International Energy Agency

CARBON CAPTURE AND STORAGE

Legal and Regulatory Review

Edition 3

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The International Energy Agency (IEA), an autonomous agency, was established in November 1974. Its primary mandate was – and is – two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply, and provide authoritative research and analysis on ways to ensure reliable, affordable and clean energy for its 28 member countries and beyond. The IEA carries out a comprehensive programme of energy co-operation among its member countries, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The Agency's aims include the following objectives:

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- Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.
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Table of Contents

The *Carbon Capture and Storage Legal and Regulatory Review*

The International Energy Agency (IEA) considers carbon capture and storage (CCS) a crucial part of worldwide efforts to limit global warming by reducing greenhouse-gas (GHG) emissions. The IEA estimates that emissions can be reduced to a level consistent with a 2°C global temperature increase through the broad deployment of low-carbon energy technologies – and that CCS would contribute about one-fifth of emission reductions in this scenario.[1] Reaching that goal, however, requires that approximately 100 CCS projects be implemented by 2020 and over 3 000 by 2050.[2]

Achieving such rapid expansion requires that regulatory frameworks, or a lack thereof, do not unnecessarily impede environmentally safe demonstration and deployment of CCS, so in 2008 the IEA established the IEA International CCS Regulatory Network (Network) as a forum for sharing knowledge amongst regulators and policy makers.[3] This publication, the IEA *Carbon Capture and Storage Legal and Regulatory Review (CCS Review)*, was launched in October 2010 in response to a suggestion made at the Network's second meeting (Paris, January 2010) that the IEA produce a regular review of CCS regulatory progress worldwide. The *CCS Review* aims to help countries develop their own regulatory frameworks by documenting and analysing recent CCS legal and regulatory developments. It also identifies steps taken towards the legal and regulatory goals in the 2009 IEA *Technology Roadmap: Carbon capture and storage*. The *CCS Review* is produced approximately every 12 months, to provide an up-to-date snapshot of CCS regulatory developments in contributing jurisdictions.

Analysing trends

The *CCS Review* gathers contributions by national, regional, state and provincial governments, at all stages of CCS regulatory development. The first half of each contribution provides an overview of CCS advances since the last edition and those expected to occur in the following 6 to 12 months, with links provided to publicly available documents. The second half addresses a particular CCS legal and regulatory theme, such as long-term liability for stored CO_2. Where a contributor is new to the *CCS Review*, an overview of CCS legal and regulatory developments to date is also provided, to give context for future editions. Each contribution is notionally limited to two pages, to ensure the information is concise and easy to consult. Where CCS legal and regulatory developments have not yet begun or are still at an early stage, contributors provide an update on broader progress on CCS in their jurisdiction. To introduce each edition, the IEA provides a brief analysis of key advances and trends. This analysis is informed by the contributions, but themes discussed may be relevant beyond the jurisdictions mentioned. In addition to contributions from governments, the *CCS Review* includes contributions from leading international and academic organisations engaged in CCS regulatory activities. Each contributor is given the opportunity to comment on the IEA analysis before the *CCS Review* is released on the IEA CCS website (www.iea.org/topics/ccs/ccslegalandregulatoryissues/).

To help track developments in contributing jurisdictions and organisations, as well as CCS legal and regulatory themes previously addressed, each edition of the *CCS Review* includes a brief synopsis of previous editions: theme; contributing entities; and key developments (see page 103). Each edition builds on previous editions and it is intended that developments in any particular jurisdiction be considered across the *CCS Review* series.

[1] IEA (2012), *Energy Technology Perspectives 2012*, OECD/IEA, Paris, available at http://www.iea.org/etp/

[2] IEA (2009), *Technology Roadmap: Carbon capture and storage*, OECD/IEA, Paris, available at www.iea.org/roadmaps/ccs_roadmap.asp

[3] The Network provides a neutral forum for stakeholders to discuss global developments via topical web-based seminars and annual meetings in Paris. As at July 2012, the Network had over 1 400 members from over 50 countries, including around 20 developing countries.

The third edition of the *CCS Review*

The theme for this third edition of the *CCS Review* is stakeholder engagement in the development of CO_2 storage projects. This is discussed in the second part of each contribution. For this edition, contributions were received from 29 governments and 8 international CCS organisations. Contributors that are new to the *CCS Review* are marked with an asterisk below. Contributors to this edition include:

Countries

Australia	Italy	Poland
Canada	Japan	South Africa
Czech Republic	Malaysia	Spain
Finland	Mexico*	Switzerland
France	Netherlands	United Kingdom
Germany	New Zealand	United States
Ireland	Norway	

Regional jurisdictions

Alberta (Canadian province)	Illinois (US state)*	Texas (US state)*
British Columbia (Canadian province)*	Queensland (Australian state)	Victoria (Australian state)
European Commission	South Australia (Australian state)	Western Australia (Australian state)

Organisations

Asia-Pacific Economic Cooperation*
Carbon Sequestration Leadership Forum*
CCS Regulatory Project
Global Carbon Capture and Storage Institute
Implementing Agreement for a Co-operative Programme on Technologies Relating to Greenhouse Gases Derived from Fossil Fuel Use (IEA Greenhouse Gas R&D Programme)
University College London – Carbon Capture Legal Programme
World Bank
IEA

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1. Regional governments make substantial contribution as domestic progress continues

The 37 entries to this third edition of the *CCS Review* – 29 from government and 8 from international organisations – illustrate continued momentum in global CCS regulatory developments since the release of the second edition in May 2011. Regional governments are playing a critical role in driving developments in Australia, North America and Europe; around one-third of government entries (9 of 29) are from regional jurisdictions, up from 6 in the second edition. The US states are represented for the first time, with entries from the Illinois State Geological Survey and the Railroad Commission of Texas. The Canadian province of British Columbia also makes its debut in this edition as a regional contributor; in addition, we welcome the Government of Mexico, the Asia-Pacific Economic Cooperation (APEC) forum and the Carbon Sequestration Leadership Forum (CSLF).

The period since publication of the second edition has seen muted efforts among governments to advance the broader policy and financial drivers required to promote deployment (section 6). By contrast, international advances towards legal and regulatory frameworks to enable deployment are tracking relatively well (section 4).

A number of key developments are being driven at the regional level. In Canada, for example, provinces continue to make significant headway. Alberta expects to complete its Regulatory Framework Assessment process by the end of 2012, in which the government is trying to pin down regulatory detail on complex issues such as pore space open access, methodology for determining rates to be paid into its post-closure stewardship fund, etc. Section 3 looks at some of the challenging issues currently being tackled by Alberta and other jurisdictions advanced in framework development, both substantive and procedural. At the federal level, the government of Canada is one of a small number of jurisdictions to date to have advanced broader emissions reductions initiatives that could provide incentives for CCS installations in the future.

In the United States, Texas – one of six states reported by the United States Department of Energy in edition 2 to have elements of frameworks in place – has built on its existing framework, issuing new rules for both pure-play CO_2 injection and storage, and injection and storage in association with enhanced oil recovery (EOR).[4] Given increasing international emphasis on the potential role of CO_2-EOR as an early driver for CCS learning and infrastructure (section 5), the IEA will continue efforts to involve governments looking at the intersection between CO_2-EOR and CO_2 storage in the *CCS Review* moving forward. Illinois is another US state that has made moves to regulate geological storage. At the federal level, the Environmental Protection Agency (EPA) reports that it has built on its Safe Drinking Water Act geological storage rule,[5] proposing to conditionally exclude CO_2 streams injected into Class VI wells – the new well class established by the 2010 rule for wells used to inject CO_2 for geological storage – from federal hazardous waste regulations.[6]

[4] 16 TAC Chapter 5, available at http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=16&pt=1&ch=5

[5] 42 U.S.C. §300f et seq. (1974). Federal Requirements under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO_2) Geologic Sequestration Wells, Final Rule, 75 Fed. Reg. 77230 (Dec. 10, 2010). A rule related to geological storage was also finalised under the Clean Air Act in 2010: see edition 2 of the *CCS Review*.

[6] The aim is to remove any impediment to deployment posed by the potential applicability of hazardous waste requirements. Hazardous Waste Management System: Identification and Listing of Hazardous Waste: Carbon Dioxide (CO_2) Streams in Geologic Sequestration Activities, 76 Fed. Reg. 48073 (August 8, 2011).

The 25 June 2011 deadline for transposition of the EU CO_2 Storage Directive[7] has galvanised action across the European Union (EU), despite this progress not being immediately apparent in the official infringement proceedings figures.[8] The European Commission reports that it launched proceedings against 26 out of 27 member states for incomplete (11 member states) or non-communication of transposition measures (15 member states) following last year's deadline, with Spain being the exception. Germany is a high-profile example of the difficulties surrounding the transposition process in some EU countries, following public opposition to CCS (section 2). In practice, however, infringement proceedings are not uncommon,[9] and as at June 2012, nine cases had been closed following communication of full transposition legislation.[10] Almost all member states with planned CCS demonstration projects have completed transposition. Work is generally ongoing in areas where the EU CO_2 Storage Directive affords discretion to member states.[11] EU member state the United Kingdom announced a comprehensive electricity market reform process in July 2011; the proposed reforms are significant as they represent the first more comprehensive approach globally to set CCS policy beyond the first demonstration facilities.

At the Australian state-level, Victoria – one of three states with legislation in place to regulate onshore geological storage, together with South Australia and Queensland – reports that its legislative framework for *offshore* CO_2 storage is now also in force.[12] This makes Victoria the first Australian state to have finalised its regulatory framework for CO_2 storage across both onshore and relevant offshore areas. A fourth state – Western Australia – has been working to develop its onshore framework since 2010; its bill has reached the initial consultation phase and will be introduced into parliament shortly. The federal government has finalised secondary legislation to underpin its offshore geological CO_2 storage legislation, and now has all elements of its CO_2 injection and storage framework in place. The regulations,[13] which entered into force in June 2011, set out detailed provisions dealing with, amongst other things: the interaction of GHG storage and petroleum activities; storage site selection and characterisation; and site plan requirements.

This edition also highlights progress beyond these regions in the context of the Clean Energy Ministerial (CEM) Carbon Capture, Use and Storage Action Group (CCUS AG) (section 4), in which jurisdictions that have not traditionally had the lead in this area participate, such as China, Japan, Mexico, South Africa and the United Arab Emirates (UAE).

[7] Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide.

[8] See page 13 of the second edition of the *CCS Review* for a discussion of the European Commission's enforcement powers.

[9] The Commission commences infringement proceedings automatically once a transposition deadline has passed, where no measures or only partial measures have been communicated.

[10] The Commission is also verifying conformity of notified measures with the EU CO_2 Storage Directive, and further infringement proceedings could potentially stem from this process.

[11] See www.ucl.ac.uk/cclp/pdf/CCSDirective-Analytical%20Table.pdf for a comprehensive analysis of the discretionary elements of the EU CO_2 Storage Directive.

[12] See *Offshore Petroleum and Greenhouse Gas Storage Act 2010 and Offshore Petroleum and Greenhouse Gas Storage Regulations 2011*, www.legislation.vic.gov.au.

[13] Available at www.comlaw.gov.au/Details/F2011L01106. The regulations complement a number of associated regulations under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* previously finalised by the Australian Government: see edition 1 of the *CCS Review*.

2. Stakeholder engagement in the development of CO_2 storage projects

Stakeholder engagement in development of CO_2 storage projects – the theme for this third edition of the *CCS Review* – is firmly on the international CCS agenda as a critical element in ensuring successful CCS deployment. This follows high-profile examples, such as the delay and then cancellation of the Barendrecht project (Netherlands, 2010) and challenges experienced by the German government in passing laws to regulate CCS (see below), that illustrate the impact that stakeholder opposition and resistance can have on development of both individual projects and government deployment policy.

The role of project developers in stakeholder engagement has been a key area of focus to date.[14] In contrast, the potential role of government and CCS regulation has received less attention.[15] This section therefore aims to consider the relationship between stakeholder engagement processes and CCS regulation, to assess how government might play a more effective role in contributing to social acceptance of CCS (*i.e.* as a key aspect of CCS deployment). There are numerous open questions about the role of government in engagement: for example, are there aspects of the engagement process that might be more readily undertaken by government, rather than project developers? What positive or negative impact might regulation have on stakeholder communication and outreach? Are CCS laws and regulation likely to be the best tool to determine processes for engagement? And how might stakeholder perceptions of CCS impact on framework development? The discussion builds on both the entries to this edition and current international guidance on "best-practice" principles for engagement.

The section also assesses current regulatory approaches to engagement and how these match up with the "best-practice" principles and lessons learnt from various case studies. It acknowledges that, depending on existing processes and practices on engagement generally, regulation may be more or less relevant in this area depending on the country in question.

One of the most important issues in stakeholder engagement is determining exactly who relevant stakeholders are. In the broadest sense, "stakeholder" is taken to mean an individual, group or organisation that has an interest in CCS policy or a specific CCS project. The term "public" is used to refer to the general public at a national or regional level (*i.e.* the stakeholder group that would be the target of, for example, national CCS education and information policy campaigns). The term "community" refers to local stakeholders, comprising both individuals (the local public) and other local stakeholders (*i.e.* local citizen groups, landowners, government), in the vicinity of or that may be affected by a particular CCS project.

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[14] See, for example, CSIRO (2010), *Communication, project planning and management for carbon capture and storage projects: An international comparison*, CSIRO, Brisbane (www.csiro.au/Outcomes/Energy/CCS-Comparison-report.aspx); National Energy Technology Laboratory (2009), *Best Practices for Public Outreach and Education for Carbon Storage Projects*, NETL/US Department of Energy, Washington (www.netl.doe.gov/technologies/carbon_seq/refshelf/BPM_PublicOutreach.pdf); CSIRO (2011), *Communication/ Engagement Toolkit for CCS Projects*, CSIRO, Brisbane (www.globalccsinstitute.com/publications/communication-and-engagement-toolkit-ccs-projects). The Global CCS Institute website includes an extensive catalogue of current, stakeholder engagement literature at www.globalccsinstitute.com/key-topics/public-engagement

[15] Notable exceptions include World Resources Institute (2010), *CCS and Community Engagement: Guidelines for Community Engagement in Carbon Dioxide Capture, Transport and Storage Projects,* WRI, Washington D.C., which include guidelines for regulators for engagement at the local community level; and University College London-Carbon Capture Legal Programme, which has addressed this issue from a legal perspective at workshops held in November 2012 (www.ucl.ac.uk/cclp/ccsresearch.php) and June 2009 (www.ucl.ac.uk/cclp/ccsthink.php#ppl). See UCL-CCLP's entry at page 95.

What role for government and CCS regulation?

There is international consensus that sound stakeholder engagement in CO_2 storage projects is likely to be essential for CCS deployment. The question of what role government and CCS law and regulation might play in that process is less clear. This is despite that it is government – and not project developers – that will drive deployment at the outset (*i.e.* given that deployment will initially need to be supported by dedicated, CCS-specific funding programmes, rather than technology-neutral emission reduction programmes).

Public policy, government-level debate

As CCS deployment will be driven through government policy (*i.e.* both climate and technology specific policies), government is likely to be better placed than project developers to undertake certain aspects of engagement, such as communication to the public about: energy systems; climate change science; rationale for emissions reduction policies and inclusion of CCS in government mitigation and energy portfolios; scientific principles underpinning CCS; CCS-specific support programmes; and other policy motivators such as energy security. As University College London – Carbon Capture Legal Programme (UCL-CCLP) puts it, situating public debate about broader CCS issues at the level of policy rather than at the project level is likely to facilitate engagement, as it enables basic policy issues to be considered and addressed by the relevant entity – government – before project-level activities commence.[16] From a public perception and individual project perspective, project developers are also likely to be seen as having commercial interest in projects proceeding, which means that their objectivity – and consequently factual or scientific information on broader issues, such as climate and CCS science – may be called into question. Of course, in jurisdictions where state-owned companies are likely to play a key role in deployment, the respective roles of government and project developers in engagement will be much more fluid.

The Canadian province of Alberta has been active in undertaking engagement at the broader, policy level. CCS demonstration efforts are ramping up in Alberta, with a first wave of CCS projects expected to come on line from 2015. Recognising the important role the public will play in deployment, the government has set itself the task of ensuring Albertans have a solid understanding of CCS and how the government will oversee CCS activities "well ahead" of start of operations. Alberta launched an extensive public outreach and education campaign on climate change, CCS and EOR in October 2011, across television, print media and the internet. The province's new *Carbon Capture and Storage: solutions start here* website[17] provides information on basic issues such as how CCS works, climate change and other motivations behind deployment, in addition to information on Alberta's CCS projects, legislation and Regulatory Framework Assessment process. It also affords users the opportunity to "ask a scientist" where technical questions are not answered by the site. These efforts are in addition to the project-level engagement of industry in Alberta, which the government reports have been extensive.

Poland and France have also been active in this area. The Polish government has undertaken a series of seminars, meeting and conferences for a broad range of stakeholders to provide information about CCS, in conjunction with efforts to advance storage exploration and capacity

[16] See also Paukovic, M. et al (2011), *The Dutch general public's opinion on CCS and energy transition: Development in awareness, knowledge, beliefs and opinions related to information and media coverage*, www.co2-cato.org/publications/publications/the-dutch-general-public-s-opinion-on-ccs-and-energy-transition-development-in-awareness-knowledge-beliefs-and-opinions-related-to-information-and-media-coverage

[17] www.solutionsstarthere.ca/

assessment in the country.[18] In France, policy-level debate on CCS commenced in 2007, in the context of the *Grenelle Environnement*, a broader public initiative on sustainable development policies. The subsequent implementing law[19] provides broad support for CCS legal and policy development: its article 22 states that CCS deployment will be supported by development of an appropriate legal framework.

The lack of a clearly-communicated, co-ordinated government position on CCS deployment is recognised as one of the factors that contributed to the derailment of the Dutch Barendrecht project in 2010. For various reasons, government participation in initial meetings with the Barendrecht community was limited. With no context on Dutch government involvement, broader national policy or the role of the project in a national, CO_2 emission reduction context in these preliminary meetings, the project came across as "Shell's idea", which enhanced community sentiment against the project at the initial stages of engagement.[20] This is despite that the project had been allocated government funding through a competitive tendering process (EUR 60 million allocated in 2008 for two projects). National regulatory procedures also meant that it was the national government – and not the municipal government – that assumed authority to grant certain project approvals. As the project proceeded, this resulted in a perception that the national government was pushing the project, with the local government resisting. The lack of a consolidated and clear position between levels of government is seen to have increased local community opposition, impacted on community confidence and entrenched debate. International commentators highlight an aligned approach between different levels of government as critical.[21]

Regulation: a key tool for engagement?

Regulatory frameworks are essential to ensure effective and safe CO_2 storage, but what role might they play in stakeholder engagement? Is CCS regulation likely to contribute positively to the process, or have a negative impact (or little impact at all)?

To a large extent, the kind of role CCS laws and regulation play in stakeholder engagement will be jurisdiction-specific and determined by existing: stakeholder consultation processes associated with planning and environmental impact assessment; cultures of stakeholder participation; general legal environments; and, of course, the content of relevant legal provisions. Illustrative examples of how regulation might impact on engagement do emerge, however, from international case-studies.

At a high level, uncertainty regarding CO_2 storage regulation is perceived to have impacted negatively on BP's Carson project in California.[22] The project was announced in February 2006, well before the US EPA finalised its 2010 Class VI rule to regulate wells used to inject CO_2 for geological storage. The Clean Air Act and Safe Drinking Water Act were existing regulatory frameworks relevant to CO_2 storage, but there was debate at the federal level on whether this would be sufficient to enable storage projects to proceed safely. Despite preliminary work by the

[18] See information on Poland's national programme: "Assessment of formations and structures for safe CO_2 geological storage, including monitoring plans" (http://skladowanie.pgi.gov.pl/), as well as the government's interactive storage atlas (http://skladowanie.pgi.gov.pl/co2atlas/atlas.phtml).

[19] Law n°2009-967, www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000020949548

[20] See ECN (2010), *What happened in Barendrecht?*, ECN Policy Studies, Petten, www.ecn.nl/publications/ECN-E--10-057 at page 15.

[21] CSIRO (2010), *Communication, project planning and management for carbon capture and storage projects: An international comparison*, CSIRO, Brisbane (www.csiro.au/Outcomes/Energy/CCS-Comparison-report.aspx).

