble Para 20.
[97] Licensing Regulations, Regulation 7.
[98] Ibid at Regulation 1(4).

For non-intrusive exploration (covering seismic, gravity and magnetic surveys, sample collection and drilling within 350 m below the seabed surface, but not deeper drilling), a general exploration licence is needed under the Petroleum Act 1998. DECC is adapting this type of licence to cover exploration for the purpose of $CO_2$ storage. Neither an AfL nor a lease from The Crown Estate is required at this stage.[99]

When the applicant decides to undertake intrusive explorations (covering deep drilling beyond 350 m below the seabed surface and test injection of $CO_2$), in addition to non-intrusive exploration activities, it will need a $CO_2$ storage licence specifying the period for conducting exploration activities ('appraisal period').[100] Such activities are limited to the licensed area (as opposed to 'storage complex' under the Directive) with a view to collecting all information needed for the selection of the storage site, before applying for a storage permit. During the appraisal term, the licence operates in effect as the exploration permit under the Directive. A 'general exploration licence' is defined as 'any licence' authorising only the exploration of a controlled place under the Energy Act and the establishment or maintenance of an installation in a controlled place for the purpose of such activities.[101] A lease or, more usually, an AfL from The Crown Estate will be required to obtain property access rights to enable intrusive exploration and test injection. Moreover, the regulations provide that a general exploration licence does not grant to its holder the sole right to carry out exploration of a controlled place, and is issued in combination with (i) a licence for importation and storage of combustible gas[102]and (ii) a licence under section 3 of the Petroleum Act.

## 5.4 Storage licence

As an indication of regulatory discretion, the UK regulations require a $CO_2$ storage licence to be obtained before, and in addition to, a storage permit under the Directive.
No storage or associated activity can be undertaken without a licence.[103] A $CO_2$ storage licence is required for:

- storage of $CO_2$ with a view to its permanent disposal,
- conversion of any natural feature,, such as saline aquifers, for the purpose of permanent storage of $CO_2$,
- exploration for the purpose of permanent storage of $CO_2$, and
- establishment or maintenance of installations for any of these activities. [104]

The area to which the licence relates is defined as a 'controlled place'[105] and it can be located in, under or over the territorial sea adjacent to the UK and Scotland (0-12 nautical miles from the coast) and the GISZ (12-200 miles from the coast).[106] All phases of $CO_2$ storage developments (exploration, operation and post-closure) are therefore covered by this framework licence. It also grants an exclusive but time-limited right to apply for the storage permit required by the Directive.

The Secretary of State will issue the licence when a relevant activity takes place in UK territorial waters (ie England, Wales and Northern Ireland) and the GISZ. The Scottish Ministers will issue the licence for CCS activities taking place in the territorial waters adjacent to Scotland. In the event that the activity or the area is located across the two regions, either authority can issue the licence. In the case of an installation, the competent authority is 'whichever of the Secretary

[99] DECC, *Consultation on the Proposed Offshore Carbon Dioxide Storage Licensing Regime* (25 September 2009) p 16.
[100] Energy Act 2008, Section 18 (2)(c).
[101] Licensing Regulations, Regulation 1(3).
[102] Energy Act 2008, Section 4.
[103] Ibid at Section 17(1).
[104] Ibid at Section 17(2).
[105]Ibid at Section 18(3) [consequently amended by the Energy Act (Storage of Carbon Dioxide) (Scotland) Regulations 2011 [SSI 2011/224] to include onshore territory of Scotland].
[106] Energy Act 2008, Section 17(2).

of State or the Scottish Ministers licenses the activities for the purposes of which the installation is established or maintained'.[107]

The content of the licence is included in Schedule 1 of the regulations. This includes indications regarding the grant of the storage permit, closure of a storage site by the operator, the post-closure plan and post-closure obligations. The licence can include provisions regarding financial security and on the review and modification of the licence itself. The licence may prevent, or enable the licensing authority to prevent, the holder from undertaking an activity for which the licence was granted (in the event of, for example, significant environmental risks). It can also contain provisions on closure, post-closure and termination, including financial arrangements. Details are established by regulations.

If no appraisal period is required by the applicant, the application for the licence must directly include a proposed initial term, which may be extended.[108] Both the appraisal period and the initial term are instrumental in defining the time limit for the holder to apply for a storage permit. If no application is submitted by the end of the appraisal term/initial term, the licence will expire. The licence will also expire as a consequence of an unsuccessful application for a storage permit.[109]

It is important to note that the licence does not correspond to the storage permit under the CCS Directive. The UK legislation therefore requires two distinct permits - a licence and a storage permit - which have two different functions. The licence gives the right to undertake certain activities and a time-limited right to apply for a storage permit, which is necessary for storage operations, as required by the CCS Directive. This duality is the result of, on the one hand, the inclusion of CCS activities within the UK legal and regulatory framework for oil and gas operations, which requires both an exploration and production licence, but on the other hand, compliance with the Directive, which requires a specific permit to undertake the storage operations.
Under the Act, the licensing authorities have enforcement powers with respect to the licence. Carrying out storage activities without a licence or in breach of one is an offence, and associated sanctions are specified under the Act.

## 5.5 Storage permit

The application for a storage permit must be submitted under the conditions of the licence, after the appraisal term or the initial term has elapsed.[110] The licensing regulations define the storage permit as 'a consent granted under the licence, authorising the use of a place as a storage site'.[111] The permit is therefore required to construct, maintain and operate the injection and storage facilities.

The application must contain all the information required by Article 7 of the Directive, including proof of financial security.[112] The conditions of Article 8 of the Directive must be satisfied, together with:

- the conditions associated with the site characterisation,
- proof of the financial soundness and technical competence of the operator, and
- a requirement that, in the event of more than one site in the same hydraulic unit, the conditions must be satisfied for both simultaneously.