[22] See Pacific Northwest National Laboratory and AJW, Inc (2010), *Case Study of the Carson CCS Project*, CSIRO, Brisbane, www.csiro.au/Outcomes/Energy/Carson-Case-Study.aspx at pages 9, 23 and 25.

US EPA, it was not yet clear whether a tailored framework would be developed for CO_2 storage, or which entity would have regulatory authority over these activities in California. The perceived absence of clear regulatory process or requirements for moving CO_2 storage projects forward – perceived as a hurdle to CCS deployment generally – and stakeholder concern over whether, from a regulatory perspective, requirements imposed on CCS projects would be stringent enough to ensure safe storage added an "unwelcome complication" to the Carson project, despite not being strictly relevant to the project itself (*i.e.* as a CO_2-EOR project).[23] In this general sense, that having an established, comprehensive CCS regulatory framework in place may reduce public concerns over the safety and efficacy of CCS projects seems clear. UCL-CCLP also highlights that effective engagement should include discussion about how broader regulatory and social frameworks are being implemented.

The Barendrecht project provides an example of how the *substance* of CCS laws and regulations might impact communication and outreach. We have seen that in Barendrecht, national law afforded the Dutch government authority to grant certain project approvals that would normally have been granted by the municipal government. The Dutch *National Co-ordination Regulation* (NCR) empowers the national government to grant all relevant authorities for projects with national impact; in the case of Barendrecht, this meant that the municipal authority no longer had control over certain zoning processes required for the project to proceed. With the municipal government seen as disempowered under NCR legislative procedures and left with no apparent means of legal input into the project process, the municipality appears to have become more determined to voice its concern and that of the community in relation to the project.[24]

Interestingly, the NCR seems to have played a completely different – and far more positive – role in the context of the *Rotterdam Opslag en Afvang Demonstratieproject* (Rotterdam Capture and Storage Demonstration Project or ROAD project).[25] The ROAD project expects to capture CO_2 from a new coal-fired power plant in the Rotterdam port and industrial area and store it in a depleted gas reservoir under the North Sea starting in 2015. The NCR is seen to have facilitated a key role for the national government in coordinating relevant permitting stakeholders, streamlining the multiple permitting procedures and cutting through the regulatory complexity of a large-scale, integrated CCS project.[26] That the ROAD project will store CO_2 offshore is of course relevant, as the stakeholders for engagement and issues to be addressed are likely to be very different than onshore projects.[27]

Nevertheless, the Dutch example – where the same regulatory provisions seem to have played a very different role in two separate projects – illustrates the potential complexity of the relationship between regulation and engagement, with regulation having the potential to help or hinder. International experts highlight the importance of flexibility and the ability to adapt to a project's social context – both in terms of project design and implementation and how a project is framed – as a key part of effective communications and outreach.[28] This issue of flexibility – a

[23] See page 25 of the *Case Study of the Carson CCS Project*.

[24] See ECN (2010) at page 19.

[25] ROAD Maasvlakte CCS Project C.V. (2011), *Stakeholder Management ROAD: Special Report for the Global Carbon Capture and Storage Institute*, Global Carbon Capture and Storage Institute Limited, Canberra.

[26] ROAD Maasvlakte CCS Project C.V. (2011), *Stakeholder Management ROAD: Special Report for the Global Carbon Capture and Storage Institute*, Global Carbon Capture and Storage Institute Limited, Canberra at page 25.

[27] See, for example, the Australian federal government entry at page 31, which sets out public engagement requirements for onshore and offshore storage respectively.

[28] See CSIRO (2010), *Communication, project planning and management for carbon capture and storage projects: An international comparison*, CSIRO, Brisbane (www.csiro.au/Outcomes/Energy/CCS-Comparison-report.aspx) at pages 4, 6 and 7. World Resources Institute (2010), *CCS and Community Engagement: Guidelines for Community Engagement in Carbon Dioxide Capture, Transport and Storage Projects,* WRI, Washington D.C.

characteristic that is not generally associated with law – is likely to be a key challenge for both regulators and project developers as enabling frameworks take form and projects move forward.

Public perception and framework development: not in my back yard (or jurisdiction, for that matter)

To take things from a different angle, what kind of impact can public perception of CCS have on framework development? Germany's experience demonstrates the considerable impact that public opposition can have on both a jurisdiction's ability to get a comprehensive CCS regulatory framework in place and how a law is framed.[29] At the time of publication, Germany's CCS law is in the final stages of the legislative process and anticipated to enter into force shortly. This follows a protracted process over a period of several years during which the German government has struggled to progress transposition of the EU CO_2 Storage Directive, principally due to public resistance to CCS.

The German Bundestag (federal parliament) passed a bill transposing the directive on 7 July 2011, revising an initial, 2009 draft CCS law that stalled following public concern over risk of leakage, contamination of drinking water, safety and reliability, as well as property rights. The German Bundesrat (the German federal council, which represents the German states at a federal level) had to consent to the second bill for it to be adopted. Despite the bill being developed in consultation with the states, the Bundesrat refused the draft bill on 23 September 2011, reflecting stakeholder pressure at state level. The German government applied for a conciliation procedure on 26 October 2011; two months later, the conciliation committee decided to put a working group in place, in an effort to find compromise and move the process forward. A key area of discussion within the committee was the so-called "states' clause", enabling the states to designate areas as ineligible for CCS and effectively opt-out of deployment. In particular, there was debate over whether the states should be able to exclude territory on political grounds.

A compromise agreement was finally reached within the conciliation committee on 27 June 2012, almost a year after the Bundestag passed the bill, and three years after Germany's initial 2009 draft. This represents a considerable achievement; however, the impact of the law's difficult legislative passage is evident in the terms of the law. The 2011 bill contained several concessions that were not present in the 2009 draft, including: a type of "sunset" clause, with a deadline for the application of storage permits of 31 December 2016, and a limitation of the law to CCS demonstration (through a restriction of the amount of CO_2 that could be stored to 3Mt of stored CO_2 per storage site and a national total of 8Mt). Additional concessions were agreed by the Bundestag and Bundesrat in the parliamentary conciliation process, including: a further limitation on total amounts of CO_2 stored (1.3Mt of CO_2 per storage site and a national total of 4Mt); and an extension of the period to elapse after cessation of injection and prior to transfer of responsibility from 30 to 40 years. On the other hand, the states' clause was amended to clarify that while the states can determine that CO_2 storage cannot occur in particular regions, certain explicitly-stated considerations are to be taken into account in making this determination (other options for use of a potential storage site; the geographical particularities of the relevant region; and other public interests). This would appear to preclude exclusion of territory on purely political grounds.

A central and interesting feature of the public debate in Germany is that it has principally focussed on the potential role of CCS in the power sector. This is despite amendments included in the 2011 bill emphasising the importance of CCS in industry. This meant that "doubts regarding

[29] See also Germany's presentation *Public Engagement and CCS Regulation: The German Experience* at the 10th IEA International CCS Regulatory Network web conference, 18 July 2011, www.iea.org/work/workshopdetail.asp?WS_ID=524

the usefulness" of CCS technologies and environmental concerns related to CCS as a potential means of perpetuating fossil-fuel use – to the perceived exclusion of renewable energy – dominated public discourse on CCS. CCS is one of the only currently-available technologies that will allow German industrial sectors to meet deep emissions reduction goals in the future, irrespective of alternative technologies that may be deployed to de-carbonise the power sector. This underscores the importance of a clear policy-level dialogue around framework development, to provide national and broader environmental (*i.e.* emissions reduction) context to deployment.

The Czech Republic also reports that, following public opposition, the entry into force of storage permitting provisions included in the country's national transposition measures – currently before the Czech Parliament – was postponed to 1 January 2017. This was considered a compromise following debate that CCS should be banned in the country entirely.

Engagement in law-making processes

It is clear that stakeholder opposition can have a considerable impact on framework development. Is there a way that stakeholders might effectively be engaged in law-making processes – including the development of prospective engagement processes – to try to ensure stakeholder views are effectively heard, without lengthy delays or difficult compromises? Following its outreach and education campaign in October 2011, the government of Alberta is planning a consultation process on Alberta's CCS framework. This process will involve stakeholder meetings, discussions and an on-line questionnaire, and will culminate in a "what we heard" report setting out feedback gained and resulting actions. The government sees this as a way of giving Albertans an opportunity to input into the regulatory framework that will govern how CCS is conducted in their province.

France and Texas also consulted with the public in developing CCS rules. In France, public consultation took place online, during a 30-day consultation period. In Texas, state law mandates stakeholder engagement in legislative processes, so was accordingly applied to development of the state's CCS rules. Under state law, the preamble of the rules must address each comment received during the 30-day consultation period; in some cases, changes are also made to the final rules to take into account comments made. Enhancements were also made to the stakeholder consultation provisions included in Germany's bill during the legislative process to provide for: community notification and consultation at the exploration stage, with relevant stakeholders afforded the possibility to raise formal objections; and early community participation for storage permit planning approval processes. The competent authority is required to encourage operators to initiate dialogue with the community prior to any formal application. Including the public in the development of engagement processes was highlighted as a potential way to enhance the effectiveness of these processes at the third meeting of the IEA's *International CCS Regulatory Network* in 2011.[30]

From "decide, announce, defend" to "investigate, adapt, engage"?

What sort of regulatory approaches to engagement are reflected in the entries to this edition? How do these compare with current international guidance? And how might jurisdictions extend efforts to effectively engage? These are the key questions this section aims to address.

[30] www.iea.org/work/workshopdetail.asp?WS_ID=507

Applying existing frameworks

CCS is not unique in facing challenges with stakeholder communication and engagement in project development and operation. Thus, virtually all jurisdictions that currently have communication and engagement requirements in place apply existing regulation and practices to the development of CO_2 storage projects, including those associated with environmental impact assessment procedures.

In Europe, article 26 of the EU CO_2 Storage Directive specifies that member states must make publicly available environmental information relating to the geological storage of CO_2 in accordance with applicable community legislation. The Environment Impact Assessment Directive[31] and Industrial Emissions Directive[32] set out applicable information-sharing and stakeholder engagement requirements. The former requires any request for development consent, as well as relevant information to be available so that stakeholders are afforded the possibility of expressing an opinion before consent is granted. Information gathered in this way is to be taken into consideration in the development consent procedure, *i.e.* the decision that entitles the developer to proceed with the project, under article 8. The Industrial Emissions Directive requires member states to ensure early and effective opportunities for stakeholder participation in relevant permitting procedures, and disclosure of specified information to the public (article 24; annex IV). Discretion is left to member states in setting engagement requirements within the parameters set by these directives; this discretion is reflected in the member state approaches highlighted in this edition. In addition, the Commission review of draft storage permits pursuant to article 10 of the EU CO_2 Storage Directive is made publicly available.

The 2010 Class VI rule in the United States adopts existing Underground Injection Control (UIC) participation requirements and permitting decision procedures. Owners or operators and regional permitting agencies are encouraged to provide information to relevant stakeholders about relevant permits as early as possible. Permitting authorities are also required to provide public notice of pending actions (through newspaper advertisements, postings, mail-outs or by email to interested parties); hold public hearings if requested; seek and respond to public comment; and ensure broad stakeholder consultation.

At the Canadian federal level, standard environmental impact assessment processes under the *Canadian Environmental Assessment Act* apply. Stakeholder consultation is at the discretion of the government for screening level assessments – the level applied to the three CCS projects that have thus far required federal environmental impact assessments. Where consultation occurs, relevant stakeholders are provided an opportunity to comment on: the scope of the project; the scope of the environmental impact assessment; and the federal screening report. At the provincial level – where, given the federal/ provincial split in regulatory competence for CCS in Canada, key requirements for engagement are likely to lie – Alberta applies regulatory requirements under existing approval processes. These include requirements for broad stakeholder notification, focused landowner consultation and public hearings.

In Australia, consultation requirements that apply to the offshore petroleum industry also apply to CCS projects, including an obligation to consult with other users of the sea in undertaking offshore exploration, and relevant environmental protection legislation requirements. Project

[31] Council Directive of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment. Article 31 of the EU CO_2 Storage Directive amends the EIA Directive to include capture and transport of CO_2 streams for the purposes of geological storage and storage sites.

[32] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).

information (in the form of a site plan summary) is to be made publicly available and comments taken into account by the regulator as part of storage permitting processes. Operators are also required, in submitting site plans for approval, to report on consultations undertaken, as well as strategies for ongoing engagement. Where Commonwealth funding supports onshore projects, operators are required to develop and implement a community consultation plan identifying key stakeholders and proposed consultation processes, and report back outcomes. In South Australia, standard *Petroleum and Geothermal Energy Act 2000* requirements apply to CCS projects. Similarly, Western Australia does not expect to develop CCS-specific legislative requirements for engagement; it is anticipated that existing requirements imposed by the Environmental Protection Authority will apply.

It is difficult to gauge from the government commentary in this edition the extent to which existing engagement processes were reviewed and adapted to take into account the specificities of CCS technologies or CCS engagement experience to date. Only one entry – from the United States – explicitly notes adaptation of existing approaches. The US entry highlights an expectation that there will be higher levels of stakeholder interest in CCS projects than for other injection activities (*e.g.* EOR). Requirements for notice for permitting activity and relevant comment periods were amended in response to feedback received on stakeholder participation. These amendments clarified that notice must be given to state and local oil and gas regulatory agencies, state mineral exploration and recovery agencies, the director of the relevant state Public Water System Supervision programme and all agencies with regulatory authority for wells, in addition to the general public.

How do current approaches match up with "best-practice" principles and lessons learnt?

There have been a number of recent attempts to catalogue and consolidate experiences from early projects and lessons learnt on engagement for the benefit of projects moving through the development pipeline.[33] To date, the principles that emerge from international guidance documents include:

- **Investigate**: Know the community, identify and engage with all relevant stakeholders, and determine and present the local benefits of a project. The community should not necessarily be considered and treated as a homogenous entity; rather, it should be seen as a set of different stakeholders with differing opinions, expectations and interests, and appropriate time taken to gain an understanding of local priorities, context, knowledge and previous experience of CCS, and preferred communication channels. The local benefits of a project are critical, but will ultimately be project-specific.
- **Adapt**: Adapt project messages, communication channels and outreach strategies to suit community stakeholders. The ability to tailor project planning, management and where possible design to social context is fundamental.
- **Engage**: Engage the community early, during the decision-making phase, and ensure active, two-way communication. Early engagement is more likely to result in meaningful interaction between project developers and the community and a corresponding sense of community

[33] See, for example, CSIRO (2010), *Communication, project planning and management for carbon capture and storage projects: An international comparison*, CSIRO, Brisbane (www.csiro.au/Outcomes/Energy/CCS-Comparison-report.aspx); National Energy Technology Laboratory (2009), *Best Practices for Public Outreach and Education for Carbon Storage Projects*, NETL/US Department of Energy, Washington, D.C. (www.netl.doe.gov/technologies/carbon_seq/refshelf/BPM_PublicOutreach.pdf); World Resources Institute (2010), *CCS and Community Engagement: Guidelines for Community Engagement in Carbon Dioxide Capture, Transport and Storage Projects,* WRI, Washington D.C.

empowerment than a "decide, announce, defend" approach, which characterised engagement efforts in some early projects. Failure to engage early (*i.e.* before finalising and announcing project plans) can intensify stakeholder conflict and increase community opposition, project delay and deadlock by leaving relevant communities relatively powerless, unable to effectively participate in project decision-making and unable to discuss alternatives or possible project modifications. Engagement should therefore be incorporated as a critical part of a project from inception, including through integration of communications staff into project teams. Engagement should be a two-way dialogue, rather than merely a one-way public relations exercise. It should continue across the project life-cycle.

Taken as a whole, how do regulatory approaches highlighted in this edition shape up when compared to current "best-practice" principles for engagement on CCS?

Overall, it is not clear that the international guidance on effective engagement is being reflected by governments in relevant regulatory requirements. Of course, not all principles outlined above are likely to be best reflected in regulation. For example, government instruction on the need to investigate particular local priorities, levels of CCS knowledge and communication channels relevant to specific communities may be more effectively included in more supple instruments such as guidance documents, which are easier to amend than legislation as notions of best-practice develop over time. The extent to which regulation will be relied on as a tool for engagement is also relevant, and will vary between jurisdictions depending on requirements in existing laws, the prevailing legal environment and the general culture of stakeholder participation, as we have seen.[34]

Nevertheless, there are concrete notions in current "best-practice" that can readily be reflected in legislation. An example is the principle of early engagement at project inception, rather than during finalisation and announcement of project plans. Reported regulatory approaches generally impose engagement requirements at the permitting stage, when project plans will essentially be finalised. While the US EPA notes that it encourages operators and regional permitting agencies to involve stakeholders as early as possible, for example, these requirements translate in Texas essentially into (albeit extensive) notice requirements at the permit application phase.[35] This approach is common across almost all jurisdictions.[36] To provide some flexibility when converting broader engagement principles into procedural elements of law and regulation, governments could outline a clear set of expectations for project level engagement, while allowing project developers to devise appropriate ways to meet those requirements (*i.e.* rather than setting out extensive, prescriptive requirements in legislation).

Governments may wish to review proposed regulatory approaches to engagement as against emerging "best-practice" principles, to: ensure that lessons-learnt from early projects are reflected in regulatory requirements imposed on operators and relevant government entities (where regulation is the appropriate forum in a given jurisdiction); and support a shift away from the "decide, announce, defend" approach. Where the specificities of CCS technologies have not been taken into account in applying engagement processes in existing laws, governments might also consider a review to this end.

[34] See page 12 above.

[35] Operators are required to: make permit applications available for public inspection; and provide, by no later than the date of application, general notice of a permit application by publication and individual notice to certain specified stakeholders. A public hearing process is provided for in the situation where RCC receives a protest regarding a permit.

[36] The Australian offshore legislation is an exception, in requiring operators to report on consultation undertaken prior to commencement of the permitting process (although early consultation is not formally required), as is the draft 2011 German law, in encouraging public participation in advance of formal storage authorisation processes. As we have seen, enhanced public consultation requirements were included in the bill as part of concessions made during the drafting process.

3. Getting down to details: taking steps to finalise CCS regulatory framework development

As CCS framework development progresses globally, jurisdictions that have been at the forefront of these developments are trying to nail down the detail of regulatory approaches to some of the more challenging issues associated with regulating CO_2 storage activities. Australia, the United Kingdom and the Canadian province of Alberta are examples of jurisdictions that have been working through complex, substantive aspects of CCS regulation since the last edition, as part of efforts to finalise framework development.

The devil's in the detail

The Australian federal government enacted detailed provisions dealing with competition between resources in June 2011, as part of its *Offshore Petroleum and Greenhouse Gas Storage (Greenhouse Gas Injection and Storage) Regulations 2011*.[37] The regulations deal with the interaction of GHG storage and petroleum activities, the principal competing resource within Commonwealth waters. This reflects that Australia's primary legislation, the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (the act),[38] allows GHG storage titles and petroleum titles to overlap in relevant offshore areas.

The central mechanism established by the act is that of "significant risk of significant adverse impact" (SROSAI), *i.e.* whether there is a significant risk that proposed GHG operations will have a significant adverse impact on petroleum exploration or recovery operations. The act takes into account whether registered petroleum title holders have agreed in writing to the relevant GHG operations, thereby encouraging commercial agreements between parties where projects are proposed in the same area.

The act specifies that the SROSAI question must, without limitation, take into account the probability of the occurrence of the adverse impact; economic consequences of the adverse impact; and how those consequences compare with the potential economic value of the petroleum operations in question. "Adverse impact" is taken to mean an increase in capital or operating costs of the petroleum operations, or a reduction in the rate of petroleum recovery or quantity of recoverable petroleum. Risk – and adverse impact – is not significant under the act if the expected, probability weighted impact cost of the operation is less than a threshold amount under the regulations. The 2011 regulations underpin these requirements, setting out, amongst other things, how the economic consequences of an adverse impact are to be estimated; how the economic consequences of an adverse impact relative to the potential economic value of operations that are being, or could be, carried on are to be estimated; relevant threshold amounts beyond which a SROSAI is deemed to exist, etc.

While these provisions reflect a concern about the potential of GHG operations to negatively impact petroleum operations, the act and regulations include a series of equivalent provisions in

[37] Available at www.comlaw.gov.au/Details/F2011L01106. The regulations complement a number of associated regulations under the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* previously finalised by the Australian Government: see edition 1 of the *CCS Review*. A presentation was given by the Australian government on this topic at the 4th meeting of the IEA International CCS Regulatory Network on 10 May 2012, available at www.iea.org/newsroomandevents/workshops/name,27053,en.html. Information on other areas covered by the 2011 regulations is included in the Australian Government entry at page 31.

[38] www.comlaw.gov.au/Details/C2012C00093

respect of petroleum titles (*i.e.* where the responsible Commonwealth Minister is required to consider the potential impact of petroleum operations on GHG operations). These provisions will afford flexibility to the Australian government if resource priorities change over time.

The United Kingdom put in place measures to facilitate third party access to CO_2 transportation and storage infrastructure in September 2011, following a formal consultation on implementation of the third party access provisions of the EU CO_2 Storage Directive (10 December 2010 - 4 February 2011).[39] Article 21 of the EU CO_2 Storage Directive requires member states to take necessary measures to ensure that potential users can obtain access to transport networks and storage sites in a transparent and non-discriminatory manner, applying the objectives of fair and open access. Operators may refuse access on grounds of lack of capacity, giving duly substantiated reasons; in this situation, member states are required to take measures to ensure that the operator makes any necessary enhancements as far as it is economic to do so or when a potential customer is willing to pay for them, provided this would not negatively impact on the environmental security of transport and storage. Member states are also required under article 22 to implement dispute settlement arrangements for disputes relating to access to transport networks and storage sites.

To comply with the requirements of the EU CO_2 Storage Directive, the UK's *The Storage of Carbon Dioxide (Access to Infrastructure) Regulations 2011*[40] extend the approach to third party access in existing UK pipeline legislation to CO_2 storage sites. This approach is one of negotiated access, with an ability for the party seeking access to appeal to an independent authority in the event a commercial agreement cannot be reached with relevant transport or storage infrastructure owners. Additional provisions are incorporated to reflect the transparency requirements of the directive, including a requirement that infrastructure owners make publicly available information on spare capacity.

To address stakeholder concerns about storage site capacity, the draft regulations were modified to clarify that a determination regarding an existing storage site could not require an increase in the total quantity of CO_2 authorised to be stored under the relevant permit. This reflects the potential for such a determination to compromise the environmental integrity of a storage site.[41] In addition, and unlike transportation infrastructure, the ability to increase the capacity of CO_2 storage sites beyond permitted amounts is subject to a large degree of uncertainty, given that they are natural rather than man-made facilities.

The UK government is currently developing guidance on the approach that will be taken to determine access where an appropriate authority is required to determine third party access, including principles for establishing financial conditions. The guidance will be made available for consultation later in 2012.

Alberta has taken an in-depth look at a host of regulatory issues as part of its Regulatory Framework Assessment (RFA) process.[42] Aimed at ensuring that Alberta's CCS framework will comprehensively and effectively regulate large-scale deployment, four specialised working groups have been examining specific issues since March 2011, to identify gaps and barriers, and develop draft recommendations for regulatory improvements. Regulatory issues under

[39] *Developing Carbon Capture and Storage (CCS) Infrastructure: Consultation on Implementing the Third Party Access Provisions of the CCS Directive and Call for Evidence on Long Term Development of CCS Infrastructure*, see www.decc.gov.uk/en/content/cms/consultations/ccs_3rd_party/ccs_3rd_party.aspx

[40] www.legislation.gov.uk/ukdsi/2011/9780111512777/contents

[41] Although it is unclear whether sites are likely to be permitted to "maximum" safe capacity on a routine basis. Operators may, for example, only seek authorisation for anticipated quantities of CO_2 to be stored.

[42] See the second edition of the *CCS Review* and Alberta's entry at page 64.

consideration as part of the RFA include, amongst others: pore space management and open access; competition with other resources; third party access to infrastructure; closure requirements and transfer of liability; financial security mechanisms and method to determine rates paid into Alberta's post-closure stewardship fund (PCSF); CO_2-EOR as a means of storage; permitting and regulatory processes; stakeholder engagement; surface access; and CO_2 classification.

Using the financial security and PCSF issue as an example of the approach taken across the various issues, the relevant working group was tasked with: identifying gaps between existing financial security mechanisms and Alberta's PCSF[43] (*i.e.* are any aspects of CCS operations not covered by either existing financial security mechanisms or the PCSF?); making recommendations on how to fill any gaps; and developing recommendations around the methodology for determining what rate operators are to pay into the PCSF (should PCSF rates be uniform or project-specific? Should there be a mechanism to adjust the rate? Should PCSF funds be pooled? Should the PCSF have a maximum or minimum balance?).

Alberta anticipates that a series of recommendations across the issues examined will be presented to the Minister of Energy for final approval by end-2012. On its completion, this work is likely to represent a considerable resource across the broad range of regulatory issues considered to jurisdictions beyond the province; Alberta is currently considering how best to share detailed outcomes of the RFA with other governments around the world.

A matter of process

In addition to the work on substantive issues currently being undertaken by these and other jurisdictions, certain countries are taking a closer look at various procedural aspects of CCS regulation. Following enactment of its *Greenhouse Gas Storage Act 2009*[44] and related regulations in 2010,[45] the Australian state of Queensland identified a need to undertake a legislative mapping exercise in order to: identify interactions between its CCS framework and other resource legislation in the state; and remove any ambiguity in requirements imposed on CCS proponents. This follows identification of a potential need to amend the 2009 act to account for requirements that may be triggered under state water regulation. The Queensland experience highlights that CCS framework development is likely to be an incremental, rather than one-off process, given the novel and complex nature of CCS activities, and that multiple, existing regulatory frameworks are likely to be relevant.

For similar reasons, efforts to resolve issues of regulatory authority and co-ordination between different government authorities are also likely to be ongoing. In the second edition of the *CCS Review*, we reported on interagency co-operation to drive and inform regulatory progress in a number of jurisdictions ("Co-ordinating within government: interagency working groups").[46] Jurisdictions are now reporting on efforts to ensure effective communication and co-ordination

[43] The *Carbon Capture and Storage Statutes Amendment Act, 2010* established the PCSF as part of Alberta's *Mines and Minerals Act*, to cover costs associated with the province assuming various obligations and liabilities from lessees on issuance of a storage site closure certificate, and protect the public from bearing those costs. Currently, the PCSF can be used to cover costs associated with: monitoring captured CO_2; assuming obligations of the lessee under a number of statutes such as the *Environmental Protection and Enhancement Act* and the *Surface Rights Act*; paying for suspension, abandonment, reclamation and remediation of orphaned facilities; and for other purposes prescribed in the regulations.

[44] http://my.lawlex.com.au/default.asp?itid=0&ntid=0&nid=&cid=105858&jurid=&alpha=&alphaid=&ihl=&nhl=&fp=&rdt=&vaftype=&requirelogin=&tab=ind&pact=coredoc&top=exp&nav=col&docview=true

[45] http://my.lawlex.com.au/default.asp?itid=0&ntid=0&nid=&cid=113123&jurid=&alpha=&alphaid=&ihl=&nhl=&fp=&rdt=&vaftype=&requirelogin=&tab=ind&pact=coredoc&top=exp&nav=col&docview=true

[46] At page 19.

between relevant governmental authorities and otherwise streamline regulatory process beyond framework development, into the implementation phase. In the Australian state of Victoria, for example, the Department of Primary Industries (DPI) and the Victorian Environmental Protection Authority (VEPA) are to jointly regulate onshore CCS activities in the state, with DPI serving as the primary regulator during exploration and injection, and VEPA to assume this role following site closure. To enhance administrative efficiency and co-operation, Victoria expects that a memorandum of understanding will be concluded between DPI and VEPA sometime this year. Similar arrangements are proposed in respect of Victoria's offshore framework.

The Canadian province of British Columbia is another example of the high level of co-ordination that CCS projects can demand from relevant government agencies. British Columbia's framework builds on the province's existing oil and gas industry law, which means that CCS projects may require approvals through up to four separate processes, each involving different regulatory authorities. For example, the jurisdiction's Ministry of Energy and Mines has authority to issue storage licenses and leases; the British Columbia Oil and Gas Commission has regulatory competence for exploration and use of storage reservoirs, facilities, wells and pipelines; and the National Energy Board can also have authority over a pipeline, where it is interprovincial or international. CCS projects can also trigger a requirement to have environmental assessments conducted by more than one agency; for interprovincial pipelines, for example, assessments are required by both provincial and federal authorities, including the National Energy Board. To avoid duplication and facilitate regulatory process, provincial and federal levels of government, including the National Energy Board, have agreements in place to co-ordinate reviews where multiple authorities are implicated in regulating a project.

4. Near-term legal and regulatory actions to accelerate deployment: CEM Carbon Capture, Use and Storage Action Group

The Carbon Capture, Use and Storage Action Group (CCUS AG) was established at the first Clean Energy Ministerial (CEM) in Washington, DC in July 2010 to advise energy ministers on concrete, near-term actions to accelerate global CCS deployment. Seven substantive recommendations were delivered to energy ministers at the second CEM (CEM 2, Abu Dhabi, April 2011), aimed at bridging the gap between current efforts and actions required to ensure CCS can effectively contribute to climate change mitigation (Box 1). Twelve of thirteen CCUS AG governments agreed to take action in accordance with the recommendations by the third CEM (CEM 3) in London, April 2012,[47] with supporting actions to be undertaken by international CCS organisations and industry. Of the seven substantive recommendations, two relate to legal and regulatory matters.

First, energy ministers committed to working within their respective governments to advance the development of legal and regulatory frameworks for CCS demonstration and deployment. This reflects the 2009 IEA *Technology Roadmap: Carbon Capture and Storage* goal of having regulatory frameworks in place for CCS demonstration by 2011 (OECD countries), 2013 (early mover non-OECD countries) and 2015 (other non-OECD countries with CCS potential); and broad CCS deployment by 2020. Near-term actions proposed under this recommendation include:

- Driving progress relevant to current status, including, as applicable, by performing a gap and barrier analysis of existing regulatory frameworks and relevant institutions for their ability to regulate CCS.
- Amending existing frameworks or developing dedicated frameworks for CCS demonstration and/ or deployment.
- Working towards ensuring institutional capacity is sufficient for regulating CCS operations.[48]

Second, energy ministers committed to raising awareness, within relevant government ministries, of the importance to global CCS deployment of ratifying key international marine treaty amendments. This includes the 2009 London Protocol[49] amendment to allow transboundary movement of CO_2 for the purposes of sub-seabed storage – which may be significant for land-locked countries or countries that would like to develop international offshore storage hubs – and the 2007 OSPAR Convention[50] amendment to allow the sub-seabed injection of CO_2 for the purposes of storage. The recommendation reflects that the amendments require ratification by a sufficient number of parties to enter into force.

[47] Australia, Canada, France, Germany, Japan, Republic of Korea, Mexico, Norway, South Africa, the United Arab Emirates, the United Kingdom and the United States. China did not formally sign up to the 2011 recommendations, but participated in the reporting process leading up to the third CEM.

[48] Greater collaboration and capacity building on the development of CCS legal and regulatory frameworks, in particular with developing countries, and the development of national definitions for "CCS-ready", were also suggested near-term actions.

[49] 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter. There are currently 42 contracting parties to the London Protocol.

[50] Convention for the Protection of the Marine Environment of the North-East Atlantic. Belgium, Denmark, the European Community, Finland, France, Germany, Iceland, Ireland, the Netherlands, Norway, Portugal, Spain, Sweden, the United Kingdom, Luxembourg and Switzerland are parties to the OSPAR Convention.

Significant progress in regulating CO_2 storage

In April 2012, *Tracking Progress in Carbon Capture and Storage: International Energy Agency/ Global CCS Institute report to the third Clean Energy Ministerial*[51] reported to CEM 3 on progress made by committed governments against the 2011 CCUS AG recommendations. The report finds that, overall, current global efforts far from match up to the significant, potential emissions reduction ambitions associated with CCS (Box 1). In particular, CCS financing and industrial applications continue to represent a serious challenge. By contrast, the report sees significant progress in regulating CO_2 storage, the first legal and regulatory recommendation endorsed by energy ministers.[52] All but one committed government has made progress in this area since CEM 2; jurisdictions advanced in framework development are now at the stage of trying to finalise regulatory approaches on complex regulatory issues associated with CCS deployment (section 3);[53] and efforts are also ongoing by governments at earlier stages of framework development, such as South Africa. The report's key message on framework development is that, despite substantial progress, committed governments must continue efforts so that lack of regulation does not unnecessarily impede or slow deployment.

In addition to the developments highlighted in this edition, which fed into the reporting process on enabling legal and regulatory frameworks, the report highlights developments in China and the UAE. China has not yet made any concrete plans to introduce laws to regulate demonstration or large-scale deployment of CCS technologies, but has undertaken preliminary research to understand the required framework and current gaps and barriers. The UAE commenced a *CCS Value Proposition* study in late-2011 that is expected to result in a recommendation to develop a policy framework. CO_2-EOR continues to be a key area of focus for the country (section 5).

Positive news on OSPAR, but further work required on London

In terms of the second recommendation endorsed by energy ministers, the report finds that there has been positive news on the 2007 OSPAR Convention amendment. In October 2011, the OSPAR Secretariat advised that the 2007 amendment had formally entered into force as of 23 July 2011 for contracting parties to have ratified as of that date, following ratification by Denmark. Sub-seabed injection of CO_2 for the purposes of storage is now formally enabled under the Convention, for those countries that have ratified the amendment.

The 2009 London Protocol amendment is, however, likely to take significantly more time to enter into force. The United Kingdom became the second contracting party out of a required 27 to ratify in November 2011; Australia and Canada are also progressing towards ratification, but have yet to do so. The London Protocol is therefore likely to constrain contracting parties that want to co-operate on offshore storage for the foreseeable future. The report recommends that governments accelerate efforts to raise awareness on the need to make progress toward ratification of the 2009 London Protocol amendment, consistent with the relevant 2011 CCUS AG recommendation to the CEM. Given the current rate of ratifications, consideration of interim options will be required to facilitate export of CO_2 for offshore storage in the near- to mid-term. In October 2011, the IEA released a working paper on options under international law to enable transboundary movement of CO_2 for sub-seabed storage while ratification of the 2009 amendment progresses, to promote dialogue within London Protocol contracting parties on this

[51] www.iea.org/publications/freepublications/publication/name,26622,en.html

[52] See pages 6 and 12 of the report.

[53] Such as third party access to CCS infrastructure, competition between resources, etc.

issue.[54] The paper was presented in plenary at the sixth meeting of London Protocol contracting parties (London, October 2011).

Box 1 • CCUS AG Recommendations to CEM 2 and the 2012 reporting process: the broader picture

The CCUS AG made seven substantive recommendations to CEM 2 in April 2011:

- **Reduce the financial gap:** advance policies that address the financial gap and risk associated with early mover CCS demonstration and deployment.
- **Support funding in developing economies:** identify and advance appropriate funding mechanisms to support the demonstration of large-scale CCS projects in developing economies.
- **Develop legal and regulatory frameworks:** advance the development of legal and regulatory frameworks for CCS demonstration and deployment.
- **Acknowledge importance of marine treaty amendments**: promote the importance to global CCS deployment of ratifying key international marine treaty amendments.
- **Share knowledge:** support and encourage the development of best practice knowledge sharing from early mover projects, in particular those with public funding.
- **Investigate CO_2 storage:** review key gaps in storage data coverage and knowledge, and progress storage exploration and capacity assessment.
- **Support CCS in industry:** recognise the potential of CCS for industrial emission sources and review demonstration opportunities.

Following CEM 2, the CCUS Action Group requested the IEA and Global CCS Institute to report on progress made against the 2011 recommendations at CEM 3, reflecting an eighth, reporting recommendation endorsed by energy ministers at CEM 2. *Tracking Progress in Carbon Capture and Storage: International Energy Agency/ Global CCS Institute report to the third Clean Energy Ministerial* was released at CEM 3 to respond to this request.

The report considers a number of key questions. Taken as a whole, what advancements have committed CCUS AG governments made against the 2011 recommendations since CEM 2? How can energy ministers continue to drive progress to enable CCS to fully contribute to climate change mitigation? While urgent further action is required in all areas, are there particular areas that are currently receiving less policy attention than others, where efforts could be redoubled? Section 1 provides an overarching analysis of progress made by committed governments across the 2011 recommendations since CEM 2. Section 2 provides a detailed account of developments against each recommendation.

The report concludes that, while the period since CEM 2 has seen some progress by committed governments against the 2011 CCUS AG recommendations, significant work remains to be done.

In particular, for CCS to remain an option for reducing CO_2 emissions from power and industry, it finds that governments must urgently scale-up financial and policy support for CCS technology demonstration and deployment, including in developing countries. This is an area that has remained largely stagnant since CEM 2, despite some positive developments with the United Kingdom's proposed Electricity Market Reform and broader emissions reduction initiatives by certain committed governments (section 6). Progress in building commercial scale demonstration projects remains painfully slow; private entities will not invest in CCS technology absent sufficient demonstration funding and clear policy signals from government for broader deployment. CCS applications in industry is another area requiring additional policy focus, despite some progress by committed governments at a high- or individual project-level since CEM 2.

The report urges energy ministers to:

- Aggressively pursue further progress against the seven CEM 2 recommendations, which remain relevant to accelerating the uptake of CCS technologies.
- Implement proposals presented to CEM 3 on funding mechanisms to support demonstration in developing countries, including an additional USD 150 to USD 200 million for CCS enabling and pre-investment activities in developing countries in the short term; and dedicated CCS funding of USD 5 billion for the "extra" CCS costs of construction and operation of demonstration projects in the medium term.
- Support ongoing work programmes related to CCS financing and industrial applications of CCS up to the fourth CEM 4 (New Delhi, 2013).

The full report is available at:

www.iea.org/publications/freepublications/publication/name,26622,en.html

[54] IEA (2011), *Carbon Capture and Storage and the London Protocol: Options for Enabling Transboundary CO_2 Transfer*, OECD/IEA, Paris (www.iea.org/publications/free_new_Desc.asp?PUBS_ID=2446).

5. Enhanced oil recovery as a climate policy option? Regulating CO_2-EOR, CCS and CO_2-EOR for storage

Enhanced oil recovery through injection of CO_2 (CO_2-EOR) is receiving increasing attention internationally as a driver for early CCS deployment. CO_2-EOR may offer a means to offset some of the cost of CO_2 capture, drive CO_2 transportation infrastructure development and further understanding of geologic storage. However, important issues need to be addressed to ensure that CO_2 storage through EOR is effective in retaining injected CO_2 and results in overall emissions reductions.

While CO_2-EOR projects do result in storage of CO_2, they have traditionally been optimised to minimise the amount of CO_2 injected per barrel of oil recovered, because CO_2 has historically been the greatest expense associated with CO_2-EOR projects. Thus, monitoring is typically conducted during injection to ensure CO_2 is used most effectively to maximise oil production, and not with the aim of assessing whether CO_2 is likely to be permanently stored (*i.e.* monitoring, measurement and verification activities are not comparable to those required of CO_2 storage projects). Similarly, sites are not selected and operated with the aim of permanent storage, but rather with the aim of recovering as much oil as is economically feasible.

In addition, the potential for CO_2-EOR to contribute meaningfully to global emissions reductions is not clear. There have been analyses of the life-cycle emissions resulting from traditional CO_2-EOR projects, some of which have concluded that CO_2-EOR is a means of reducing emissions. Others have shown that CO_2-EOR results in net positive emissions to the atmosphere, if the CO_2 emissions of the incrementally produced oil are included. What is clear from these analyses is that the boundaries of the analysis are a decisive factor in determining the emissions associated with the project and that, at the widest possible scope, emissions from a project will depend on assumptions about the future of global oil production. Thus, whether CO_2-EOR is an emission reduction technology depends not only on the technical aspects of project design, but also much on the policy and regulatory environment in which the project operates. The point is important given the significant number of planned projects that rely on CO_2-EOR and current international dialogue on the potential for CO_2-EOR to contribute to climate goals.[55]

From a legal and regulatory perspective, the minimum requirements for a CO_2-EOR project to qualify as a CO_2 storage project include regulatory standards for monitoring, measurement and verification and long-term storage that are equivalent[56] to those applied for other types of CO_2 storage, to ensure operations are undertaken with a view to safe, effective and permanent storage. These standards are essential to the integrity of CO_2 storage as a climate mitigation option, as well as any associated incentive schemes. The same standards should apply where a traditional CO_2-EOR project transitions to a CO_2 storage project (whether associated with hydrocarbon recovery or not). On the policy front, measurable emissions reduction goals, and policy and accounting rules that accurately award credit for avoided emissions, are required to provide incentives to deploy CO_2-EOR for storage beyond conventional practices.