[107] Ibid at Section 18(2).
[108] Licensing Regulations, Regulation 4.
[109] Ibid at Regulation 4(4).
[110] Ibid at Regulation 6.
[111] Licensing Regulations, Regulation 1(3).
[112] Ibid at Regulation 6(3).

The regulations also require the application to provide evidence that 'no part of the storage complex extends beyond the territories of the member States'.[113] This is an interesting clause if one considers, for instance, straddling oil and gas reservoirs between Norway and the UK. However it could be argued that, by virtue of its European Economic Area (EEA) membership, Norway will also implement the CCS Directive, and virtually be considered as a Member State with the purpose of CCS.[114]

Similar to the exploration permit, no reference is made to the Directive's requirements for non-discrimination, transparency and objectivity criteria for granting the storage permit. Nor is there any mention in the regulations of the requirement that no conflicting uses of the storage complex may be permitted during the period of validity of the permit. However, both DECC and The Crown Estate have clarified this point in the context of their approach to the granting of the licence and the lease, respectively.

There is no explicit indication of the requirement that there shall be only one operator per storage site (as required by the Directive); however, this may be implicit insofar as the licence holder has the exclusive right to apply for a storage permit in the controlled place. The regulations define the operator as 'the person who carries on or (where different) controls activities at the storage site'. This definition does not include the most ambiguous element of the Directive's definition of an operator: any person 'to whom decisive economic power over the technical functioning of the storage site has been delegated according to national legislation'. The licensing regulations do not expressly require that the competent authority is satisfied that 'all relevant requirements of the Directive and of other relevant Community legislation are met', in order to grant the permit.

The Secretary of State must forward the permit application and other material relevant to the final decision to the European Commission for it to give a non-binding opinion, and must consider any such opinion when granting the permit.[115] Although non-binding, such involvement of the Commission in a national licensing procedure is unprecedented in EU law.

The final storage permit will contain all the information specified in Article 9 of the Directive, plus:

- both the name of the holder of the licence and the name of the designated operator of the storage site, as they are two different entities under the UK regime, and
- 'requirements designed to prevent any undue interference with other uses of the area surrounding the storage site'.[116]

The latter is interesting as it recalls the specific provision about non-conflicting uses.

## 5.6 Review, modification and revocation of a storage permit

The regulations implement the Directive regarding the obligation of the operator to notify the competent authority of any change planned in the operation of the storage site, including any change in the operator (Article 11).[117] The permit will be consequently reviewed and modified, if appropriate.[118] The authority may make the modification and notify the operator about its entry into force and implementation.[119] However, if the matter constitutes a substantial change, the

[113] Ibid at Regulation 7(1)(b).
[114] See discussion on the territorial limits to the application of the EEA agreement in Norway, in HC Bugge 'Case Studies on the Implementation of Directive 2009/31/EC on the Geological Storage of Carbon Dioxide' in *EU Case Studies Project* by the Carbon Capture Legal Programme, UCL (Nov 2011).
[115] Licensing Regulations, Regulation 7(7).
[116] Licensing Regulations, Regulation 8(1)(f).
[117] Ibid at Schedule 2 (4)(1).
[118] Ibid at Schedule 2 (5).
[119] Ibid at Regulation 11(1)

authority must either make a modification and notify the operator or notify the operator that it may not implement the change.[120] The regulation does not define 'substantial change', but explicitly refers to the definition given under Article 3 of the Directive.

Modification or revocation of the permit must be considered when the authority becomes aware of:

(a) any leakage (including any such risk) or significant irregularities;
(b) any breach of the terms or conditions of the storage permit;
(c) any scientific finding or technological development which appears to have a bearing on the conduct of operations at the storage site; or
(d) 'in any event, 5 years after the grant of the permit ("review date") and subsequently every 10 years'.[121]

Before making the revocation or modification, the competent authority must 'consult the operator or any other holder of the licence'.[122]

## 5.7 Consequences of the revocation of the storage permit

In compliance with the Directive, the authority has two alternatives upon revocation of the storage permit.

It must either:

(a) close the storage site, or
(b) consider any application for a new licence, and consequently a new storage permit, with respect to the storage site.[123]

Of special significance in this context is the fact that, until the storage site is closed, or pending the granting of the new storage permit, the authority is deemed to be the operator with respect to a series of legal obligations under the Directive (ie acceptance and injection of the $CO_2$ stream; monitoring; corrective measures; surrender of allowances under the ETS directive; and preventive and remedial actions under the Environmental Liability Directive[124]).[125]

When the storage site is actually closed, the authority will also be required to make sure that it is sealed and the injection facilities removed, in addition to complying with the provisions of the Petroleum Act on decommissioning.

The closure can be agreed by the authority from the beginning or because a new storage permit cannot be issued as a result of a new application process. In this case, even though the permit has been revoked, the existing licence will still be in force. However, if a new permit is issued, the existing licence expires at the date of issuance of the new permit.[126]

There is no explicit reference to the fact that the post-closure requirements should be fulfilled by the competent authority pursuant to the provisional post-closure plan (Article 17 (3)).

[120] Ibid at Regulation 11(2).
[121] Ibid at Regulation 11(6).
[122] Ibid at Regulation 11(8).
[123] Ibid at Regulation 12.
[124] Directive 2004/35/EC of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage [hereafter ELD].
[125] Licensing Regulations, Regulation 12(4).
[126] Ibid at Regulation 12(3).

Although important, the practical relevance of the provisions on revocation of the storage permit might be influenced by the oil and gas experience. In this context, due to the close relationship between the regulator and the operator, negotiations or modifications seem therefore a more viable option than the definite revocation of the permit.

## 5.8 Acceptance and injection of $CO_2$

Details about criteria and conditions to be fulfilled before accepting a $CO_2$ stream are included in the regulations.[127] These requirements mostly adopt the same language as the Directive concerning $CO_2$ stream acceptance criteria and procedure. The operator is also required to keep a register of the quantities, properties and composition of the $CO_2$ stream delivered and injected into the storage site.

There is no clarification of the exact percentage of $CO_2$ to be contained in the stream for it to be considered overwhelmingly composed of $CO_2$. This wording was incorporated in the Directive to mirror the amendments to international marine treaties (Article 12). In those negotiations, the UK was especially active in trying to include an open-ended wording ('overwhelmingly') with respect to the $CO_2$ stream acceptance as opposed to an exact percentage (which was the German preference). This preference is therefore consistently reflected in its national transposition.

## 5.9 Monitoring

The licensing regulations take on board Article 13 of the Directive concerning the obligations of the operator to carry out a programme of monitoring, the purpose of such monitoring, the monitoring plan and its approval/modification/update procedure.[128] As required by the Directive, the plan must be updated in accordance with its Annex II. The authority must approve the plan, but can require modifications to it.

The regulations do not provide guidance for some undefined concepts (ie 'significant adverse effects', 'users of the surrounding biosphere'). Nor is there any clarification of the meaning of some other terms that are ambiguous in the Directive (ie 'corrective measures', 'significant irregularities'), as the Regulations simply refer to the limited definitions included in the Directive.

## 5.10 Reporting, notification of leakage and significant irregularities

The licensing regulations include reporting obligations within the storage permit.[129] The operator is required to submit an annual report to the competent authority, beginning one year after the start of the injection ('reporting period'). The length of the reporting periods can be modified by the competent authority subject to notification to the operator. As required by the Directive (Article 14), the report must include information on:

- the results of the monitoring;
- the quantity, properties and composition of the $CO_2$ streams;
- proof of putting into place and maintenance of financial security; and
- any other information relevant to assessing 'compliance with the conditions of the storage permit or[130] for increasing knowledge of the behaviour of the $CO_2$ stored at the storage site'.[131]

In accordance with the Directive (Article 16), the operator must immediately notify the authority if he 'becomes aware of any leakages or any significant irregularities'. In cases involving leakages or significant irregularities which imply the risk of leakage, the operator must also

[127] Ibid at Schedule 2 (1).
[128] Ibid at Schedule 2 (2).
[129] Licensing Regulations, Schedule 2 (3).
[130] Article 14 of the CCS directive says 'and'.
[131] Licensing Regulations, Schedule 2(3)(5).

immediately notify the regulator enforcing the ETS directive. These are the EA in England and Wales, and SEPA in Scotland.

## 5.11 Corrective measures

If he becomes aware of any leakage or significant irregularity, the regulations require the operator to take the necessary corrective measures and measures for the protection of human health.[132] The measures must include those set out in the corrective measures plan, submitted to and approved by the competent authority as a condition for granting the storage permit, but may also be additional to, or different from, those contained in the plan.

The licensing regulations clarify the powers and duties of the competent authority with respect to corrective measures.[133] The authority can itself require the operator to take corrective measures and any measures for the protection of human health that it considers necessary after consulting the operator. If the operator fails to carry out the required measures, the competent authority must undertake them itself. It also retains the power to take such measures at any time, whether or not it has requested the operator to do so. In all cases, until such time as the licence has been terminated, the costs involved are to be paid by the operator. The measures that are required may be different from or additional to the initially approved plan. The authority's powers to require the operator to take such measures refer to any leakage or significant irregularity occurring when the storage permit is still valid and do not cover circumstances where the event occurs after the permit has been revoked.

The Energy Act also gives the licensing authority power of direction in the event that the operator fails to comply with any provision of the licence, including the obligation to take corrective measures.[134]

Within the UK regulations, there is no indication of the operator's right to appeal against a direction to take corrective measures. No details are provided on the technical mechanisms for recovery of costs or to prevent competing claimants from prevailing in such recovery. Nothing is said in the regulations with respect to the exception to the corrective measures provisions, given in the Directive, concerning specified types of leakage from enhanced hydrocarbon recovery (EHR) operations.[135]

## 5.12 Inspections

The UK has not yet transposed the Directive's provision on inspections (Article 15). New regulations on inspections are intended to be adopted in the near future to complete the transposition process.

## 5.13 Closure of the storage site and post-closure obligations

The rules for closure and post-closure mirror the Directive (Article 17). When the conditions for closure included in the storage permit are met, the operator *must* close the storage site.[136] As in the Directive, detailed conditions are not listed ex ante in the regulations, as they will eventually be project-specific. The operator *may* also close the site if consent is given by the competent authority to do so and any conditions attached to such consent are met.[137]

Prior to closure, the operator must submit a proposed post-closure plan to the authority for approval. The plan must be based on the provisional post-closure plan approved at the time of the granting of the storage permit, subject to any modifications proposed by the operator, taking

[132] Ibid at Schedule 2(6).
[133] Ibid at Regulation 10.
[134] Energy Act 2008, Section 24.
[135] Preamble to the CCS Directive, Para 20.
[136] Licensing Regulations, Schedule 1(2)(1).
[137] Ibid at Schedule 1(2)(2).

account of: an analysis of the relevant risks, current best practice and any improvement in the available technology.[138]

After the site is closed, the operator is still required to comply with the obligations to undertake preventive and remedial measures under the ELD, and to surrender emissions allowances under the ETS legislation.[139] The operator is also still responsible for monitoring, reporting and corrective measures, the sealing of the storage site and the removal the injection facilities, as required under the Directive.[140]

## 5.14 Transfer of responsibility

The procedure, conditions and consequences for the transfer of responsibility from the operator to the competent authority are separately regulated by the Termination of Licences Regulations under the authority of the Energy Act 2008.[141] These regulations apply to licences issued by either the Secretary of State or the Scottish Ministers.