A number of contributing jurisdictions are currently considering policy and regulatory issues associated with EOR and the interaction between EOR and CO_2 storage regulations. Alberta, for

[55] 29 of a total 65 planned large-scale integrated projects included in the Global CCS Institute's 2011 *The Global Status of CCS: 2011* report, Global CCS Institute (2011), *The Global Status of CCS: 2011*, Global CCS Institute, Canberra (www.globalccsinstitute.com/publications/global-status-ccs-2011).

[56] Regulations need not be identical in form, but they must be fit-for-purpose: *i.e.* they must achieve the same results in terms of ensuring effective and permanent storage of injected CO_2.

example, is examining the need to review requirements for CO_2-EOR projects wanting to transition to storage projects, and whether they should afford equivalent protection to the public and environment to those imposed on projects starting out as pure CCS projects.

The Railroad Commission of Texas (RRC) has issued new rules intended both to document and quantify storage of anthropogenic CO_2 in association with EOR, and to reflect the EPA's 2010 Class VI rule (*i.e.* to regulate wells used to inject CO_2 for geological storage).[57] EOR-aspects of the rules are intended to assist oil and gas operators claim state tax incentives for storage of anthropogenic CO_2 in association with EOR, which allow a reduction in well head taxes levied on oil production. RRC anticipates that it will receive applications for the reduced well-head taxes in the upcoming months; by contrast, it reports that the regulated community has indicated no desire to undertake Class VI storage operations under current conditions. The Texas entry highlights that broader policy and financial action is required to drive CCS deployment (section 6); similar action is likely necessary to provide incentives for CO_2-EOR as a climate policy option.

[57] 16 TAC Chapter 5, available at http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=16&pt=1&ch=5

6. CCS incentive policy: how can governments drive deployment?

In addition to the development of legal and regulatory frameworks for safe and effective storage, CCS deployment requires strong financial and policy action by government. This is important to overcome obstacles to private investment due to technology risk associated with early-mover projects, relatively high capital and operating costs, as well as the fact that there is no cost benefit to undertaking CCS in the absence of a sufficiently high charge or fee on CO_2 emissions (or a commercial market for CO_2-EOR). Government action is required to stimulate new markets, address market barriers and failures, and promote infrastructure development in support of deployment.

The first edition of the *CCS Review* (October, 2010) reported on European efforts to provide policy support for CCS, in the form of: revision of the EU ETS to fully include CCS from 2013; and the NER 300 funding programme, under which revenue from the sale of 300 million allowances in the new entrants reserve of the EU ETS has been allocated to help stimulate the construction and operation of up to 12 CCS and innovative renewable energy demonstration projects by the end of 2015. It also reported then-UK plans to impose a levy on electricity production, to help finance a limited number of CCS demonstration plants.

There have been a number of developments in contributing jurisdictions since that time. In terms of targeted deployment programmes, the UK Department of Energy and Climate Change published an Electricity Market Reform paper on 12 July 2011, setting out reforms intended to drive decarbonisation of the electricity sector (including through CCS) and address energy security concerns.[58] These include:

- An emissions performance standard set to ensure that no new coal-fired plants are built without CCS.
- A carbon price floor, intended to strengthen the incentive to invest in low carbon electricity generation and reduce investment uncertainty.
- Feed-in tariffs combined with contracts-for-difference, to provide stable revenue streams to generators of low-carbon electricity.

The UK government has stated that it will be legislating on key aspects of the proposed reforms, which reflect that the current, fully privatised electricity market is unable to drive sufficient investment in low-carbon technologies, from May 2012. The proposed reforms are significant in that they constitute the first attempt globally to create – as part of the broader reform package – CCS deployment incentives that bridge the gap between CCS-specific demonstration project funding programmes and deployment driven purely by carbon pricing schemes.

There has been limited movement otherwise in developing policy frameworks to support CCS through targeted deployment programmes. However, certain countries have made progress with broader emissions reductions initiatives that may in the future also provide incentives for CCS installations. Australia legislated on 8 November 2011 to introduce an AUD 23 per tonne carbon price from 1 July 2012, which will move to an emissions trading scheme from 1 July 2015. The carbon price is expected to encourage investment in lower emissions generation technologies, including CCS.[59] Australia does not yet have a technology-specific programme in place to support

[58] These measures supersede the previously-proposed levy on electricity suppliers.

[59] Although the carbon price currently remains below the level that would be required to drive CCS projects.

CCS deployment beyond demonstration, but closed consultation on a draft Energy White Paper[60] on 16 March 2012. This is likely to provide a framework for future policy developments once finalised.

Canada has also been active in this area. At the federal level, the Canadian government published proposed "Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations" on 27 August 2011 (scheduled to come into effect on 1 July 2015). The regulations will require all new coal-fired units and units reaching the end of their economic life to meet a performance standard based on the emissions performance of high-efficiency natural gas combined cycle generation; a temporary exception, however, would be provided for those that incorporate CCS, out to 2025. At the provincial level, British Columbia also reports on a suite of climate legislation enacted over the past few years to encourage investment in low-carbon technologies, including CCS. Measures implemented include a broad-based, revenue-neutral carbon tax, which started on 1 July 2008 at a rate of CAD 10 per metric tonne and reached CAD 30 per metric tonne on 1 July 2012. Section 84 of the 2008 *Carbon Tax Act* enables waiver or reduction of tax payable in emissions stored in accordance with relevant legislative requirements through enactment of regulation.

The United States also proposed a Carbon Pollution Standard for New Power Plants on 27 March 2012.[61] Under the proposal, power plants incorporating CCS would have the option to average CO_2 emissions over a 30-year period to meet the proposed standard, rather than having to meet the standard each year.

Despite this progress, very few countries have proposed or put in place integrated policy support for CCS technology deployment, *i.e.* from early pilot and demonstration project stages to broad deployment. Beyond the proposed reforms in the United Kingdom, Norway represents the only country to have a targeted CCS deployment policy programme in place, with sector-specific policy support for certain industrial applications of CCS in the form of its tax on offshore CO_2 emissions.[62] The IEA/Global CCS Institute report to the CEM 3 (section 4) concludes that, despite advancing policies to "reduce the financial gap" being one of the recommendations endorsed by energy ministers at the 2011 CEM, financial and policy support for CCS demonstration and future deployment remains perhaps the most critical challenge to development of CCS technologies.[63]

Given current levels of activity in this area – and that CCS deployment will not happen without additional financial and policy action to support demonstration and wide-scale deployment – the IEA released guidance for CCS policy makers on how incentive policy design can support CCS technology uptake, from demonstration to wide-scale deployment, in January 2012.[64] This work specifies how overall CCS policy architecture and individual policy instruments can support conditions for CCS deployment in a way that maintains the balance between policy certainty and flexibility, as CCS develops.

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[60] www.ret.gov.au/energy/Documents/ewp/draft-ewp-2011/Draft-EWP.pdf

[61] Output-based standard of 1 000 lb CO2/MWh. See http://epa.gov/carbonpollutionstandard/pdfs/20120327factsheet.pdf

[62] Two large-scale CCS projects (Sleipner and Snøhvit) are currently incentivised exclusively by this tax and the EU ETS (*i.e.* they receive no government support). Gassnova, a state-owned company that advises the Norwegian government on and manages the country's interest in CCS, is currently looking at possible policy frameworks to facilitate deployment in power and other industrial sectors (*i.e.* beyond Norway's offshore gas projects); the government is also developing a new white paper on climate change that will address CCS policy (to be presented to parliament around mid-2012).

[63] See page 3 of the report, hwww.iea.org/publications/freepublications/publication/IEA%20and%20Global%20CCS%20Institute%20Tracking%20Progress%20in%20Carbon%20Capture%20and%20Storage%20report%20to%20CEM%203%20FINAL.PDF

[64] IEA (2012), *A Policy Strategy for Carbon Capture and Storage*, OECD/IEA, Paris (www.iea.org/papers/2012/policy_strategy_for_ccs.pdf).

While CCS technologies remain relatively untested on an integrated, large-scale, incentive policies should initially aim to overcome technical and commercial barriers and support technology learning, through technology-specific support for both capital deployment[65] and the operation of capture units, networks and storage.[66] Assuming CCS technologies progress as intended, policies should eventually evolve to technology-neutral incentives to reduce emissions (*i.e.* cap-and-trade schemes, carbon taxes) that will support mass deployment of CCS when it is cost-effective in relation to other abatement options.

When shifts in policies occur will depend on how CCS and other low-carbon options develop, but governments can provide some certainty to industry by setting clearly defined break points or "gateways" that indicate when or if policy will move to a further stage. For example, a first gateway, where policies move from instruments such as capital grants, operating subsidies and loan guarantees to a quantity support mechanism, may be triggered based on CCS technologies demonstrating technical feasibility on an integrated basis at scale, passing a first cost threshold, and confirmation of storage capacity availability. See *A Policy Strategy for Carbon Capture and Storage*, www.iea.org/papers/2012/policy_strategy_for_ccs.pdf.

[65] *I.e.* through grants or provision of debt or equity capital.

[66] Through, for example, incentive mechanisms supplementing revenue per unit of output.

Country contributions

Australia

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Part 1: Developments since the second edition

Under Australia's federal system of government, the Australian Government has jurisdiction over Commonwealth waters (extending from three nautical miles offshore to the edge of Australia's continental shelf) and the states and territories have jurisdiction over onshore areas and coastal waters (up to three nautical miles). The development of legislative and regulatory systems in each jurisdiction is a matter for the jurisdiction concerned.

The Commonwealth has finalised the *Offshore Petroleum and Greenhouse Gas Storage (Greenhouse Gas Injection and Storage) Regulations 2011* (Commonwealth), which came into force in June 2011.[67] These detailed regulations underpin the overall framework contained in the *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (Commonwealth)[68] regulating offshore injection and storage operations. The regulations cover six linked elements:

- The detailed mechanisms for determining whether there is a significant risk of a significant adverse impact, which is invoked if GHG storage and petroleum production activities come into conflict.
- Declaration of a storage formation, which establishes whether a proposed storage site is suitable for storing a given amount of GHG.
- The site plan for GHG injection and storage, which includes detail on how the project will be managed, defines what behaviours of the stored substance will be acceptable, describes risk management and contingency plans, and includes a detailed monitoring plan.
- Incident reporting.
- Decommissioning.
- Discharge of securities.

The government has established a new national body (the National Offshore Petroleum Titles Administrator) to regulate the offshore petroleum industry, replacing the previous system of State/Commonwealth Joint Authorities.[69] This new body will also be responsible for the day-to-day administration of offshore GHG injection and storage projects and commenced operations on 1 January 2012.

Developments expected in next six-twelve months

No major developments are expected in the next 6-12 months because all the necessary parts of the Commonwealth's regulatory regime for injection and storage are now in place. However, in

[67] www.comlaw.gov.au/Details/F2011L01106

[68] www.comlaw.gov.au/Details/C2012C00093

[69] www.ret.gov.au/resources/nopta/Pages/nopta.aspx

relation to transport, the Commonwealth is providing support for research into CO_2 pipelines with the objective of developing cost-effective standards for pipelines that will also ensure that transport is safe and secure. This work will progress over the next two years.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

State and territory governments have responsibility for regulatory requirements in their jurisdictions. The following, therefore, only addresses those matters which are the direct responsibility of the Australian Government.

The government recognises the importance of public engagement in all phases of a CO_2 storage project.

In undertaking exploration for offshore for storage sites, industry is required to consult with other users of the sea (including the offshore petroleum industry, the fishing industry, shipping, defence, telecommunications, and native title interests). In addition, any activities have to a meet a range of environmental approvals, which may include consultation under environmental protection legislation (the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)).[70] These requirements are identical to those required of the offshore petroleum industry.

The Commonwealth's regulatory framework for CCS requires that information on a proposed injection and storage project (in the form of a summary of the site plan) be made publicly available before a project can be approved and provides that any comments will be taken into account by the regulator as part of the approval process. While the regulatory framework does not formally require proponents to undertake consultation before lodging a site plan for approval, they are advised to do so. However, the regulations require a site plan to include a report on consultations undertaken and a strategy for on-going consultation with stakeholders over the life of the operation. Projects are also likely to trigger further public consultations under environmental protection legislation.

Where the Commonwealth is providing funding support for on-shore CO_2 storage projects, it requires proponents to develop and implement a community consultation plan which identifies key stakeholders, outlines proposed community consultation processes, and to report back on the implementation and outcomes from the process.

[70] www.comlaw.gov.au/Details/C2011C00751

Canada

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Part 1: Developments since the second edition

Federal government

On 23 June 2010, the Government of Canada (GoC) announced that it is taking action to reduce GHG emissions in the electricity sector by moving forward with regulations on coal-fired electricity generation. On 27 August 2011, the GoC published proposed *Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations* in *Canada Gazette Part I*. These regulations, which are scheduled to come into effect on 1 July 2015, propose to require all new coal-fired units, as well as units reaching the end of their economic life, to meet a stringent performance standard based on the emissions performance of high-efficiency natural gas combined cycle generation. Under the proposed regulations, new units and units reaching the end of their economic life that incorporate technology for CCS could receive a temporary exemption from the standard until 2025. The proposed regulations also contain provisions that give recognition to units that implement CCS before they are subject to the performance standard. A 60-day comment period closed 26 October 2011.

- Announcement by Canada's Minister of the Environment, the Honourable Peter Kent, about the proposed regulations: www.ec.gc.ca/default.asp?lang=En&n=6F2DE1CA-1&news=70D4C0D9-45C3-4410-8B13-8A648EC1A144
- Environment Canada news release with further details:

  www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=2E5D45F6-E0A4-45C4-A49D-A3514E740296

The GoC continues to work with London Protocol parties to update the guidance on the assessment and permitting of the storage of CO_2 streams in sub-seabed geological formations, with a view to considering movement and how that should be addressed in terms of information sharing, consent, mitigation and longer term monitoring. The Canadian government is also currently undertaking the necessary steps to ratify the 2009 London Protocol amendment. Canada is also working with the United States through the US-Canada Clean Energy Dialogue to discuss compatibility in regulatory standards and is actively engaged in other international CCS dialogue pertaining to advancing the development of CCS regulatory frameworks.

Provincial governments

Alberta is conducting a CCS Regulatory Framework Assessment (RFA) to ensure that its CCS regulatory framework is comprehensive. The GoC is represented in this process. An overview of the Alberta CCS regulatory context is provided in the *Regional jurisdiction contributions* section on page 64.

British Columbia is in the process of drafting a regulatory framework for CCS. A review of the existing legal framework has been conducted. An overview is provided in the *Regional jurisdiction contributions* section on page 66. British Columbia is also a participant in the Alberta RFA.

In Saskatchewan, CO_2 transportation (pipeline), injection and storage are regulated under *The Oil and Gas Conservation Act* (the Act) and *The Pipelines Act, 1998*, administered by the Ministry of Energy and Resources. In May 2011, an amendment to the Act passed the third reading and received Royal Assent. The Act was proclaimed on 1 April 2012, under which the *Oil and Gas Conservation Regulations, 2012* came into effect. The provisions in the amendment that relate to CO_2 injection and storage include:

- Expanding and clarifying the purpose of the Act to include the regulation of the injection, storage and withdrawal of substances, including CO_2 and other GHGs.
- Replacing the term "non-oil-and-gas waste" with "non-oil-and-gas substance" and revising its definition to clarify that The Act applies to all substances as defined, not only those that may be considered waste.
- Expands the regulation-making power under the Act to properly regulate and measure the withdrawal and underground storage of substances (such as CO_2) from and to a well for commercial, industrial or other uses (such as enhanced oil recovery).

Bill 157, The Oil and Gas Conservation Amendment Act, 2011 can be found at the following link: www.qp.gov.sk.ca/documents/english/Chapters/2011/Chap-11.pdf

The Oil and Gas Conservation Regulations, 2012 can be found at the following link: http://www.qp.gov.sk.ca/documents/English/Regulations/Regulations/O2R6.pdf

Saskatchewan is also a participant in the Alberta RFA.

CCS Nova Scotia, a non-profit public-private-academic research consortium, is in the final year of research into determining the technical and economic feasibility of the capture, transport and storage of CO_2 from coal-fired electrical generating facilities in Nova Scotia. The research extends to options for storage and transportation both onshore and offshore. Reports include geological assessments, capture and transportation options in addition to ancillary activities such as a regulatory/legal report, risk management roadmap and a public/stakeholder awareness plan for the possible deployment of a pilot CCS project, all developed with a Nova Scotia perspective.

Developments expected in next six-twelve months

The final GoC *Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulation*s are expected to be published in 2012. In Nova Scotia, all research work is expected to be completed by the third quarter of 2012.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

Generally speaking, the GoC is required to ensure that an environmental assessment (EA) is conducted prior to making certain decisions in relation to a project as defined under the Canadian Environmental Assessment Act (CEA Act). The three most common EAs conducted under the CEA Act are screenings, comprehensive studies and panel reviews.

For screening level EAs, conducting public consultation is at the discretion of the GoC. In making the determination of whether to conduct public consultation for a screening, the GoC considers several factors such as: the likelihood of public concern or interest, whether the project involves a new or un-tested technology, whether the project is occurring in a location with environmental sensitivities, etc. Currently, all of the CCS projects for which a federal EA has been required (*e.g.* Shell Quest, Enhance, Husky Lashburn and Tangleflags) were subject to screening level EAs. Of these, the GoC conducted public consultation pursuant to subsection 18(3) of the CEA Act on

only one, the Shell Quest CCS project. The public was provided an opportunity to comment on the scope of the project, the scope of the EA and the federal screening report.

The GoC EA documents in relation to the Shell Quest project, including the decision that the project is not likely to cause significant adverse environmental effects, are available from the Canadian Environmental Assessment Agency's web site:

www.acee-ceaa.gc.ca/050/details-eng.cfm?evaluation=55916

Further, the Shell Quest project was recently approved with conditions by the province of Alberta's primary energy regulator, the Energy Resources Conservation Board:

www.ercb.ca/decisions/2012/2012-ABERCB-008.pdf

For comprehensive studies and panel reviews, public consultation is mandatory under the CEA Act, however, to date none of the CCS projects have been subject to a comprehensive study or review panel process.

Czech Republic

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Part 1: Developments since the second edition

The Ministry of the Environment submited a law for transposition of the EU CO_2 Storage Directive to the Government of the Czech Republic. On 25 October 2011, the government passed the *Act on the storage of carbon dioxide into natural rock structures and amending certain laws* in its resolution No. 783.

The governmental proposal of this Act was forwarded to the Parliament of the Czech Republic.

Developments expected in next six-twelve months

It is expected that the House of Representatives will approve the proposal upon the first reading. After the Senate approves the proposal, it will be signed by the President and come into force 30 days after publication in the Collection of laws.

It has been proposed to postpone the day of coming into force of the provisions concerning the licensing regime in relation to the operation of storage of CO_2 (§ 3 to 6 of the Act) to 1 January 2017. The District Mining Offices will not be able to issue operating permits for storage of CO_2 up until this date, but individual operators will be able to prepare for the legal conditions for the storage of CO_2 in the Czech Republic.

The most promising storage sites are currently considered to be aquifers in northern Bohemia and depleted oil fields in southern Moravia. Furthermore, several options of carbon capture and use are being evaluated.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

The government's *Act on the storage of carbon dioxide into natural rock structures and amending certain laws* assumes that the public's representatives will be the participants in the administrative procedure for issuing operating permits for the storage of CO_2.

According to § 4 par. 1 of the Act the participants of the administrative procedure for issuing operating permits for the storage of CO_2 will be the operator, the municipality in whose territorial jurisdiction the storage of CO_2 is to occur, persons meeting the requirements under other legislation (*e.g.* according to § 23 par. 9 of the *Act on the assessment of environmental impact*) and persons whose rights and legally protected interests or obligations may be affected by the permit.

Finland

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Part 1: Developments since the second edition

The Finnish government prepared the law for CCS which will implement the EU CO_2 Storage Directive. The law was approved by the Parliament in June 2012.

The approved law forbids the storage of CO_2 in the Finnish territory, due to the lack of suitable geological formations. However, storing volumes up to 100 000 tonnes for research and technology development purposes may be permitted. CO_2 potentially captured in Finland may only be exported for storage in geological formations located within the European Union.

Developments expected in next six-twelve months

Finland's CCS law will come into force on 15 July 2012.

France

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Part 1: Developments since the second edition

Over the last twelve months, France has finalised transposition of the EU CO_2 Storage Directive and notified the European Commission of this achievement. *Decree n° 2011-1411 dated 31 of October 2011 on the geological storage of carbon dioxide*[71] entered into force on 1 November 2011. This decree completes law level provisions that entered into force in 2010.[72]

This decree settles practical provisions related to seeking and granting exclusive rights to explore (exploration permits) as well as seeking and granting storage concessions, both addressing access right to the underground. Its scope also encompasses exploration activities and granting of storage permits. Details are set out about documents to be handed to the competent authority as part of these processes.

Monitoring, closure, post-closure of storage sites as well as transfer of responsibility procedures are also addressed in this decree.

This regulation does not cover some of the topics unresolved by the EU CO_2 Storage Directive itself, including the calculation method for financial security or financial security mechanisms, criteria for the composition of the CO_2 stream, storage perimeter, etc. However, it brings complementary provisions for example on injection tests that take place under the exploration permit: these complementary provisions address CO_2 stream quantity injection thresholds and the necessary protection of underground waters.

This decree has since been codified in the Environmental Code[73] as articles R.229-57 to R.229-102.

Developments expected in next six-twelve months

No further regulatory developments are expected to occur in the next 6-12 months and beyond. However, technical works will be carried out to deepen some key issues around geological storage including:

- CO_2 stream composition.
- Storage perimeter and migration issues.
- Financial security.

[71] *Décret n° 2011-1411 du 31 octobre 2011 relatif au stockage géologique de dioxyde de carbone afin de lutter contre le réchauffement climatique*.

[72] See previous editions of the IEA *CCS Review*.

[73] www.legifrance.gouv.fr/affichCode.do?cidTexte=LEGITEXT000006074220

Part 2: Stakeholder engagement in the development of CO_2 storage projects

France is addressing public engagement issues very carefully.

Debate on CCS has taken place in the framework of a wider debate on sustainable development policies – the so called *Grenelle Environnement* which took place in 2007. As a result the law n°2009-967 entered into force.[74] Its article 22, related to CCS, states that CCS development will be accompanied by appropriate legal framework development and supported financially.

Then, while drafting the various legislative provisions that have now entered into force, public consultation took place via internet (30 days' consultation).

Finally, as far as CCS projects are concerned, public engagement takes place at various levels all throughout the projects.

Exploration activities

- Public consultation is to take place as part of the granting process of an exploration permit. This provision, which concerns any exploration permit, is currently under review by Parliament.[75]
- A public enquiry is to take place for activities subject to an authorisation regime, such as injection tests.[76]
- Establishment of a public information commission whenever injection tests take place.[77]

Storage activities

- A public enquiry is to take place as part of the granting process of pore space access concession.[78]
- A public enquiry is to take place as part of the granting of a storage permit.[79]
- Finally, a public information commission is to be set up whenever test injections take place.[80]

[74] www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000020949548
[75] Subject to parliamentary processes, Article L. 122-3 of the Mining Code is to be modified to insert this provision.
[76] See article R. 229-59 and R. 229-60 of the Environmental Code and article 13 of *Décret 2006-649 du 2 juin 2006 relatif aux travaux miniers, aux travaux de stockage souterrain et à la police des mines et des stockages souterrains*.
[77] See article L. 229-30 of the Environmental Code.
[78] See article R. 229-69 of the Environmental Code and article 26 of *Décret 2006-648 relatif aux titres miniers et aux titres re stockage souterrain*.
[79] See articles R. 229-64 and L. 512-2 of the Environmental Code.
[80] See article L. 229-40 of the Environmental Code.

Germany

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Part 1: Developments since the second edition

The legislation on CCS is currently passing the last steps of the legislative process and is going to enter into force soon. The German Bundestag passed the draft act on 7 July 2011. The Bundesrat decided on 23 September 2011 not to consent to the draft. The German government applied for a formal conciliation procedure on 26 October 2011. The conciliation committee proposed amendments to Parliament on 27 June 2012; both chambers, Bundestag and Bundesrat, consented to the amended draft at end-June 2012.

Developments expected in next six-twelve months

Entry into force within the next month.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

This technology is met with great reservations in particular in areas that would be suitable for CO_2 storage. Numerous citizens' initiatives have sprung up that have created a network of contacts all over the country. The main reasons for their rejection are the ecological concerns put forward by some environmental organisations and doubts regarding the usefulness of the technology in general. The main concerns vary among the different environmental organisations. BUND (Friends of the Earth) and Greenpeace, for example, have reservations against CCS technology in particular because the CO_2 to be stored stems from burning fossil energy sources, while the WWF and Germanwatch are in favour of testing and demonstrating CCS technology especially with a view to reducing process-related emissions from industry.

Public resistance is the major barrier to reaching the demonstration phase for CCS in Germany. It seems necessary to clarify that CCS will only reach commercial-scale deployment after the demonstration phase has shown the economic, technical and environmental feasibility of CCS and that CCS will primarily play a role where other mitigation options do not exist.

The law covers a lot of these aspects. When drawing up a new draft in 2010/2011 the latest developments in CCS technologies were taken into account. As a consequence it was decided that German legislation should be limited to the testing and demonstration of CCS. The amount of CO_2 to be stored every year was restricted to three million tonnes of CO_2 per storage site and a national total of eight million tonnes CO_2. Thus, the bill allowed for no more than three larger demonstration projects in Germany. In addition, a deadline for the application for storage permits of 31 December 2016 was included. Amendments in the conciliation procedure were the following: in order to further stress the character of the law as a demonstration law the amounts of CO_2 were restricted to 1.3 million tonnes of CO_2 per storage site and a national total of four

million tonnes CO_2. Furthermore, the time lapse between decommissioning of the storage site and transfer of responsibility was extended from 30 years to 40 years. The much contented states' clause – allowing states to exclude territory from CO_2 storage – was amended to clarify the obligation to take into account objective reasons when excluding state territory.

Applying the highest environmental and safety standards for storing CO_2 in geological formations remains one of the key aspects for public acceptance. Therefore Germany's CCS law regulates that a permit for a storage site can be granted only after a planning approval procedure has been carried out, requiring *inter alia* that the storage site is safe in the long term, dangers to human health and the environment are ruled out and that precautionary measures are taken in accordance with the state of science and technology. The public has extended opportunities for participation. The operator has to provide financial security to cover all relevant risks (see Edition 2 of the *CCS Review*).

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Part 1: Developments since the second edition

Statutory Instrument No. 575 of 2011, *European Communities (Geological Storage of Carbon Dioxide) Regulations 2011* (SI), was published on 18 November 2011 and was laid before the Oireachtas on 22 November 2011. The SI transposes the EU CO_2 Storage Directive by prohibiting storage of CO_2 in amounts greater than 100 kilotonnes in the territory of the state, its exclusive economic zone and on its continental shelf.

Developments expected in next six-twelve months

None expected.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

No CO_2 storage projects are envisaged.

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Part 1: Developments since the second edition

The transposition process of the EU CO_2 Storage Directive has been successfully completed and the Directive is now law in the Italian legal framework (legislative decree 14 September 2011, no. 162, *Attuazione della direttiva 2009/31/CE in materia di stoccaggio geologico del biossido di carbonio, nonche' modifica delle direttive 85/337/CEE, 2000/60/CE, 2001/80/CE, 2004/35/CE, 2006/12/CE, 2008/1/CE e del Regolamento (CE) n. 1013/2006*, published in the Italian Official Journal no. 231 of 4 October 2011). Italy implemented the legislative decree through a number of implementation decrees, including:

- Exploration permits.
- Storage permits.
- Transfer of responsibility.
- Financial security.
- Financial mechanism.
- Financial provisions.
- Access to transport network and storage sites.
- Information to the public.
- Data reporting to the European Commission.

Developments expected in next six-twelve months

In the next 6-12 months, Italy will finalise the legislative decree implementation process outlined above, including starting work on an implementation decree on selection of storage sites (to be issued by September 2013).

Part 2: Stakeholder engagement in the development of CO_2 storage projects

According to the legislative decree no. 162 the Ministry of Economic Development and the Ministry of the Environment will make information available to the public regarding the environmental aspects of the geological storage of CO_2 under the applicable European and national legislation. Contents and modalities of the dissemination of information were defined by an implementation decree of the Minister of Economic Development in consultation with the Minister of the Environment, issued within 180 days from the date of entry into force of the decree no. 162 (*i.e.* March 2012).

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Part 1: Developments since the second edition

As part of a process that commenced in 2011 and is envisaged to occur up to 2014, Japan has been accumulating knowledge about the marine ecosystem in waters around Japan, which is essential for the environmental impact assessment review (refer to Article 18.12 of the Marine Pollution Prevention Law).

Developments expected in next six-twelve months

Work on accumulating knowledge about the marine ecosystem in waters around Japan will continue.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

None.

Malaysia

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Part 1: Developments since the second edition

Malaysia undertook a scoping study for CCS in Malaysia in 2010, which investigated amongst other areas the legal and regulatory aspects of the implementation of CCS in the country. The scoping study reported that there was a lack of strong existing legal and regulatory structures in Malaysia to address all three components of CCS, *i.e.* capture, transport and storage.

As a step forward, Malaysia undertook a number of activities in 2011, including participating in the Global CCS Institute Policy, Legal and Regulatory Study Group (PLR-SG) on 5 October 2011. Malaysia also participated in the APEC CCS Regulatory Review in July 2011 to understand the gaps in the current regulatory framework to address CCS implementation. The findings of the study will form a good platform for launching work on the regulatory regime for CCS in Malaysia.

Malaysia also organised a panel discussion session on *Carbon Capture and Storage and Low Emissions Strategy* on 9 September 2011 in Kuala Lumpur, as part of the capacity development work programme for the Ministry for Energy, Green Technology and Water (KeTTHA) in collaboration with the Global CCS Institute during the Malaysia International Greentech and Eco Products Exhibition and Conference (IGEM-2011). The discussion covered Malaysia's current energy outlook and insight on how CCS could fit into Malaysia's Low Emission Strategy, by providing information on costs, industrial uses for CO_2 and perspectives on CCS from different industry players.

Finally, together with the IEA KeTTHA hosted a CCS roundtable in Putrajaya, Malaysia on 21 March 2011.[81] The aim of the roundtable was to explore the current status of CCS globally, including legal and regulatory developments, and the status of the technology in Malaysia.

Developments expected in next six-twelve months

In the next 6-12 months, Malaysia is expected to continue work on capacity building in CCS. Malaysia will also look into establishing an institutional mechanism to move forward work on CCS. A public-private working group will need to be established to further co-ordinate and plan future work on CCS. Apart from work in the regulatory area, Malaysia will also need to look into CO_2 storage and transportation issues.

[81] www.iea.org/ccs/legal/global_engagement.asp

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Part 1: Developments since the second edition

- With the support of the Global CCS Institute, work has been undertaken towards a National Strategy on Carbon Capture, Use and Storage (CCUS).
- Work has commenced to define the guiding elements for the regulatory framework on CCUS, by the Secretariat of Energy, Secretariat of Economy and Secretariat of Natural Resources and Environment.
- A workshop titled *CCS in Mexico: policy strategy options for CCS* was held in Mexico City on 7-8 March 2012, with the support of the IEA.
- Negotiations are underway with the World Bank CCS Trust Fund for a donation to support capacity building.
- Mexico has engaged with the Global CCS Institute on capacity building for planning and policy making for CCUS. On 27-28 June 2012 a workshop *CO_2 Geological Storage for Earth Sciences students* took place in Mexico City.
- On March 2012, SENER and the Electricity Federal Commission (CFE, for its initials in Spanish), released Mexico's CO_2 Storage Atlas (http://co2.energia.gob.mx/co2/atlas.html)
- SENER, Natural Resources Canada (NRCan) and the U.S. Department of Energy, released in May 2012, *The North American Carbon Storage Atlas*, which was produced under the leadership of the North American Carbon Atlas Partnership (www.nacsap.org/).

Developments expected in next six-twelve months

Aspects of the above mentioned activities will continue.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

In terms of public engagement activities in 2011, CCUS was presented as part of the energy sector technological development agenda. In November 2011, a review on energy innovation (*Especial de Innovación Energética Sustentable*) was published by the Secretariat of Energy and the Investment Promotion Unit of the Secretariat of Economy (Promexico), which included a specific article on CCUS (www.laspaginasverdes.com/energia/).

During the remainder of 2012, we expect to consider public engagement activities as follows:

- With the support of the World Bank CCS Trust Fund donation (negotiations underway), Mexico will work on the adoption of best practices of public engagement in regards to CCUS.

Since the proposed pilot and demonstration projects are CCS-EOR, public engagement will be influenced by previous experiences in the power and oil industries. The role of state-owned companies in these projects will potentially facilitate transparency and public engagement.

The Netherlands

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Part 1: Developments since the second edition

The implementation of the EU CO_2 Storage Directive entered into force by the following means:

- The law to amend the Mining Law in order to implement the EU CO_2 Storage Directive was accepted by the first chamber of the Parliament in May 2011. It was published on 6 June 2011 in the Staatsblad (Stb 2011-381)[82] and is in force as of 10 of September 2011. This amending law was also the implementation of *OSPAR Decision 2007/2 on the storage of carbon dioxide streams in geological formations*.
- The Ministerial Decree to amend several existing decrees regarding environmental impact assessments, environmental permits for large combustion engines and mining was published on 9 September 2011 in the Staatsblad (Stb. 2011-406)[83] and also entered into force on 10 September 2011.
- The regulation to amend the Mining Regulation was published on 15 September 2011 in the Staatscourant (Stscrt 2011-16804)[84] and entered into force on 16 September 2011.

Developments expected in next six-twelve months

Legislation to amend the Civil Code with regard to long-term liability for CO_2 storage is in preparation (see the second edition of the *CCS Review*).

Ratification of the amendment to Article 6 of the London Protocol is expected to be finalised by the end of 2012.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

All preparations for CO_2 storage projects on land have ceased since February 2011, when the cabinet decided that CO_2 storage offshore would probably be sufficient for mitigating climate change. The cabinet decided then not to support onshore CO_2 storage projects. The small scale demonstration project planned in the town of Barendrecht had already been cancelled at the beginning of November 2010.

The General Administrative Law Act (*Algemene Wet Bestuursrecht*)[85] describes the general public engagement requirements for administrative decisions such as licences or spatial plans. There are differences in procedures depending on the type of decision. Other specific legislation determines which procedure will apply. Sometimes draft decisions are published for public engagement and the possibilities to protest final decisions are limited to court appeal. Sometimes there is no public engagement possible on draft decisions but there is then public engagement possible for final decisions. In cases where the national co-ordination procedure

[82] https://zoek.officielebekendmakingen.nl/stb-2011-381.html

[83] https://zoek.officielebekendmakingen.nl/zoeken - search in Staatsblad with year (2011) and number (406).

[84] https://zoek.officielebekendmakingen.nl/zoeken - search in Staatscourant with year (2011) and number (16804).

[85] See http://wetten.overheid.nl and search with *Algemene Wet Bestuursrecht*. The procedures are in Chapter 3.

(NCP) applies publication of draft decisions with public engagement is mandatory. For a determination whether a project falls under the NCP, the type of project is important. However, for every permit/licence/administrative decision concerning the installations or uses of installations for the part of the project falling under the NCP the minister in charge of the NCP can decide to include or exclude certain of those. That will have a consequence for the public consultation.

In terms of how these principles apply to CCS projects:

- Capture: capture installations do not fall under the NCP but in general the draft licences required (*omgevingsvergunning*, which literally translated means "surroundings permit" and is a combination of a building permit and environmental permit amongst other things) will in itself mandatorily go through the process of public consultation.
- Transport: if there are administrative decisions to be made, then public consultation is mandatory because of the NCP unless the minister decides not to include them in the NCP procedure.
- Storage: storage is part of the NCP. However, in general CO_2 storage licences for offshore storage have no public consultation on draft permits, but every interested party can object to a decision on the final storage permit. Onshore CO_2 storage permits always have a public consultation. In this case the NCP minister can also decide to include the storage licence in the NCP, which will mean that the draft offshore licence will also then undergo public consultation.

In general the NCP minister (for CO_2 storage, this is the Minister of Economic Affairs, Agriculture and Innovation) can decide on a case-by-case basis which licences of administrative decision will be part of the co-ordination.

Preparations for the ROAD-project (*Rotterdam Opslag and Afvang Demonstratie*) have continued. Recently the draft licence for the capture unit was published for public engagement in accordance with the existing rules for public engagement. Draft decisions (licences and other decisions *e.g.* spatial plans) for the pipeline and the storage location will follow separately. The ROAD project will store CO_2 captured in the Rotterdam area in a depleted gas field some kilometres off the coast (field P18).

In addition to the legal requirements above, the Ministry of Economic Affairs, Agriculture and Innovation is presently considering additional ways to engage the public, both in the context of CCS and broader energy projects, For example, the government is considering how permanent information centres could help better inform local stakeholders about projects and how local discussions on controversial projects could best be organised in the spirit of “investigate, adapt, engage”.

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Part 1: Developments since the second edition

In 2009, the New Zealand Carbon Capture and Storage Partnership (the Partnership) commissioned research on the potential of CCS for New Zealand. The Partnership includes government and industry contributors. The report was developed to inform the early stages of CCS policy development. The Transfield Worley consortium report *CCS in New Zealand – Can Carbon Capture and Storage deliver for New Zealand as we head towards a low carbon future?* was released on 2 November 2011. The full technical report and companion summary report can be downloaded at www.straterra.co.nz/CCS.

The main elements of the report are:

- A review of the potential for CCS in New Zealand looking at the technical, legal, environmental, and social implications.
- The development of two specific case studies illustrating issues that New Zealand will need to address before embarking on a CCS project. These are:
  - Case study one: retrofitting an existing North Island power station with CCS; and
  - Case study two: developing a new South Island processing plant with CCS (assuming a new lignite processing facility).

Broadly, the outcome of the case studies was that case study one (retrofitting an existing power station) is currently uneconomic, and that this is likely to remain the case for the foreseeable future. The economics of case study two (developing a processing plant with CCS) were more favourable, but hurdles to overcome include regulatory uncertainty and public acceptance.

Ultimately, for the potential of CCS to be realised, further work is needed to overcome barriers to its adoption. The Ministry of Economic Development (MED) is taking note of this report and will consider it, and any future reports, in order to inform its policy on CCS. MED's work programme is focused on ensuring an appropriate legislative and regulatory framework is in place to regulate CCS should it be deployed in New Zealand, and to allow for proactive investment decisions.

Developments expected in next six-twelve months

None.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

The Transfield Worley consortium report referenced above states that there may be a number of social perceptions and concerns that adversely impact the future development of CCS in New Zealand, including lack of knowledge of the benefits of CCS; concern about possible issues in relation to New Zealand *e.g.* seismic issues and leakage; and opposition to technologies associated with the mining and burning of coal.

Kingdom of Norway

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Part 1: Developments since the second edition

The Ministry of Petroleum and Energy and the Ministry of Labour continue to work on the new regulations on transport and storage of CO_2 in sub-sea reservoirs on the Norwegian Continental Shelf. The work has been somewhat delayed, due to internal considerations in the Ministries involved on the formulation of the draft regulations. Consequently, no draft regulations have as yet been submitted for public consultation.

Developments expected in next six-twelve months

The plan is still to submit two new sets of regulations relating to transport and storage of CO_2 in sub-sea reservoirs on the Norwegian Continental Shelf for public consultation at the same time. These regulations will be drafted by the Ministry of Petroleum and Energy and the Ministry of Environment, respectively. The draft worked out by the Ministry of Petroleum and Energy will regulate transport and storage of CO_2 in relation to managing the CO_2 and the geological reservoirs as natural resources (resource management), as well as issues related to health, safety and work environment in this respect. The Ministry of Environment will regulate the environmentally safe storage of CO_2. The two drafts are planned to be submitted for public consultation within the next few months.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

In accordance with the requirements of the EU CO_2 Storage Directive, Norway plans to include provisions on impact assessments in the new regulations pertaining to transport and storage of CO_2 on the Norwegian Continental Shelf. The requirements will be in line with those included in Directive 85/337/EEC[86] as amended, implying that an impact assessment shall be carried out by the operator before development of a storage location on the Norwegian Continental Shelf.