When the storage site has been closed, the licence holder can apply to the competent authority for a termination of the licence.[142] In this application, the licence holder must submit a transfer report, or can be requested to do so by the competent authority, as required by the Directive.[143] The transfer report must be made available to the European Commission, together with any other documents that the authority will take into account when deciding whether to issue draft approval for the transfer ('draft termination notice').[144]

As in the Directive (Article 18), at the time when it grants a storage permit (and approves a proposed post-closure plan), the competent authority must determine the minimum period that will have to elapse between the date of site closure and the date when the licence can be terminated, that period being no less than 20 years. After closure has taken place, the authority may reduce the period if it is satisfied that the transfer conditions have been met earlier.

The transfer conditions are as follows:

- all available evidence indicates that the stored $CO_2$ will be completely and permanently contained;
- the minimum period has elapsed;
- the operator has provided the financial contribution required to cover the authority's post-transfer costs;
- the storage site has been sealed and the injection facilities have been removed; and
- an abandonment programme has been carried out in accordance with Part IV of the Petroleum Act. [145]

The transfer report must demonstrate that such conditions have been met. If the report is satisfactory, a copy of the draft termination notice will be sent to the European Commission for a non-binding opinion.[146] If the conditions for transfer are met, the authority will issue a termination notice that specifies the exact date when the licence terminates.

[138] Ibid at Schedule 1(3).
[139] Ibid at Regulation 14.
[140] Ibid at Schedule 1(4).
[141] The Storage of Carbon Dioxide (Termination of Licences) Regulations 2011 [SI 2011/1483] [hereinafter 'termination regulations'].
[142] Termination Regulations, Regulation 4.
[143] Ibid at Regulation 4(2).
[144] Ibid at Regulation 6.
[145] Ibid at Regulation 8.
[146] Ibid at Regulation 11.

The transfer of responsibility is a key element of the EU CCS regime. The UK regulations are broadly based upon the provisions of the Directive, but a few new and interesting choices have been made with respect to the obligations and liabilities resulting from such transfer.
First, when the termination notice is served, the authority has the power to require the licence holder to provide 'all records, returns, plans, maps, samples, data and other information that the licence holder holds in respect of the storage site'.[147] This is significant as the authority can use such information to:

- carry out its obligations (monitoring, corrective measures, surrender of allowances under the ETS Directive and preventive and remedial action under the ELD);
- discharge its liabilities; or
- exercise other functions that the authority considers appropriate.[148]

This provision goes beyond what is required by the Directive, in the context of the operator's reporting obligations (Article 14) and disclosure of data about the storage site at the time of transfer of responsibility (Article 18). In one of its Guidance Documents, however, the European Commission has highlighted that the operator will be expected to transfer all the relevant raw data and documents related to the site to the competent authority when it hands over responsibility.[149] Regulation of intellectual property rights over such information is left to Member States. In the Guidance Document, the Commission has suggested a balance between the rights of the operator and the potential to contribute to improved the knowledge of the reservoir and its performance over time. This approach would be based on the commercial rules and/or applicable practice of the oil and gas industry.[150] In this context, the UK regulations are very precise, but only state that confidentiality would be ensured, when proved justifiable, making no reference to the Guidance Document. Depending on the interpretation given to this provision by the competent authority, there could be scope for disputes over intellectual property rights.

Second, the termination notice enables the transfer of responsibility from the licence holder to the authority. Immediately when the licence terminates, the following responsibilities are transferred to the authority:

- monitoring;
- corrective measures;
- surrender of ETS allowances;
- preventive and remedial action under the ELD[151]; and, interestingly,
- any leakage liabilities incurred by the licence holder prior to termination of the licence, where payment of the corresponding debts has not been determined prior to transfer.[152]

The last point is new as it is not included in the Directive. Under the regulations 'leakage liabilities' are defined as 'any liabilities, whether future or present, actual or contingent, arising from leakage from the storage complex to which the relevant licence relates and includes liabilities for personal injuries, damage to property and economic loss'.[153]

This provision explicitly allows a significantly wider transfer of responsibility than is provided for in the Directive, adding civil and common law liabilities to the transfer process.

[147] Ibid at Regulation 13(2).
[148] Termination Regulations, Regulation 13(3), referring to obligations and liabilities listed in Regulations 14 and 15.
[149] European Commission, *Guidance Document 3-Criteria for the Transfer of Responsibility to the Competent Authority'* p 16.
[150] Ibid.
[151] Termination Regulations, Regulation 14 (2).
[152] Ibid at Regulation 15(1).
[153] Ibid at Regulation 15 (3) (b).

A key question arises as to whether this departure is allowed by EU law. It could be argued that the extra protection granted to operators against civil and common law claims by the UK regulations results in a substantially less stringent regime than that specified under the Directive. While the Directive gives the authorities the power to relieve the operator of certain statutory obligations under specified EU laws, it does not offer such a wide indemnification. The UK regulations effectively limit the right of the public to sue operators for injures, damage to properties or economic losses, once the transfer has occurred. It could also be argued that this might constitute a State aid. Further issues may arise from the unclear meaning of the temporal limitation of this extra protection, to liabilities 'incurred prior to the termination of the licence'.

The cut-off point for these civil/common law liabilities to be transferred is defined in terms of pre-existing debts. The regulations provide that the transfer will not be possible if, at the time of termination, the liability 'constitutes a debt or a judgment debt for a liquidated sum', which was either payable by the licence holder before termination, or is payable after termination, but 'at a time which is certain'.[154] This seems to mean that, if a court has already taken a decision on a case of leakage (or a settlement agreement has been reached) and compensation must be paid by the operator, that liability cannot be transferred. Conversely, if a case has been brought, but not yet been decided, the contingent liability could in principle be transferred to the authority. In reality, it is likely that this provision will be interpreted narrowly by the competent authority, and that any unresolved liability will be 'ring-fenced' and excluded from the transfer, or the transfer as a whole will be postponed until such matters are resolved.