The impact assessment process shall start by the operator formulating a draft programme for the impact assessment. The draft shall be submitted for public consultation for at least 6 weeks and any comments are to be considered as part of finalising the impact assessment programme. This programme will be subject to the approval of the Ministry of Petroleum and Energy. The impact assessment itself shall then be carried out by the operator on the basis of the approved programme. When the impact assessment has been carried out, the assessment shall be submitted to public consultation for a period of three months, and in no case less than 6 weeks. Any comments shall be taken into consideration as the assessment is submitted to the Ministry of Petroleum and Energy as part of a plan to develop and operate the storage reservoir. This plan will then be subject to approval by the Ministry of Petroleum and Energy. The new provisions described above will be based on existing requirements in the Petroleum Act pertaining to petroleum activities on the Norwegian Continental Shelf.

[86] Council Directive of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment 85/337/EEC.

Poland

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Part 1: Developments since the second edition

In last twelve months, work continued on the preparation of regulations transposing the EU CO_2 Storage Directive. In March 2011, the assumptions to amend Polish Geological and Mining Law were adopted by the Council of Ministers. A key element is that the provisions concerning CCS will only apply to the demonstration phase in a transitional period to 2026. On the basis of the assumptions a first draft of an Act was prepared. Currently the Polish Government Legislation Centre in co-operation with the Ministry of the Environment is working on the final wording of the draft. The main issues for now are provisions concerning transfer of responsibility to the competent authority and, related to this, property rights.

Developments expected in next six-twelve months

Work on the draft of the Act should be finalised in the near future and it will be forwarded for additional consultations with trade unions, employer organisations and The Joint Commission of Government and Local Government (KWRiST). Then the Committee for European Affairs should confirm compliance of the Act with European law and it will be laid down for adoption by government (the Committee of the Council of Ministers and the Council of Ministers). Next the Act will be forwarded to the Parliament, where it will be analysed by the Lower House and then the Upper House.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

To identify potential CO_2 storage possibilities in Poland, the Ministry of the Environment has launched a National Program *Assessment of formations and structures for safe CO_2 geological storage, including monitoring plans* (2008-2012).[87] Within the programme co-operation with a number of industry stakeholders, as well as with European geological surveys and other organisations of relevant expertise was established. The main goal of the programme is to collect and elaborate country-wide geological information necessary for future decisions on exploration and storage permits, according to the EU CO_2 Storage Directive. The scope of this programme includes also public acceptance. There were several seminars, meetings and conferences for public, local authorities, schools and media, to inform about CCS technologies, answer questions and clarify doubts about the safety of CO_2 storage processes. The Ministry of the Environment also issued *The interactive atlas* that presents the capacity for geological storage of CO_2 in Poland.[88] Nevertheless entrepreneurs planning to develop CCS demonstration projects play the main role in communication with public.

According to the draft regulations, the key moment where public engagement is to occur in the development of CO_2 storage projects will be environmental impact assessment processes both before exploration and at the storage phase. It will be required also in the permitting granting

[87] http://skladowanie.pgi.gov.pl/

[88] http://skladowanie.pgi.gov.pl/co2atlas/atlas.phtml

procedure (opinion of the local authorities before exploration and consent before exploitation of the storage site). This will be related with public engagement in land use planning. The role of national authorities and next the operator in those processes will be to propose suitable and safe localisations for geological storage of CO_2. To achieve transparency of storage projects, all permits (concessions), protocols from inspections and environmental decisions will be available to the public.

Public consultations are also provided for in legislative processes (assumptions, acts, regulations).

South Africa

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Part 1: Developments since the second edition

In October 2011, the South African government published the *National Climate Change Response White Paper*.[89] In the White Paper, CCS has been named as one of South Africa's eight Near-term Priority Flagship Programmes which seek to address both mitigation and adaptation, thereby making CCS an integral part of South Africa's climate change response policy. The CCS Flagship Programme will be led by the Department of Energy (DoE) in partnership with the South African Centre for CCS (SACCCS). The programme includes, among other initiatives, the development of a CCS demonstration plant to store the process emissions from an existing high-CO_2 emissions facility. This inclusion represents an important development for CCS policy in South Africa. More details on the implementation of the CCS Flagship Programme will be available in due course.

During the 2nd South African CCS Week (CCS week) held on 24-28 October 2011, the Minister of Energy announced the formation of an Interdepartmental Task Team (IDTT) on CCS. The IDTT will look at all areas of CCS but will have a special focus on CCS legal and regulatory aspects. The IDTT includes the Department of Energy, Department of Environmental Affairs, Department of Mineral Resources, Department of Trade and Industries, Department of Science and Technology, National Treasury and Department of Transport. However, other government departments and state organs as well as private institutions will be invited as and when required. The DoE is in the process of inviting the Department of Public Enterprise into the IDTT. An inaugural meeting of the IDTT was held on 21 November 2011. The establishment of the IDTT was in part informed by the IEA *CCS Model Regulatory Framework* and the 2nd Edition of the IEA *Carbon Capture and Storage Legal and Regulatory Review*, both of which highlight the value of such an inter-agency working group. The IDTT meetings occur bi-annually. The IDTT has recently on 14 June 2012 held its first meeting for this year where parties that contribute on issues of CCS (SACCCS and the World Bank) made presentations to the meeting. The IDTT also resolved to further invite parties involved in a study on legal framework development in South Africa to present at its next meeting and to further finalise its terms of reference before the next meeting.

On 4 May 2012 Cabinet announced that in its ordinary meeting held in Pretoria on 3 May 2012, it endorsed the South African Carbon Capture and Storage Roadmap. The announcement went further to state that one of government's strategic objectives is mitigation against carbon emissions and adaptation to the impact of climate change. South Africa relies heavily on fossil fuels (coal, gas and oil) for energy production.

[89] www.environment.gov.za/PolLeg/WhitePapers/national_climatechange_response_whitepaper.pdf

The Government's Long-Term Mitigation Scenarios plan identified CCS as one of the options to mitigate CO_2 emissions. In addition, South Africa has voluntarily committed to reduce CO_2 emissions by 34% in 2020 and by 42% in 2025, on condition that the requisite technological and financial support is provided. CCS can reduce CO_2 emission by 80% to 90%. CCS aims to reduce GHG emissions that contribute to climate change, particularly CO_2 from sources such as electricity generation plants, coal-to-liquids (CTL) plants and cement manufacturing plants.

A workshop on CCS legal and regulatory aspects was also held during CCS Week, hosted by the DoE with the support of SACCCS and the financial support of the Carbon Sequestration Leadership Forum (CSLF). The workshop brought together international and South African CCS legal and regulatory experts, officials from various government departments, financial institutions as well as multilateral institutions like the IEA, CSLF and Global CCS Institute. The aim of the workshop was to improve the understanding of how legal and regulatory developments could proceed in South Africa. Presentations from the CCS Week legal and regulatory workshop can be found on the SACCCS website.[90]

In November/December 2011, the South African Government hosted the COP17/CMP7 climate negotiations in Durban. On the agenda was the ongoing issue of inclusion of CCS in the Clean Development Mechanism (CDM). Given the importance of CCS to South Africa, the resolution of this issue was made a priority by the South African Government and the chair of the negotiations, the Minister of International Relations and Co-operation – the Honourable Ms. Maite Nkoana-Mashabane. With the South African position being put forward by the DoE, a resolution was reached on the issue of modalities and procedures[91] after six years of effort. This development is critically important for CCS in South Africa as it cements an internationally agreed approach to CCS in developing countries, clearing the path for international CCS funding via the CDM and other future funding mechanisms.

SACCCS, supported by the DoE, also had a presentation stand at the climate change negotiations aimed at informing the public about the basics of CCS as well as the current status of CCS in South Africa. Over the course of the two weeks, SACCCS was honoured to have the President of South Africa, Dr. Jacob Zuma and the Minister of Energy of South Africa, Honourable Ms Dipuo Peters, visit the stand.

The DoE together with SACCCS hosted the CCS seminar as one of the DoE's side events during COP17/CMP7 in Durban on 1 of December 2011.The purpose of the seminar was, amongst others, to enlighten the public about the challenges and opportunities on CCS technology; the role CCS can play in the fight against climate change; an international perspective on the status of CCS; CCS-readiness of developing, non-Annex 1 countries; and the South African and international CCS perspectives. The seminar was honoured by the participation of the Minister of Energy of South Africa as well as local and international experts on CCS.

In the last twelve months, the DoE and World Bank with the support from SACCCS have also called for expressions of interest for the DoE - World Bank CCS Study Task 1: CCS legal and regulatory. The study, which commenced in the second quarter of 2012, aims to build on work done to date and assist the DoE in developing a CCS legal and regulatory framework that would allow for execution of the CO_2 Test Injection and further commercial application of the CCS technology in South Africa.

[90] www.sacccs.org.za

[91] http://unfccc.int/files/meetings/durban_nov_2011/decisions/application/pdf/cmp7_carbon_storage_.pdf

Developments expected in next six-twelve months

In the next 6-12 months, South Africa will be holding the follow-up meetings of the IDTT on CCS. The IDTT on CCS will ensure that all the relevant government departments are involved and play their rightful roles in developing CCS.

During this period, SACCCS will complete three studies looking at CCS legal and regulatory aspects in South Africa. The CO_2 Test Injection Scoping Study and the South African – European CCS Study (SAfECCS) will together outline how the proposed CO_2 Test Injection relates to existing South Africa law. The outcomes of this work will help inform the DoE – World Bank Study. SACCCS will also see the completion of their CCS Ready study which will suggest an appropriate definition of CCS Ready in South Africa.

The DoE will also engage the Global CCS Institute regarding the use of the Legal and Regulatory Toolkit in its quest to develop a fitting CCS legal and regulatory environment for CCS development in South Africa.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

CCS public engagement is seen by the South African Government and SACCCS as a prerequisite for the successful development and deployment of CCS in South Africa. As such, public engagement will form a key topic for discussion in the IDTT.

To date, CCS public engagement has been discussed extensively within the DoE and with SACCCS. SACCCS in now in the process of developing public engagement plans around CCS nationally and around the CO_2 Test Injection at both a national and local levels. To support this work, CCS public engagement has been included in the DoE - World Bank CCS study as Task 4: Public Engagement. As such, a contractor has been employed to conduct the study expected to be finalised by end December 2012. This task will also look to develop two public engagement plans for the CO_2 Test Injection project, one at a local level and the other at a national level. Similarly to Task 1 of the study discussed above, a call was circulated for expressions of interest for Task 4: Public Engagement, with the study looking to commence in the second quarter of 2012.

During the CCS Week in October 2011, there was also a workshop held on CCS public engagement in South Africa. The workshop involved speakers who have first hand experience developing and implementing public engagement plans around real CCS projects – the Decatur project in the US and the Otway project in Australia. The workshop also involved a presentation from Eskom, the national electricity utility, discussing their public engagement experience with power plants in South Africa. The CCS Week and other seminars/ workshops on CCS have also helped to advance public awareness of CCS.

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Part 1: Developments since the second edition

No further developments have occurred since the second edition.

Developments expected in next six-twelve months

It is not possible at the moment to foresee new regulatory developments in the next 6-12 months.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

Spain approved Law 40/2010 transposing the EU CO_2 Storage Directive in December 2010.[92] Both contain rules addressing public engagement. In this regard, the Spanish Law is fully in line with the directive.

[92] www.marm.es/es/cambio-climatico/publicaciones/documentacion/ley_40_2010_tcm7-132047.pdf

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Part 1: Developments since the second edition

To raise awareness of CCS, the Swiss Federal Office of Energy and Swisselectric research, a private energy research grant-giving organisation, held a workshop titled *Carbon Capture and Storage: Current status and future perspectives with a focus on power generation* on 31 August 2011.[93] Representatives of Vattenfall, Alpiq, Alstom, various Federal Offices, universities and the Swiss Federal Energy Research Commission discussed CCS in terms of their priorities and the current status in Switzerland. Utility companies underscored that principal hurdles are encountered in storage rather than capture or transport issues. For Switzerland in particular, there does not exist today an enabling political, societal, regulatory and process-oriented framework that would allow planning and execution of CCS projects. Alpiq, a major Swiss utility, concluded that a lack of future for CCS owes to the absence of such a framework rather than technological and geological constraints.

There have been no further developments concerning CCS in the last twelve months.

Developments expected in next six-twelve months

There are no CCS legal or regulatory developments expected in the next 6-12 months.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

Public participation in general

In Switzerland, the people are the supreme political authority and have extensive decision-making powers. The longstanding democratic tradition, but also the comparatively small size of the population and the country, as well as a high literacy rate and broad range of media services are crucial to the proper functioning of this particular system of government.[94] Swiss nationals have the following political rights at federal level:

- Elections.
- Voting.
- Popular Initiatives.

[93] Presentations may be downloaded at www.bfe.admin.ch/forschungkraftwerk/index.html?lang=de&dossier_id=05174

[94] For more information on the Swiss democratic system and the participation of the Swiss people in decision making see: *The Swiss Confederation – a brief guide 2011*, www.bk.admin.ch/dokumentation/02070/index.html?lang=en

- Referendums.

Such extensive rights of participation in decision making and approval procedures not only exist on federal level, but also on a cantonal level.

Public participation under the Spatial Planning Act (SPA)[95]

Although Swiss law does not provide regulation concerning public engagement in the development of CCS storage projects in particular, it provides public participation rights for the development of building projects in general.

Swiss Federal Law only provides the legal framework for spatial planning (article 75 of the Swiss Federal Constitution).[96] The competence for implementation regulation concerning spatial planning resides with the member states of the Swiss Confederation, the cantons (article 10 paragraph 1 SPA). Granting permits for subsurface planning or building fall within the cantons' remit as well. The mandatory procedures may vary from one canton to another. However, building permits are usually granted by the municipal authorities.

Article 4 of the SPA constitutes a minimal information and participation standard for the public. Authorities entrusted with tasks of planning must inform the public about objectives and procedural processes in accordance with the SPA. Furthermore, they have to make sure that the public has the chance to participate appropriately in the fields of planning. Most cantons and municipalities have established rights of appeal and objection that may be exercised by the public. Furthermore, plans subject to the SPA are public.

Last but not least, SPA articles 33 and 34 stipulate a minimal standard concerning judicial appeal on cantonal and federal level against rulings and planning that are based on the SPA and its implementation regulation.

Public participation under the Environmental Protection Act (EPA)[97]

Participation and information rights do apply in the field of impact assessment as well. Anyone may inspect the report and the results of an environmental impact assessment unless overriding public or private interests require secrecy (article 10*d* paragraph 1 EPA).

Furthermore, according to article 55 paragraph 1 EPA and article 12 of the *Nature and Cultural Heritage Act* (NCHA)[98] environmental protection organisations have the right of appeal against rulings of the cantonal or federal authorities on the planning, construction or modification of installations for which an environmental impact assessment in terms of Article 10*a* EPA (article 55 EPA) is required or on the planning, construction or modification of installations that lie within the scope of federal tasks (article 12 NCHA), subject to the following requirements:

- The organisation is active in Switzerland on a national basis.
- It pursues non-profit making objects; any commercial activities must serve to achieve the non-profit making objects.

The right of appeal is available to organisations only for complaints in legal fields that have formed their objects in terms of their articles for a minimum of ten years (article 55 paragraph 2

[95] www.admin.ch/ch/f/rs/c700.html, in French.

[96] www.admin.ch/ch/e/rs/c101.html

[97] www.admin.ch/ch/e/rs/c814_01.html

[98] www.admin.ch/ch/f/rs/c451.html, in French.

EPA). The environmental organisations that have the right of appeal are designated by the Federal Council.[99]

The authority notifies the organisations of its ruling under Article 55 paragraph 1 by written notice or by publication in the Official Federal Gazette or in the cantonal organ of publication. If federal or cantonal law provides for an objection procedure, applications must also be published in accordance with paragraph 1 (article 55*a* paragraph 1 and 2 of EPA / article 12*a* paragraph 1 and 2 NCHA).

Addendum

The reference to 268 gigatonnes in *Part 1: Developments over the last six months* of the Swiss entry in the second edition of the *CCS Review*[100] should read 2.68 gigatonnes.

[99] www.admin.ch/ch/f/rs/c814_076.html, in French.

[100] See pages 53 and 54 at www.iea.org/ccs/legal/review.asp

United Kingdom

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Part 1: Developments since the second edition

In October 2011 a decision was taken not to proceed with the first proposed project of the UK's programme of publicly supported demonstration projects at Longannet Power Station in Scotland, as a deal could not be reached within the GBP 1 billion of capital support available from the UK Government. All parties involved in the project believe that other full chain projects can be delivered within the GBP 1 billion. An extensive amount of detailed technical information was gained through the first competition process and all this is freely available on the Department of Energy and Climate Change (DECC) website to support future deployment of CCS[101] (see the section below on knowledge transfer to support the development of CO_2 storage projects).

The UK Government remains firmly committed to CCS, as demonstrated in April 2012 when the government launched the UK CCS Roadmap, which sets out a comprehensive package to take the United Kingdom to cost competitive CCS in the 2020s. The Roadmap is made up of five key components:

- The CCS Commercialisation Programme with GBP 1 billion in capital funding and additional operational support available through contracts for difference.
- A GBP 125 million, four year, co-ordinated R&D and innovation programme and a new UK CCS Research Centre.
- Development of a market for low carbon electricity through electricity market reform, including availability of feed-in tariff contracts for difference for low carbon electricity (see further below).
- Commitments to working with industry to address other important areas including developing the CCS supply chain, storage and assisting the development of CCS infrastructure.
- International engagement focused on sharing knowledge generated through the UK programme and learning from other projects around the world.

CCS-specific regulation

The UK's programme of regulatory developments to permit storage is drawing to a close as measures identified since 2007 are progressively put into effect.

During the last half of 2011 national legislation to implement the EU CO_2 Storage Directive was substantially completed. In September measures were put into place to facilitate third party access to CO_2 pipelines and storage sites, following a formal consultation. Work is now underway to develop detailed guidance on the implementation of these arrangements.

The *Energy Act 2011* contains provisions to facilitate re-use of existing pipeline and storage site infrastructure for CO_2 transport and storage.

Relatively minor actions required to round off transposition of the EU CO_2 Storage Directive were completed over the last twelve months, including: the coming into effect of regulations dealing

[101] www.decc.gov.uk/en/content/cms/emissions/ccs/demo_prog/feed/feed.aspx

with inspections required by article 15 of the EU CO_2 Storage Directive; amendment of the *Infrastructure Planning (Environmental Impact Assessment) Regulations 2009* by the Department for Communities and Local Government (DCLC) to transpose article 31, which came into force in December 2011; and amendment of the *Environmental Impact Assessment Regulations (Northern Ireland) 1999* to reflect the requirements of article 31 in Northern Ireland.

Electricity market reform

During the summer of 2011 DECC published an Energy White Paper setting out a far reaching package of electricity market reforms. These reforms are the biggest change to the UK market since privatisation and will transform the UK's electricity network and drive investment in low-carbon generation including CCS. The reforms provide (for CCS):

- Long-term contracts (in the form of a feed-in-tariff, based on a contract for difference) to provide the stable financial incentives needed to drive investment in low carbon electricity generation (including CCS).
- An additional option for supporting CCS demonstrations with contracts that are designed to recognise the uncertainties of these early projects.
- An emissions performance standard set at 450g CO_2/KWh to limit the CO_2 emissions allowed from new coal fired power plants.
- A carbon price floor that will further incentivise investment in low-carbon generation now, whilst also giving appropriate exemptions for CCS generators to help increase competitiveness in the market.

Knowledge transfer to support the development of CO_2 storage projects

In March 2010, the UK Government awarded funding to both E.ON UK and the Scottish Power CCS Consortium to carry out Front-End Engineering and Design (FEED) studies as part of the procurement process for the United Kingdom's first commercial-scale CCS demonstration project. The FEED studies involved detailed engineering and design work enabling the bidders to further their designs for the projects at Kingsnorth and Longannet respectively and to improve their understanding of the risks and associated costs.

The government is committed to disseminating the knowledge from the UK CCS demonstration competition to enable the wider commercial deployment of CCS in the United Kingdom and internationally. This is exemplified in the government's commitment to make the products from both E.ON UK and the Scottish Power CCS Consortium FEED studies freely and publicly available. The FEED study material includes details of the stakeholder profiling work to identify key stakeholders and to understand their CCS knowledge requirements. It also includes details of the regulatory work and related consultation with both statutory and non statutory stakeholders.[102] The amount of information made available through the release of these two FEED studies goes beyond anything previously undertaken globally, in the context of CCS knowledge transfer.