Except for the above obligations and liabilities, any other obligation and liability would remain with the licence holder as not affected by the termination of licence.[155] The question arises as to what other obligations or liabilities might occur in this context.

In addition, it is worth noting that the civil/common law liabilities that can be transferred to the authority under this Regulation are limited to those caused by leakage from the storage complex. The provision seems to overlook the possibility not only of liabilities resulting from other processes (eg contamination by other pollutants or seismic and pressure effects), which could well be causes of harm, but also of 'significant irregularities' as defined under the Directive, which are not mentioned in the regulation's wording.

The authority will also be able to recover costs incurred after the transfer has taken place if they arise 'due to fault on the part of the operator'. The regulations provide that fault includes 'negligence, deceit, or a failure to exercise due diligence'.[156] This is a purely illustrative list which reflects the Directive's approach.[157] The regulations also include additional information provisions, enforcement provisions and penalties.

## 5.15 Financial security

The licensing regulations define 'financial security' as including:

(a) a charge over a bank account or any other asset;
(b) a deposit of money;
(c) a performance bond or guarantee;
(d) an insurance policy; and
(e) a letter of credit.[158]

[154] Termination Regulations, Regulation 15(2).
[155] Ibid at Regulation 14(1).
[156] Ibid at Regulation 16(2).
[157] The UK regulation differs from Article 18(7) of the Directive, however, in two respects. First, the list of what might constitute 'fault' omits 'deficient data', which is a category which could be very difficult to keep within bounds. Second, the regulation gives the authority a discretionary power to recover from the operator in cases of fault, whereas the Directive imposes a duty to recover in such circumstances.
[158] Licensing Regulations, Regulation 1(3).

The financial security must (a) be of an amount sufficient to ensure that the obligations of the operator can be met ('the secured amount'); (b) be in force before starting injection and (c) remain in force until the licence is terminated.[159] If the storage permit is revoked, the financial security must remain in force until a new storage permit is granted or, following site closure, the licence is terminated. This is because, in the UK, the financial security is linked to the wider licence, which governs responsibility for statutory obligations, and not to the storage permit, which deals only with operational activity. The authority must, upon receipt of the periodical report from the operator, assess whether the financial security is still adequate to its purpose. If it is not, the amount must be adjusted by the authority in the light of the assessed risk of leakage or estimated costs of meeting the obligations covered by the financial security.

The regulations do not offer any more detail on the technical aspects of the financial security provisions of the Directive (Article 19), such as: the criteria for approving specific instruments, the required, amounts, duration, terms and conditions, renewals or possible exclusions. Although no reference is made to the European Commission guidance document on these issues, the list in the definition of financial security provides the operators with some indication of which mechanisms will be, in principle, acceptable.

While some questions remain with respect to the practical application of the financial security requirements, there are parallels that can be drawn from established experience with financial provisions for landfill sites. At present, the financial security requirement is still seen by industry as one of the main challenges. Concerns have been expressed by some about the risk that, if poorly implemented, the financial security elements might constitute a 'showstopper' and make investment in CCS unviable.[160]

## 5.16 Financial mechanism

In the context of the draft termination notice, the regulations state that the authority determines 'the amount and form of financial contribution from the operator that the authority considers will be sufficient to cover the expected post-transfer costs'.[161] If the contribution is not made available by the operator, the licence will not be terminated and the transfer of responsibility will not occur.

In the regulations, the 'post-transfer costs' are defined as 'the costs for which the authority will be liable as a result of the transfer of obligations and liabilities to the authority'.[162] Those costs will therefore include 'any leakage liabilities incurred by the licence holder prior to termination of the licence', unless there are already resolved as debts beforehand. On that basis, in the UK. such financial mechanism is broader than what is foreseen by the Directive (Article 20), which only covers statutory obligations post-transfer.[163] As discussed above, this is the result of the provision for a potentially wider transfer of responsibility.
The regulations refer to the factors in Article 20(1) of the Directive to be taken into account in determining the amount of the contribution, also including 'any representations received from the operator'.[164] The operator must be notified of:

- the decision on the amount and form of the financial contribution,
- the date by which the financial contribution must be provided to the authority.

There is no reference to the European Commission's guidance documents.

[159] Licensing Regulations, Schedule 2(7)(1).
[160] CCSA, *A Strategy for CCS in the UK and Beyond* (September 2011) p 46.
[161] Termination Regulations, Regulation 10.
[162] Ibid at Regulation 1(3).
[163] I.e. at least the anticipated monitoring costs for 30 years, plus other costs that the authority might incur to ensure complete and permanent containment, including corrective measures under the CCS Directive, surrender of allowances under the ETS Directive and preventive and remedial actions under the ELD.
[164] Termination Regulations, Regulation 10 (2)(b).

## 5.17 Third party access and dispute settlement

The Directive's provisions on third parties access to the $CO_2$ transport network and storage sites are implemented by specific regulations.[165] They apply to onshore and offshore $CO_2$ pipelines and storage sites in the UK, except for Northern Ireland.

Prior to these regulations, pre-existing UK legislation applicable to oil and gas pipelines[166] extended to pipelines conveying $CO_2$ and included provisions on third party access, but did not cover $CO_2$ storage sites. As a result, these regulations amend existing legislation to remove $CO_2$ pipelines from its scope and establish a specific regime for $CO_2$ infrastructure as a whole, including onshore and offshore pipelines, storage sites and associated infrastructure (eg pumps or temporary storage facilities).

The regulations are, however, largely based upon pre-existing petroleum legislation and transfer the principles of third party access to $CO_2$ infrastructure to comply with Articles 21 and 22 of the Directive. This is of great importance to provide legal certainty to investors in the CCS industry.

Key provisions concern: (a) the variation conditions for storage sites and pipeline variation notices, (b) allocation of costs, (c) the acquisition of access rights, (d) compulsory modifications of infrastructure and (e) information and publication requirements.