Developments expected in next six-twelve months

Given the United Kingdom's transposition of the EU CO_2 Storage Directive is now complete, no significant developments are expected in the next 6-12 months.

[102] The studies can be found at www.decc.gov.uk/en/content/cms/emissions/ccs/demo_prog/feed/feed.aspx

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Part 1: Developments since the second edition

In August 2011, the US Environmental Protection Agency (EPA) proposed to exclude CO_2 streams from EPA's hazardous waste regulations under the Resource Conservation and Recovery Act (RCRA), if they meet certain conditions, including injection for the purpose of geologic storage (GS) into specific wells regulated under the Safe Drinking Water Act.[103] EPA concluded that the management of CO_2 streams under the proposed conditions does not present a substantial risk to human health or the environment, and will encourage the deployment of CCS technologies in a safe and environmentally protective manner while also ensuring protection of underground sources of drinking water (USDWs). This proposed rule is complementary to a recently finalised Safe Drinking Water Act rule that sets requirements for GS, including the development of a new class of injection well, termed Class VI, established under EPA's Underground Injection Control (UIC) Program. The UIC Class VI requirements are designed to ensure that wells used for GS of CO_2 streams are appropriately sited, constructed, tested, monitored, and closed in a manner that ensures USDW protection.

Developments expected in next six-twelve months

EPA will continue its efforts related to the safety and effectiveness of GS, including developing technical guidance materials for the Class VI rule, continuing to evaluate risks to drinking water sources and human health and the environment, and working to address other key policy issues.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

Public input and participation in GS projects has a number of benefits, including: (1) providing citizens with access to decision-making processes that may affect them; (2) educating the community about a GS project; (3) ensuring that the public receives adequate information about the proposed GS project; and (4) allowing the permitting authority and owners or operators to become aware of public viewpoints, preferences and environmental justice concerns and ensuring these concerns are considered by decision-making officials.

GS of CO_2 is a new technology that is unfamiliar to most people and maximising the public's understanding of the technology can result in more meaningful public input and constructive participation as new GS projects are proposed and developed. Early and frequent public involvement through education and information exchange is critical to the success of GS and can provide early insight into how the local community and surrounding communities perceive potential environmental, economic, or health effects associated with a specific GS project.

[103] Hazardous Waste Management System: Identification and Listing of Hazardous Waste: Carbon Dioxide (CO_2) Streams in Geologic Sequestration Activities, 76 Fed. Reg. 48073 (August 8, 2011).

Owners or operators can increase the likelihood of success by integrating social, economic, and cultural concerns of the community into the permit decision-making process.

The UIC Class VI final rule adopts the existing UIC public participation requirements at 40 CFR part 25 and the permitting decision procedures at 40 CFR part 124. EPA encourages owners or operators and permitting agencies to involve the public by providing them information about the Class VI permit (and any requests for a waiver of the injection depth requirements or an expansion of the areal extent of an aquifer exemption) as early in the process as possible. Under 40 CFR parts 25 and 124, permitting authorities must provide public notice of pending actions via newspaper advertisements, postings, mailings, or e-mails to interested parties; hold public hearings if requested; solicit and respond to public comment; and involve a broad range of stakeholders.

EPA expects that there will be higher levels of public interest in GS projects than for most other injection activities. The Agency believes that encouraging public participation will help permitting authorities understand public concerns about GS projects and will afford the public an opportunity to gain a clearer understanding of the nature and safety of GS projects and technologies. To address comments about stakeholder participation, EPA amended the requirements for public notice of permit actions and public comment period at § 124.10 to clarify that public notice of Class VI permitting activities must be given to state and local oil and gas regulatory agencies, state agencies regulating mineral exploration and recovery, the Director of the Public Water System Supervision programme in the state, and all agencies that have jurisdiction to oversee wells in the state in addition to the general public.

New forms of information technology can improve public participation and understanding of GS projects. EPA recognizes the importance of social media as a public outreach tool. Social media, which are primarily internet and mobile based technologies for disseminating and discussing information, can help provide accessibility and transparency to a wide audience. EPA encourages permit applicants and permitting authorities to use the internet and other forms of social media to explain potential GS projects; describe GS technologies; and post information on the latest developments related to a GS project including schedules for hearings, briefings and other opportunities for involvement.

Regional jurisdiction contributions

Alberta (Canadian province)

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Part 1: Developments since the second edition

Alberta has recognised the need to address regulatory and policy barriers facing the deployment of commercial-scale CCS and has implemented legislation to deal with these issues. To address uncertainty related to pore space ownership and the management of long-term liability, the Government of Alberta passed the *Carbon Capture and Storage Statutes Amendment Act*[104] (the Act) in December 2010. This legislation was essential to enable the Government of Alberta to grant tenure agreements for pore space access, which allows for the advancement of a number of commercial-scale CCS projects that will reduce GHG emissions by five million tonnes annually beginning in 2015.

To support the Act, the *Carbon Sequestration Tenure Regulation*[105] was passed in April 2011. The regulation addresses three main aspects of tenure for CCS. They are:

- To allow operators to evaluate a potential storage site to investigate the geology and determine the adequacy and effectiveness of the site.
- To allow operators to obtain leases to allow for commercial-scale storage at suitable storage sites.
- To specify what criteria must be included in a monitoring, measurement and verification plan that is to be approved by the regulator.

In order to identify and address any other potential regulatory gaps associated with CCS in Alberta, the Government of Alberta initiated a Regulatory Framework Assessment (RFA) in March 2011. The RFA is a significant project being led by the Department of Energy, with participation by various stakeholders including other government departments, industry, academia, non-governmental organisations and international experts. The RFA is examining in detail the environmental, safety and assurance processes that exist to determine what, if any, new processes or requirements need to be put in place. This project is being guided by a multi-disciplinary steering committee and an expert panel that consists of world-renowned scientists who are internationally recognised for their experience and expertise in CCS issues and in developing energy and environmental policy. The expert panel is acting as a third-party advisor and will peer review work. The regulatory analysis and development of recommendations are being conducted by four working groups - highly specialised teams that are examining various specific issues in detail.

[104] *Carbon Capture and Storage Statutes Amendment Act (2010),* www.energy.alberta.ca/Initiatives/1902.asp

[105] *Carbon Sequestration Tenure Regulation,* www.energy.alberta.ca/Initiatives/1902.asp

Developments expected in next six-twelve months

In the next 6-12 months, the RFA will continue to proceed and develop recommendations for regulatory enhancements as they are identified. The expert panel and steering committee will review and approve recommendations from the working groups with subsequent submission of the recommendations to the Minister of Energy for final approval. The RFA is expected to conclude its work by the end of 2012.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

Alberta recognises the important role stakeholders and the public play in deploying commercial-scale CCS. Our approach is to ensure Albertans have a solid understanding of CCS and confidence in the provincial government's approach to managing CCS activities well before projects begin operation in 2015.

To increase public awareness of CCS, and how the government is moving forward with this technology, the Government of Alberta undertook a public education and outreach campaign in October and November of 2011 to provide accurate information about CCS to the public via newspaper inserts, television commercials featuring three themes: CCS, enhanced oil recovery and climate change, and a new website (www.SolutionsStartHere.ca). The education and outreach programme is expected to be followed by a public consultation about the regulatory framework for CCS. The consultation will involve a number of community meetings, discussions with stakeholders and an online questionnaire. The government plans to provide a "what we heard" report that summarises these discussions following the consultation.

Through these consultations, Albertans will have the opportunity to participate in the development of a world-class regulatory framework for CCS by providing their views on issues related to CCS, and input into the rules that will govern how CCS activities are done in the province.

It is important to note that at the project level, our proponents have spent significant amounts of time building relationships with their neighbours and the nearby communities. They have been very actively engaging with their stakeholders - hosting numerous open houses and meetings and providing responses to the many requests for more information about CCS or about their particular project.

Currently, there are regulatory requirements for operators to undertake public engagement as part of the approval process for industrial facilities, and CCS projects are no different. Requirements for broad public notification, focused landowner consultation and public hearings are well-established in Alberta's regulatory regime. Requirements and triggers for engagement and consultation are being reviewed as part of the RFA to ensure appropriate requirements are in place in the Alberta regulatory process for commercial-scale CCS.

Alberta is committed to sharing its experience with others in the global CCS community. The province will provide periodic updates, as well as share reports, data and the lessons that are learned through the RFA and the three commercial-scale projects that are receiving part of their funding through a CAD 1.5 billion commercial demonstration programme.

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Part 1: Developments since the second edition

Review of existing legal framework

British Columbia is in the process of drafting a regulatory framework for CCS. The CCS regulatory framework builds on British Columbia's existing legislation and regulations within the oil and gas industry.

CCS projects may undergo project review and approval via three or four separate processes involving different regulatory authorities. The Ministry of Energy and Mines has the statutory authority to issue storage licenses and leases, administer tenure application processes and manage tenures. Depending on the specifics of the project proposed, a provincial and/or federal environmental assessment could be required. The British Columbia Oil and Gas Commission has the regulatory authority for the exploration and use of storage reservoirs, facilities, wells and pipelines except where a pipeline and related facility is interprovincial in nature, where the authority lies with the National Energy Board.

In British Columbia the *Petroleum and Natural Gas Act* (*P&NG Act*) provides the legal basis for the tenuring of underground storage reservoirs. As defined in the *P&NG Act*, a storage reservoir means "a naturally occurring underground reservoir that is capable of being used for the introduction, disposal, storage or recovery of petroleum, natural gas, water produced in relation to the production of petroleum or natural gas, waste or any other prescribed substance". Storage reservoirs can include oil and gas bearing formations, but any other formation as well. As the *P&NG Act*'s definition of natural gas includes its unprocessed constituents, CO_2 from natural gas production can be stored in an underground reservoir. The *P&NG Act* was amended in 2008 to enable CCS from sources other than natural gas processing by expanding the storage reservoir definition to include "other prescribed substances". It is anticipated that a regulation prescribing CO_2 from other industrial sources will be finalised in conjunction with the CCS Regulatory Framework.

Part 14 - Underground Storage of the *P&NG Act* clarifies storage space ownership. The *P&NG Act* recognises that the pore space required for natural gas storage or CCS purposes may be owned by a private owner or by the Crown. The *P&NG Act* creates a tool by which pore space ownership, if not already owned by the Crown, can be vested in the Crown for the purposes of creating a storage reservoir. If private ownership exists then under s.128 pore space ownership rights can become vested in the Crown. These rights may then be leased to a private operator in order to facilitate the development of a natural gas storage project or a disposal project. The *P&NG Act* creates a process by which a person can apply for compensation for loss of the ownership of the pore space due to the vesting order.

Part 14 outlines the tenure disposition process by which companies can be granted the right to use an underground space for storage. Under the *P&NG Act*, the Ministry of Energy and Mines is the statutory authority for managing storage licences and leases. Section 130 describes the lease

application process for a storage reservoir. It outlines who may apply: 130 (1) The holder of a petroleum or natural gas permit, drilling licence or lease or an storage exploration licence may apply to the minister for a lease of a storage reservoir that is owned by the government; how they can apply – 130 (2) An applicant for a lease must make the application to the minister in a form suitable to the minister; and, government's response - 130 (3) The minister may lease a storage reservoir that is owned by the government to a person who applies and the minister may grant a lease that is different than the one applied for or may refuse to grant a lease. The Minister of Energy and Mines has considerable discretion in deciding whether or not to approve an application for a storage license or lease as well as the term and conditions of the lease.

When a major project or facility is proposed in British Columbia an environmental assessment by one or more government agencies may be required. For example, an interprovincial pipeline triggers an environmental assessment from the provincial government under the *BC Environmental Assessment Act* (BCEAA), a federal environmental assessment under the *Canadian Environmental Assessment Act* (CEAA), and a review from the National Energy Board (NEB).

If a project requires approvals or review from more than one of the authorities listed above the review may be co-ordinated in an effort to expedite the process and avoid duplication. To facilitate this co-ordination, agreements have been signed between provincial and federal levels of government and the NEB.

In British Columbia, the Environmental Assessment Office (EAO) manages the assessment of proposed major projects as required by the BCEAA. Projects become reviewable in three ways:

- The projects meet certain thresholds as prescribed under the Reviewable Projects Regulation.[106] Most major projects are reviewable based on this regulation.
- The Minister of Environment designates the project as reviewable.
- The proponent applies to the EAO for the project to be designated as reviewable.

Natural gas processing, energy storage facilities and transmission pipelines are oil and gas projects that are deemed to be reviewable under the Reviewable Projects Regulation.

British Columbia has a mature oil and gas regulatory regime that was recently modernised in the 2008 *Oil and Gas Activities Act*.[107] Under the *Oil and Gas Activities Act*, the Oil and Gas Commission (OGC) is the regulator of all oil and gas activities. The exploration and use of a storage reservoir is defined in the Act to be an oil and gas activity. As an agent of the government, the OGC fulfils government responsibilities to review applications, issue authorisations and regulate projects on lands within provincial jurisdiction, both private and Crown.[108] CO_2 storage or disposal into a storage reservoir requires the regulatory approval of the OGC. Regulations for the injection and underground storage of gases currently exist to facilitate the disposal of acid gas from the natural gas processing industry. In northeast British Columbia there are currently twelve acid gas disposal sites re-injecting a mixture of CO_2 and hydrogen sulphide deep underground into depleted gas pools or saltwater-filled rock formations.

The CCS regulatory framework under development will address identified gaps in the current regulatory framework. Identified areas include site selection, monitoring, measuring and verification and, long-term liability.

[106] *Environmental Assessment Act,* REVIEWABLE PROJECTS REGULATION

[107] www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_08036_01

[108] Except for interprovincial pipelines, which fall under federal jurisdiction.

Broader context: British Columbia's climate action policy and legislation

The Government of British Columbia has passed a number of significant pieces of climate action legislation that drive the adoption of emissions mitigation measures such as CCS. Brought into force on 1 January 2008, the *Greenhouse Gas Reduction Target Act* (*GGRTA*) sets a target for British Columbia's emissions to be lowered by 33% by 2020 and 80% by 2050 from 2007 levels. These targets drive development of supporting legislation, regulation and policy that reduce GHG emissions.

The Carbon Neutral Government Regulation under the *GGRTA* also requires each public sector organisation to be carbon neutral. This includes measuring energy use and GHG emissions, taking steps to conserve energy where possible and economical, reducing remaining emissions to net-zero through offsets through Pacific Carbon Trust and reporting out publicly. Since industrial process, venting and fugitive emissions are not currently taxed or capped within British Columbia, projects where these emissions are captured and stored could be eligible for offsets until those emissions have been regulated or have a carbon price.

British Columbia was the first province to introduce legislation authorising hard limits ("caps") on GHG emissions through the *Greenhouse Gas Reduction (Cap and Trade) Act* (GGR(CT)A). This legislation would enable BC's participation in the trading system being developed with other jurisdictions through the Western Climate Initiative (WCI). The GGR(CT)A Reporting Regulation requires all facilities, oil and gas operations or electricity import operations with 10 000 tonnes or more of GHG emissions to quantify and report emissions levels to British Columbia. Third party verification is required for operations with emissions of 25 000 tonnes or more.

British Columbia, through the 2008 *Carbon Tax Act,* is also the only jurisdiction in North America to have implemented a broad-based revenue-neutral carbon tax. The carbon tax started July 1, 2008 at a rate of CAD 10 per metric ton on combustion emissions and rises by CAD 5/t a year for the subsequent four years, reaching CAD 30 per metric ton by 1 July 2012. Although not in force at this time, section 84 of the Act enables the Lieutenant Governor in Council through regulation to waive or reduce the tax payable on emissions stored or sequestered in accordance with provisions of the *Environmental Management Act*.

The 2007 BC Energy Plan has set the performance standard of zero GHG emissions for any new coal-fired electricity generation facilities. This standard allows for the development of coal-fired generation only if in combination with CCS.

European Union

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Part 1: Developments since the second edition

EU CO_2 Storage Directive

EU member states had to transpose the EU CO_2 Storage Directive[109] into national legislation by 25 June 2011. Spain had notified complete transposition on time. Due to incomplete or non-communication of transposition measures, the European Commission launched infringement procedures with Letters of Formal Notice against 26 EU member states. As of June 2012, nine of those cases were closed as full transposition legislation has been communicated in the meantime. The remaining 17 cases are still under assessment. In parallel with the completeness check, the Commission services have started assessing the conformity of the notified transposition measures with the requirements of the EU CO_2 Storage Directive. Timely and correct transposition of the EU CO_2 Storage Directive is of particular importance in member states with CCS demonstration projects in the NER300 funding competition (see below), as award decisions will be conditional upon all relevant national permits being issued within a certain time limit, in accordance with relevant EU legal requirements.

On 28 February 2012, the Commission published its first opinion on a draft CO_2 storage permit that was notified to the Commission services for review pursuant to Article 10 of the EU CO_2 Storage Directive.[110] The purpose of the Commission review is to ensure consistency in the implementation of requirements of the EU CO_2 Storage Directive across the EU and help to enhance public confidence in CCS.

NER 300 funding programme

79 proposals for large-scale demonstration projects involving innovative renewable energy and CCS have passed the member state stage of the NER300 programme and have been submitted to the European Investment Bank (EIB) by the submission deadline of 9 May 2011; 13 CCS project proposals were submitted.[111] The EIB finalised its financial and technical due diligence assessment and reported to the Commission services in February 2012 with a list of ranked projects according to the criteria set out in the NER300 Decision.[112] Since December 2011, the EIB

[109] Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC, OJ L 140, 5.6.2009, p.114.

[110] http://ec.europa.eu/clima/policies/lowcarbon/ccs/implementation/docs/c_2012_1236_en.pdf

[111] See DG CLIMA website: http://ec.europa.eu/clima/news/articles/news_2011051301_en.htm

[112] Commission Decision of 3 November 2010 laying down criteria and measures for the financing of commercial demonstration projects that aim at the environmentally safe capture and geological storage of CO_2 as well as demonstration projects of innovative renewable energy technologies under the scheme for greenhouse-gas emission allowance trading within the Community established by Directive 2003/87/EC of the European Parliament and of the Council, OJ L 290, 6.11.2010, p. 39.

has been monetising the first 200 million ETS allowances for the co-financing of projects selected under the first call for proposals.

Developments expected in next six-twelve months

The Commission services will continue to ensure timely and correct transposition of the EU CO_2 Storage Directive.

After finalisation of the financial and technical due diligence assessment by the EIB earlier this year, the Commission services are verifying the eligibility of projects and carrying out competitiveness checks as necessary. The monetisation of the first 200 million allowances has to be completed by early October 2012. Award decisions are envisaged by the end of 2012. The Commission services will also set up structures and procedures for knowledge sharing under the NER 300 programme.

Illinois (US state)

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Part 1: Developments since the second edition

Illinois is a primacy state, which means that the implementation of US Underground Injection Control (UIC) regulations and the permitting of certain classes of wells under the federal Clean Water Act is administered by the Illinois Environment Protection Agency (IEPA). Development of the first 1 million tonne saline reservoir storage demonstration in Illinois was permitted by the IEPA under a Class I Nonhazardous permit classification. This project is the Illinois Basin-Decatur Project (IBDP) in collaboration with the Archer Daniels Midland Company in Decatur, Illinois. The permit application was submitted in January 2008 and the final authorisation to inject was received in November 2011. During this period, the injection well was permitted and drilled and two other wells were drilled for monitoring as permit modifications were approved during this nearly four-year period. Continuous injection began in mid-November 2011 at 1 000 tonnes per day. Permitting took place in this way because IEPA felt that there was the most background and precedent to issue a Class I permit rather than a Class V experimental permit at the time the original application was submitted.

Currently, the new Class VI UIC regulations, issued by the US EPA, now apply to CO_2 storage wells and Class I permits are no longer being issued in the US for storage. Regardless of current well status, all existing, permitted storage projects were required to apply for a Class VI permit by 10 December 2011, and these permits are being handled by the regional US EPA offices. As of the end of 2011, no state had applied for primacy in issuing Class VI permits, but several states are in discussion with the US EPA and may take primacy at a future date. The Illinois State Geological Survey leads one of the US Department of Energy regional carbon sequestration partnerships and is developing the IBDP, but the actual permit holder is the Archer Daniels Midland Company which owns the site and is the supplier of the CO_2 from its ethanol fermentation facility in Decatur, Illinois.