First, development consent for $CO_2$ infrastructure can be subject to 'variation conditions'[167] or a 'pipeline variation notice'.[168] This means that the competent authority[169] may require the operator to increase the capacity of the infrastructure, modify its design, or modify its route (in the case of a $CO_2$ pipeline) if:

- there is demand for the construction of other infrastructure for the conveyance or storage of $CO_2$;
- the route that would be taken by other pipelines would be substantially the same than the one taken by the proposed pipeline; and
- there is not prejudice to the safety, environmental integrity or the efficient operation of the relevant pipeline ('qualified third party access').

Before taking this decision, the authority must consult the applicant, third parties who made representations, any person having access rights with respect to the infrastructure and the Health and Safety Executive.

Second, following a variation, the authority may indicate the sums to be paid to holder of the consent for infrastructure by the person who asked for the variation, in the light of the additional costs borne by the holder to comply with the variation condition.[170]

Third, the acquisition of access rights to use proposed infrastructure (pre-construction) and relevant infrastructure (post-construction) are also regulated.[171] In both cases, an access application must be made to the owner of the infrastructure.[172] If there is a dispute, the matter can be brought before the competent authority. In its consideration, the authority will take into

[165] The Storage of Carbon Dioxide (Access to Infrastructure) Regulations 2011 [hereinafter Access Regulations] [SI 2011 No 2305].
[166] Petroleum Act 1998 (c 17), Pipe-line Act 1962 (c 58) and Planning Act 2008 (c 29).
[167] Access Regulations, Regulation 7.
[168] Ibid at Regulation 8, applicable when a pipeline requires planning consent under Part 3 of the Town and Country Planning Act 1990 or Part 3 of the Town and Country Planning (Scotland) Act 1997.
[169] In the case of a pipeline, competent authorities are: the Secretary of State, the Scottish Ministers and the Infrastructure Planning Commission; while in the case of a storage site, the authority only lays with the Secretary of State or the Scottish Ministers.
[170] Access Regulations, Regulation 9.
[171] Ibid at Regulations 10 and 12.
[172] Ibid at Regulation 5 defines the 'owner of the infrastructure'.

account the conditions set by Article 21(2) of the Directive and issue an 'access notice' to enable the access. One of the benefits of a statutory third party access mechanism is that it constitutes an incentive to meaningful negotiations, in order to avoid the possibility that access is ultimately imposed by the authority.

A notice to allow access rights will only be issued by the competent authority if it will not prejudice:

(a) the safety, environmental security, or efficient operation of the conveying by or storage in the infrastructure and
(b) the conveying by or storage in the infrastructure of the quantities of $CO_2$ which the owner, his associates or another person with access rights require.

Finally, the authority may require the applicant to provide specific information to enable it to decide whether to exercise its functions under the regulations and how to do so. Such information is included in the notice and comprises financial information. The owner of the relevant infrastructure must publish the information related to available capacity and technical and operating requirements at least once a year to ensure access to third parties. This information sharing on capacity and technical specifications is new compared with the access provisions of the petroleum legislation and implements the transparency criterion of the Directive.

DECC intends to publish guidance on the powers to be taken by the authority in cases of access applications and on the principles for establishing the allocation of costs.

## 5.18 Integration with existing legislation

The implementation of the CCS Directive in the UK has required not only the adoption of dedicated legal and regulatory provisions, but also a wide adaptation of existing environmental legislation. Following the entry into force of the Energy Act, amendments have been made to existing offshore environmental protection regulations so that they also apply to $CO_2$ storage, associated exploration activities and the maintenance of relevant infrastructure.[173]

Among these amendments, the following expressly implement the Directive:

(a) The requirement to include an environmental statement within the consent application for the construction of a pipeline conveying $CO_2$.[174] This provision implements Article 31 of the Directive amending the Environmental Impact Assessment Directive.

(b) The extension of the prevention and control of pollution requirements to offshore installations on structures used in connection with gas unloading or storage activities, under certain conditions.[175] This provision implements the amendment made by Article 37 of the CCS Directive to the Integrated Pollution and Prevention and Control (IPPC) Directive.[176]

(c) A mandatory Environmental Impact Assessment (EIA) is expressly required for (i) pipelines with a diameter of more than 800 millimetres and a length of more than 40 kilometres for the transport of $CO_2$ streams for the purposes of geological storage,

[173] See the Energy Act (Consequential Modifications) (Offshore Environmental Protection) Order 2010 [SI 2010 No 1513].
[174] Amendment to the Offshore Petroleum and Pipe-lines (Assessment of Environment Effects) Regulations 1999.
[175] Amendment to the Offshore Combustion Installations (Prevention and Control of Pollution) Regulations 2001.
[176] Council Directive 2008/1/EC.

including associated booster stations, (ii) the storage sites and (iii) installations for the capture of $CO_2$ streams for the purpose of geological storage pursuant to the CCS Directive from installations included in Schedule 1 of the relevant regulations, or where the total yearly capture of $CO_2$ is 1.5 megatonnes or more. A discretionary EIA can be required for other capture installations and pipelines not included in Schedule 1. These provisions implement Article 31 of the Directive. [177]

(d) Pursuant to the Directive, UK licensing regulations include the operation of $CO_2$ storage sites within the list of activities that may cause environmental damage for which liability is triggered under existing regulations.[178] This provision transposes Article 34 of the CCS Directive amending the Environmental Liability Directive to cover such operations.

(e) CCS activities also require a permit under the new Environmental Permitting Regulations in England and Wales.[179] This requirement transposes the Directive's Article 32 amending the Water Framework Directive and Article 37 amending the IPPC directive.

(f) Specific amendments have also been made to regulations governing environmental liability, groundwater protection and integrated pollution prevention and control in Northern Ireland.[180]

Overall, elements of CCS operations will also fall within the scope of various pieces of pre-existing legislation, which, although not CCS-specific, must be taken into account. These include regulations concerning, for example, offshore habitat, offshore marine conservation, offshore combustion installations, offshore chemicals, emergency pollution control, contingency planning, control of major accident hazards, pipeline safety. Some of these have been consequentially amended.[181]

## 5.19 Stricter interpretation of the Carbon Capture Readiness requirement

The UK has implemented the requirement for Carbon Capture Readiness under the Directive (Article 33) through the development consent under Section 36 of the Electricity Act 1989.[182] This requirement not only implements the Directive, but goes beyond it by making this condition a mandatory requirement for obtaining consent. The Directive only requires operators to assess whether the key conditions are met. If met, the competent authority must ensure that suitable space on the installation is left aside in order to retrofit the capture and compression equipment at a later stage.

The UK's approach is stricter than the Directive's in two respects:

- availability of suitable space on the installation becomes only one of a series of equally mandatory requirements (e.g. storage capacity, technical and economically feasibility of the

[177] Amendment inserted in The Town and Country Planning (Environmental Impact Assessment) Regulations 2011 [SI 2011/1824] and The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 [SSI 2011/139].
[178] Regulation 15, Licensing Regulations amending the Environmental Damage(Prevention and Remediation) Regulations 2009 [SI.2009/153]. Equivalent amendment is included in The Environmental Liability (Scotland) Amendment Regulations 2011 [SSI. 2011 No 116].
[179] Environmental Permitting Regulations (England and Wales) (Amendment) 2011 [SI 2011/2043], amending Environmental Permitting Regulations (England and Wales) 2010 [SI 2010/675].
[180] Environmental Liability (Prevention and Remediation) (Amendment) Regulations (Northern Ireland) 2011 [2011/210]; Groundwater (Amendment) Regulations(Northern Ireland) 2011 [2011 No 211]; and Pollution Prevention and Control (Amendment) Regulations (Northern Ireland) 2011 [2011/ 212].
[181] See Energy Act (Consequential Modifications) Order 2010.
[182] See section 2.3 above.

full CCS chain) to obtain consent, rather than a requirement subject to the positive assessment of other elements;

- no combustion plant will be permitted unless it is CCR,[183] while the Directive seems to imply that a power plant could still be permitted without being CCR if the assessment proves that the conditions are not met.

In both cases, it is ultimately up to the competent authority to decide whether these conditions are met, not only on the basis of their assessment, but also by reference to 'other available information'.[184] This expands the competent authority's discretion in its decision.

The first consent for a CCR plant was granted in April 2010.[185] Since then, a number of new power plants, fulfilling the CCR requirement, have been approved.[186]

The stringency of this requirement is crucial to the UK CCS policy and confirms the government's commitment to move swiftly from demonstration to commercial deployment. No such ambitious approach can be found in any other EU Member State's framework.

# 6. Public participation and access to information

The CCS Directive is silent with respect to public participation in decision making and access to information concerning CCS. It was felt that such requirements
could apply to $CO_2$ storage activities simply by extending the scope of existing EU legislation, such as the EIA and the Integrated Pollution Prevention and Control (IPPC) Directives. Consequently, the CCS Directive includes CCS projects within the lists of activities covered by these directives.

The same approach has been followed in the UK implementation process. While the Energy Act and the $CO_2$ storage regulations are silent on the issue, public participation on CCS must be ensured via the EIA procedure by means of amendments to existing legislation.[187] Public consultation on the wider CCS plans and programmes must also be ensured under the Strategic Environmental Assessment procedure (SEA). A specific SEA has been conducted by DECC with respect to its policy framework for developing clean coal.[188]

Moreover, public consultation is also required before development consent is granted. Under the Planning Act 2008, for example, there are three stages where public participation and publicity is mandatory: (a) during the formulation of the National Policy Statements,[189] (b) during the preparation of the application before the Infrastructure Planning Commission (IPC)[190] and (c) during the hearings before the IPC.[191] Since CCS-equipped power plants are now included in the remit of the IPC these requirements would also apply to them.

[183] See DECC, *Overarching National Policy Statement for Energy (EN-1)* (June 2011) p 60.
[184] CCS Directive Article 33 (2).
[185] Decision letter of April 2010: Application for consent to construct and operate a 1520 MW combined cycle gas turbine station at Carrington, Greater Manchester.
[186] See DECC Recent Decisions on Applications, available at www.og.decc.gov.uk/EIP/pages/recent.htm.
[187] See amendments to existing EIA legislation in section 5.18 above.
[188] See DECC, *Strategic Environmental Assessment for a framework for the development of clean coal,* Post Adoption Statement (November 2009).
[189] Planning Act 2008, Sections 7 and 8.
[190] Ibid at Sections 42,47,48 and 49.
[191] Ibid at Sections 92 to 94.

The right of access to information concerning the environment will also be governed by existing UK legislation.[192] With respect to providing information to the public for specific CCS projects, the Directive is ambiguous on the publicity of the registers established under Article 27. However, the UK Energy Act 2008 makes clear that the registers including the details of each licence and storage permit, and of each storage site are public.[193] This register must be made available to the public free of charge.

Key issues with public participation remain. First, consultation requirements under the Planning Act are still weak when, for example, they limit the definition of local community to 'people living in the vicinity of the land' to be consulted in the pre-application phase.[194] This seems to exclude communities likely to be affected by the full-chain of the project (ie transport and storage), and, more generally, the wider public. Second, the minimum period for the public to reply to the consultation (28 days[195]) seems quite short, compared with the usual 12 weeks for government consultations. Third, despite the requirement to engage the public in decision-making concerning CCS, there is almost no legal indication for developers on how such consultation and participation should be carried out in practice. Voluntary guidelines are available, but this may be an area for further development.

Finally, the opportunities for participation in the decision making with respect to offshore $CO_2$ storage are restricted compared with the onshore facilities under the Planning Act. EIA requirements for CCS projects have recently been included in the Offshore Petroleum Regulations.[196] However, opportunities for public involvement and information in that context are rather limited under those regulations.[197]

The UK and Scottish government and environment agencies have been conducting public consultations on CCS policies and regulations relating to CCS.[198] It is ironic however that, on the provisions concerning liability, the government decided to conduct an informal consultation with key stakeholders, rather than the expected public consultation. Despite the absence of a statutory requirement to do so, involvement of the wider public on such a crucial topic would have been a more reassuring signal.

DECC's Office for CCS is chiefly tasked with public outreach on CCS. Community-specific public engagement activities have also been carried out by project developers (in particular 2CO, Scottish Power, National Grid). However, public awareness about CCS in general, and CCS projects in particular, is still low in the UK. A recent study on public awareness and acceptance of CCS[199] has revealed that only 11 per cent of the UK respondents had heard of CCS and knew what it was. Only 6 per cent had heard about CCS projects. Based on what they knew, there was a general acknowledgement of the efficacy of the technology in mitigating climate change, but the majority of the respondents would be worried if a $CO_2$ storage site were to be located in the proximity of their home. More support was therefore shown for offshore storage.

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[192] See Environmental Information Regulations 2004 under the authority of the Freedom of Information Act 2000.
[193] Energy Act 2008, Section 29. Details implemented under Regulation 9 of the Licensing Regulations.
[194] Planning Act 2008, Section 47 (1).
[195] Ibid at Section 47(3).
[196] See Section 9-10 of the Offshore Petroleum Production and Pipe-lines (Assessment of Environment Effects) Regulations 1999 [SI 1999/360].
[197] See M Lewis, N Westway, 'Public Participation in UK CCS Planning and consent procedures' in I Havercroft, R Macrory, and RB Stewart, *Carbon Capture and Storage-Emerging Legal and Regulatory Issues,* (Oxford, Hart Publishing, 2011) 277-296.
[198] Details of the consultations available on the CCLP website: www.ucl.ac.uk/cclp/ccsdedlegnat-UK.php.
[199] European Commission, *Special Eurobarometer 364- Public Awareness and Acceptance of $CO_2$ capture and storage,* Report (May 2011).

These figures show the discrepancy between the official commitment to engaging the public on CCS projects and the degree of public awareness of CCS and participation in the decision-making process. Specific information and details on the actual content of public engagement initiatives both from government and the developers are not easily accessible.

In light of these considerations, and the complexity and risks of CCS, one can raise the more general question of whether the Directive's silence – and the consequent UK approach – with respect to public participation on CCS is adequate to deal with the challenges of public perception of the technology, and whether a CCS-dedicated regime for public participation would have better served this purpose.

# 7. Conclusions

- In light of the potentialities of CCS in terms of emissions reduction, national energy security and new business opportunities, the UK is fully committed to demonstrate CCS with the view to starting commercial deployment by 2020.

- The UK has designed a sophisticated, and rather unprecedented, policy framework to support such commitment, which includes: mandatory requirements for Carbon Capture Readiness and CCS demonstration; a competition programme for funding to four demonstration projects; and a wider set of economic incentives to support its development.

- Based on the existing oil and gas model, the UK has also established one of the very first legal frameworks for enabling offshore CCS operations within its Energy Act 2008, which was adopted in anticipation of the Directive, but provided the necessary flexibility to enable its implementation. This Act, together with its implementing regulations, constitutes the main national measure for transposing the CCS directive within the domestic legal regime. The combination of well-established legal regulatory experience with the oil and gas industry, and the flexibility of a 'learning-by-doing approach' to deal with the more novel aspects of this technology, strike a very positive balance to encourage developers' confidence.

- However, despite all these positive signals, the UK has encountered some unexpected hurdles to swiftly translate its commitments into meaningful practice. From a policy point of view, this is shown by the delay to and criticisms of its demonstration and funding programme. More crucially from a legal point of view, this is highlighted by the UK's inability to maintain its initial advantage in adopting CCS legislation when it came to transposing the Directive within the specified deadline. This has led the European Commission to start an infringement procedure against the UK, which has surprisingly resulted in the UK being in the same position as (almost all) the other Member States, including those with uncertain strategies with respect to the technology (e.g. Germany or Poland). This was an unexpected outcome, but confirms the feeling that the UK has somehow lost its first-mover advantage compared with other Member States.

- Detailed analysis of the discretionary choices and unique features of the UK implementation of the Directive could prove challenging in the future. Among them, the aspects that are likely to need further consideration and reflection on the part of UK decision-makers are: the complexities linked to asymmetric devolution; the horizontal fragmentation in the administrative responsibilities associated with CCS operations; and the arguable inadequacy of the existing mechanisms to ensure effective and substantial public participation in the decision making process concerning CCS.

- The most significant departure from the CCS Directive can be observed in the provisions on transfer of responsibility. The UK termination of licence regulations bring common

law/civil law liability claims within the list of liabilities that can be transferred to the competent authorities, if all conditions for transfer are satisfactorily fulfilled. This expansion on liability poses questions of conformity with the Directive; its possible interpretation as 'less stringent' under the meaning of the Treaty; and, ultimately, its compliance with EU State aid legislation.

- Nevertheless, in the wider European scenario, some of the UK legal and policy measures to support CCS still appear unprecedented. Despite its formal non compliance with the deadline for transposition, the UK can still be considered far advanced with respect to the technology due to: the mandatory requirements for CCS; a sophisticated legal framework implemented by means of a deep harmonisation with existing legislation; and the decision to establish multiple funding mechanisms within the domestic Electricity Market Reform, as well as by means of public funding. Such variety of legal, policy and economic tools is not to be found in any other Member States. While one can say that the UK has effectively lost its first-mover advantage, the current situation surely corroborates the conclusion that it has not yet lost the opportunity to be a leader in CCS.