Developments expected in next six-twelve months

A second project at Decatur, the Illinois Industrial Sources Carbon Capture and Storage project, submitted a Class VI permit application to the US EPA Region 5 office in Chicago, Illinois in July 2011. This was the first submittal of a Class VI permit in the US at this scale. The project will inject approximately 2.5 million tonnes over three years. This project is an industrial scale-up of the IBDP and the expectation is that the permitting timeline may allow drilling to begin in mid- to late 2012.

US EPA Region 5 is also handling a permit application for a commercial coal gasification project in central Illinois that proposes to produce a combination of electricity and synthetic natural gas and store, or sell for enhanced oil recovery, a major portion of their CO_2. Legislative uncertainty exists around the ability of the project to secure offtake agreements, but developers are proceeding with the UIC permitting process in the interim.

In another area, legislation was drafted and introduced to the General Assembly (state legislature) of Illinois in 2011 to address ownership rights of pore space and definitions and

requirements related to storage project development in the state. These provisions relate, for example, to unitisation of lease blocks to allow project developers to move forward if the majority (but not all) of affected pore space owners concur with project development. Also, the surface owner would own the pore space storage rights and this distinction would be made relative to any mineral rights owners, as has been done in several other states in the US. These provisions would be in addition to Class VI permitting under the UIC programme. The legislation was not voted on by the full General Assembly in 2012, but it is expected to be revised and reintroduced in the legislative session that convenes from January through May 2013.

Queensland (Australian state)

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Part 1: Developments since the second edition

There have been no explicit drafting amendments to the Queensland *Greenhouse Gas Storage Act 2009* (GHG Act)[113] over the past twelve months. An amendment included in the *Geothermal Energy Act 2010,*[114] however, changed the definition of authorised activity to be carried out under the GHG Act. Links between the GHG Act and other Queensland legislation have come under review by CCS proponents during development of target work programmes for exploration and site remediation activity. Potential limitations with regard to the production of water during exploration activities have been identified and trigger requirements under the *Water Act 2000.*[115] Provisions similar to those in the *Petroleum and Gas (Production and Safety) Act 2004*[116] regarding water production related to exploration activities have been suggested as requests for amendment to the GHG Act by the proponents. Testing of the GHG legislation has identified the need for a legislative mapping exercise to be conducted, which is intended to identify the interdependencies apparent between the different areas of resource legislation in the state. Queensland has also continued to participate in development of collaborative frameworks to facilitate CCS projects through the Clean Energy Working Group of the Standing Council on Energy and Resources.

Developments expected in next six-twelve months

The Queensland Government is currently reviewing the IEA working paper *Carbon Capture and the London Protocol: Options for Enabling Transboundary CO_2 Transfer*.[117] The conditions imposed by the London Protocol for cross border transportation and disposal of CO_2 are being used to provide context for interstate legislative frameworks that would be required in the event that subsurface migration of injected CO_2 has the potential to cross jurisdictional borders.

The Queensland environment and water regulator has identified the need to develop a guideline for managing the potential impacts of CO_2 storage. The guideline is to include a legislative mapping exercise to identify interdependencies between the various environmental and resource management acts and a technical requirements framework for impact assessment. The aim of the guideline is to provide clear and transparent instructions for CCS proponents to prepare and evaluate a site for CO_2 storage, without causing environmental harm and/ or adverse impacts on

[113] http://my.lawlex.com.au/default.asp?itid=0&ntid=0&nid=&cid=105858&jurid=&alpha=&alphaid=&ihl=&nhl=&fp=&rdt=&vaftype=&requirelogin=&tab=ind&pact=coredoc&top=exp&nav=col&docview=true

[114] http://my.lawlex.com.au/default.asp?itid=0&ntid=0&nid=&cid=117368&jurid=&alpha=&alphaid=&ihl=&nhl=&fp=&rdt=&vaftype=&requirelogin=&tab=ind&pact=coredoc&top=exp&nav=col&docview=true

[115] http://my.lawlex.com.au/default.asp?itid=0&ntid=0&nid=&cid=40691&jurid=&alpha=&alphaid=&ihl=&nhl=&fp=&rdt=&vaftype=&requirelogin=&tab=ind&pact=coredoc&top=exp&nav=col&docview=true

[116] http://my.lawlex.com.au/default.asp?itid=0&ntid=0&nid=&cid=80347&jurid=&alpha=&alphaid=&ihl=&nhl=&fp=&rdt=&vaftype=&requirelogin=&tab=ind&pact=coredoc&top=exp&nav=col&docview=true

[117] IEA (2011), *Carbon Capture and Storage and the London Protocol: Options for Enabling Transboundary CO_2 Transfer*,, OECD/IEA, Paris, available at www.iea.org/ccs/London_Protocol.asp

the groundwater systems. The guideline will also assist the regulator in evaluating exploration work plan proposals by removing potential ambiguity in the requirements imposed on CCS proponents. The Department of Environment and Resource Management is working in collaboration with the Department of Employment Economic Development and Innovation in the development of a draft guideline. This collaborative effort is intended to provide appropriate regulatory control for CO_2 storage projects without imposing restrictions, which may adversely impact the responsible development of a future CCS industry. This approach is an example of the state's desire to promote exploitation of its rich natural resource endowment, without causing environmental harm or jeopardising essential groundwater resources.

South Australia (Australian state)

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Part 1: Developments since the second edition

CCS in South Australia is regulated under the *Petroleum and Geothermal Energy Act 2000* (P&GE Act) and associated *Petroleum and Geothermal Energy Regulations 2000*.[118]

Amendments to the legislation in 2009 implemented special purpose gas storage licences and also specified no royalty payments on injection for storage purposes. Gas storage licences allow storage of petroleum, CO_2 and other regulated substances under the P&GE Act. To date, nine gas storage licences have been granted in South Australia, and an additional 42 gas storage licences have been applied for. These gas storage applications will be processed towards grants of licences in due course.

The South Australian Government progresses with CCS regulation and technology through active participation in the Carbon Storage Taskforce,[119] the Federal-State Carbon Dioxide Geosequestration Regulatory Working Group, and the Global CCS Institute.

Given sufficient incentives, the injection and storage of CO_2 into the depleted oil and gas fields of the Cooper and Eromanga Basins in the state's northeast is a possibility.

The state government chose to support the CO2CRC (Cooperative Research Centre for Greenhouse Gas Technologies) last year through funding from South Australia's Plan to Accelerate Exploration, or PACE, Energy program. The new Department for Manufacturing, Industry, Trade, Resources and Energy (DMITRE) is also providing in-kind support towards the CO2CRC's Research Centre at the University of Adelaide.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

Activities (including CO_2 storage projects) regulated under the P&GE Act cannot be carried out unless there is an approved Statement of Environmental Objectives (SEO) in place, prepared on the basis of an Environmental Impact Report (EIR). The environment in the P&GE Act includes natural, social and economic environments and hence deals with all associated risks. The EIR is prepared by the proponent and identifies:[120]

- Specific features of the environment that can reasonably be expected to be affected by the activities, with particular reference to the physical and biological aspects of the environment and existing land uses.
- Reasonably foreseeable events associated with the activities that could pose a threat to the relevant environment and estimated frequency of these events.

[118] Relevant act and regulations available at www.pir.sa.gov.au/petroleum/legislation/relevant_acts_and_regulations

[119] *The National Carbon Mapping and Infrastructure Plan for Australia*, available at www.ret.gov.au/resources/resources_programs/nleci/cst/pages/default.aspx

[120] Refer to Part 3 of the *Petroleum and Geothermal Energy Regulations 2000*

- Potential consequences of these events on the environment.
- Actions proposed to be taken to manage or address potential consequences.
- Relevant owners of land and affected stakeholders.

The SEO sets out the natural, social and economic environmental objectives to be achieved to address the risks identified in the EIR and specific criteria to be used (by both the proponent and government) to assess the achievement of the objectives. SEO's are reviewed by DMITRE once every five years to ensure objectives remain up to date and relevant.

The P&GE Act requires an environmental significance assessment[121] to be undertaken by DMITRE on the basis of information provided in the EIR. This assessment classifies the level of environmental impact of the proposed activities, which is then referred to other state government agencies as relevant for concurrence.

Once agreed, the environmental impact classification is used to determine the level of stakeholder consultation that DMITRE will conduct on the EIR and SEO document. In all cases, consultation on the EIR and SEO is undertaken with other state government agencies. For activities classified as medium environmental impact, DMITRE also consults with directly affected landowners, relevant stakeholders and the general public.

All EIRs, SEOs and environmental significance assessments are publicly available documents.[122]

Through the development of the EIR and SEO documents and consultation undertaken by both the proponent and DMITRE, stakeholders (including other state government agencies and landowners) are provided with opportunities to raise any issues of concern they may have with the proposed activities.

[121] Environmental significance assessment criteria, available at www.pir.sa.gov.au/__data/assets/pdf_file/0008/27728/sigactv6.pdf

[122] EIRs, SEOs and environmental significance assessments available at: www.pir.sa.gov.au/petroleum/environment/register/seo,_eir_and_esa_reports

Texas (US state)

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Part 1: Developments since the second edition

In response to Senate Bill 1387 (SB 1387), the statutory impetus and framework for CCS in the State of Texas, the Railroad Commission of Texas (RRC) has promulgated new rules. These rules are codified as 16 TAC Chapter 5123 (20 December 2010). These new state rules implement technical, financial, legal, and administrative considerations in accordance with the legislation, and where applicable, in concert with existing state rules. These rules are intended to address issues related to capture and storage of anthropogenic CO_2 (CCS-a). Anthropogenic CO_2 is approximately defined as "carbon dioxide that would otherwise be released into the atmosphere that has been: separated from any other fluid stream; or captured from an emission source including an advanced clean energy project or industrial source of emission; and any incidental associated substance derived from capture of CO_2, and any substance added to CO_2 to enable or improve the process of injecting CO_2".

The first phase of these rules dealt with CCS-a as the state analogue of the federally promulgated rules finalised on 10 December 2010. These new federal rules were promulgated under the Underground Injection Control (UIC) Program of the Safe Drinking Water Act (SDWA). The federal rules created a new UIC Class of wells, known as Class VI. These rules are intended for "geologic sequestration (GS)" of CO_2 in order to "reduce CO_2 emissions to the atmosphere and help mitigate climate change".

The second phase of the rules was intended to document and quantify CCS-a in association with EOR (UIC Class II) operations. In EOR operations, CO_2 is injected at rates less than those expected for commercial storage. The injectate loosens residual oil from mineral grains in the reservoir, thereby assisting in greater oil production. Incidental to the oil production, some of the CO_2 is also produced, and some is stored. The CO_2 that is produced with the oil is recaptured, and reinjected, rather than released. The CO_2 is a purchased commodity and thus is not wasted. Thus, large amounts of CO_2 remain in place as a result of EOR operations.

Notwithstanding pending federal rules regarding reporting and management of GHGs, and a potential federal market for carbon credits, there are state incentives for CCS-a in association with EOR. These incentives (*e.g.*HB 469) allow a reduction in well head taxes levied by the State of Texas on oil production. This part of the rules helps oil and gas operators claim the tax reduction(s).

Another aspect of SB 1387 is a directive to the RRC to pursue state primacy. State primacy is the means by which Texas (or any other state) may gain authorisation from the federal government to administer and enforce federal rules such as those finalised for UIC Class VI. The RRC's effort to obtain primacy is ongoing.

SB 1387 also required two reports from four state agencies, which were the RRC, the Texas Commission on Environmental Quality (TCEQ), the General Land Office, and the University of

[123] Carbon Dioxide (CO_2) – 16 TAC Chapter 5 available at http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=16&pt=1&ch=5

Texas Bureau of Economic Geology. These two reports had similar requirements, and thus the four agencies pooled their resources and provided a report[124] to the state legislature that integrated the needs of both. The report published was intended to provide legislative recommendations, commentary pertaining to suitability of certain geologic types of sites within Texas, and insight into the issues of liability and property rights. It was also intended as a policy document for future CCS considerations in the State of Texas.

Staff in the RRC CCS programme have attended and spoken at multiple seminars and workshops regarding history of CO_2-EOR and implementation of CCS in Texas. These have included seminars hosted by American Business Conference (San Francisco, June 2011 and Houston, November 2011), the Groundwater Protection Council (Atlanta, September 2011), the Annual Carbon Conference planned by UT-CLE (Austin, February 2012), and the annual TCEQ Environmental Fair (Austin, May 2012). The RRC was part of the impetus for the Global CCS Institute seminar in Austin that was held on 8 November 2011.

Developments expected in next six-twelve months

Based on comments from the regulated community, in the upcoming months, the RRC expects to receive applications for reduced well-head taxes for oil production as allowed under HB 469. These applications would document CO_2 storage in accordance with the second phase of 16 TAC Chapter 5 as described above. Based on additional comments, the regulated community has indicated no desire to undertake Class VI operations in Texas, under current conditions.

Legislatively, there was a recommendation in the above referenced report required in SB 1387 to consolidate jurisdiction of CCS operations in Texas. As currently written, jurisdiction for CCS operations in Texas is split between the RRC and the TCEQ. Jurisdiction is currently given to the RRC in geologic settings that include the production of oil, natural gas, or geothermal resources, as well as in saline aquifers above and below such reservoirs. Other settings are under the jurisdiction of TCEQ. The recommendation made in the report was to consolidate all Class VI operations under the RRC. A bill to achieve that end was filed in the legislature in the past session, but was not adopted. Preliminary indications are that such a bill will be filed in the next legislative session, which is planned for early 2013.

The RRC is working on state primacy in response to the federally promulgated rules finalised in December of 2010. This is a work in progress as described above. Because of decades of rules and established engineering practices in the regulatory purview of the RRC, line by line explanation of equivalence to federal rules (as required in the primacy process) is a complicated endeavour. Also, there is split jurisdiction of Class VI facilities, between TCEQ and the RRC, as described above. Because of split jurisdiction, joint co-ordination, two sets of rules and their reconciliation are required, which further complicates the primacy process.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

Public engagement is required by state law in the drafting of rules. Proposed rules are published in the Texas Register, with a comment period of at least 30 days. Each comment must be addressed in the preamble of the rules, and in at least some cases, appropriate changes in the final rules are made to take these comments into account. This process was implemented in promulgation of CCS rules in Texas.

Public engagement in CCS permits is part of the rules promulgated under 16 TAC Chapter 5.

[124] Senate Bill 1387, Final Report available at www.rrc.state.tx.us/forms/reports/notices/SB1387-FinalReport.pdf

Key points include the following:

- Placement of copy of application for public inspection: the applicant must make a complete copy of the permit application available for the public to inspect and copy by filing a copy of the application with the County Clerk at the courthouse of each county where the storage facility is to be located, or if approved by the director, at another equivalent public office. The applicant also must provide an electronic copy of the complete application to enable the RCC to place the copy on the RCC website.
- General notice by publication: to give general notice to local governments and interested or affected persons, the applicant must publish notice of the application for an original or amended storage facility permit no later than the date the application is mailed to or filed with the director. Standardised notification forms are provided by the State of Texas. The applicant must also file proof of publication of the notice with the application.
- Individual notice: by no later than the date the application is mailed to or filed with the director, the applicant must give notice of an application for a permit to operate a CO_2 storage facility, or to amend an existing storage facility permit to:
  - each adjoining mineral interest owner, other than the applicant, of the outmost boundary of the proposed geologic storage facility;
  - each leaseholder of minerals lying above or below the proposed storage reservoir;
  - each adjoining leaseholder of minerals offsetting the outermost boundary of the proposed geologic storage facility;
  - each owner or leaseholder of any portion of the surface overlying the proposed storage reservoir and the adjoining area of the outermost boundary of the proposed geologic storage facility;
  - the clerk of the county or counties where the proposed storage facility is located;
  - the city clerk or other appropriate city official where the proposed storage facility is located within city limits; and
  - any other class of persons that the director determines should receive notice of the application.
- Hearing requirements: (1) If the Commission receives a protest regarding an application for a new permit or for an amendment of an existing permit for a geologic storage facility from a person notified pursuant to applicable rules within 30 days of the date of receipt of the application by the Oil and Gas Division, receipt of individual notice, or last publication of notice, whichever is later, then the director will notify the applicant that the director cannot administratively approve the application. Upon the written request of the applicant, the director will schedule a hearing on the application. The Commission must give notice of the hearing to all affected persons, local governments, and other persons who express, in writing, an interest in the application. After the hearing, the examiner will recommend a final action by the Commission. (2) If the Commission receives no protest regarding an application for a new permit or for the amendment of an existing permit for a geologic storage facility from a person notified pursuant to subsection (b) of this section or from any other affected person, the director may administratively approve the application.

Victoria (Australian state)

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Part 1: Developments since the second edition

On 1 January 2012, Victoria's *Offshore Petroleum and Greenhouse Gas Storage Act 2010* came into force and the associated *Offshore Petroleum and Greenhouse Gas Storage Regulations 2011* (Victorian Offshore Regulations) commenced.[125] The offshore legislative framework has effect in Victoria's state waters up to the jurisdictional boundary with the Commonwealth of Australia (Commonwealth).

The commencement of the offshore legislative framework makes Victoria the first state in Australia with a comprehensive legislative and regulatory framework that provides for CCS (GHG injection and storage) activities in both onshore and offshore areas.

The Victorian Offshore Regulations were made on 13 December 2011, following a detailed consultative process involving workshops with key stakeholders, Victorian government agencies and Australian jurisdictions, including the Commonwealth.

The Victorian Offshore Regulations are a single set of regulations which mostly mirror the range of standalone offshore petroleum and GHG storage regulations made by the Commonwealth.

Victoria has sought to mirror the Commonwealth's offshore CCS legislative and regulatory framework as far as practicable to mitigate policy and regulatory problems associated with divergent requirements applying to operations that straddle jurisdictional boundaries.

The Victorian Offshore Regulations differ from the Commonwealth regulations in some respects to align with the Victorian-specific regulatory context. For example, the construction of offences aligns with Victorian regulatory drafting conventions and criminal law policy requirements. The limited number of more substantive differences in drafting approaches between Victoria and the Commonwealth are not significant enough so as to jeopardise the mirror nature of the Victorian regulations. Developments expected in next 6-12 months

To underpin the operation of the Victorian Offshore Regulations, Memorandums of Understanding between the Department of Primary Industries (DPI) and other state regulatory agencies will be developed to enhance administrative efficiency and co-operation between those agencies in relation to CCS activities.

Additionally, the onshore Victorian CCS legislative framework, encompassing the *Greenhouse Gas Geological Sequestration Act 2008* (Onshore Act) and associated 2009 regulations, is jointly regulated by the DPI and the Victorian Environment Protection Authority (EPA). Under the Onshore Act and regulations, DPI is the primary regulator for CCS operations during the exploration and injection phase, while the EPA becomes primary regulator post-site closure during the monitoring and verification phase of a CCS operation. A Memorandum of Understanding between DPI and the EPA will likely be concluded at some stage this year.

[125] See www.legislation.vic.gov.au

Part 2: Stakeholder engagement in the development of CO_2 storage projects

DPI places great importance in community engagement as a means of educating communities, providing community assurance around specific CCS projects and CCS more generally.

Public engagement associated with the Cooperative Research Centre for Greenhouse Gas Technologies (Otway Project) and the CarbonNet Project are well underway.

DPI's CarbonNet Project commenced a targeted engagement and consultation programme in 2011. This programme is expanding in 2012 as the project progresses.

The Otway Project has undertaken pre-project and post-project public surveys allowing them to compare public perceptions before and after the project.

In 2012, DPI is undertaking social research to enhance existing community engagement approaches and inform the development of a community engagement strategy specific to CCS.

The social research is expected to identify how best to engage the Victorian community in CCS projects. The research will also investigate how best to manage communications and media matters relating to CCS.

Further information on the CarbonNet Project and the Otway Project can be obtained from the DPI Website (www.dpi.vic.gov.au) and The Otway Project website (www.co2crc.com.au).

Western Australia (Australian state)

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Part 1: Developments since the second edition

Approval to draft a bill amending the state's *Petroleum and Geothermal Energy Resources Act 1967*[126] to include provisions for the onshore transport and storage of GHG was received in August 2010. The bill, titled the *Petroleum and Geothermal Energy Legislation Amendment Bill 2011* has reached draft 4 stage.[127] Draft 4 is the initial consultation stage of the bill. Many of the clauses in the bill are modelled on GHG provisions in the Commonwealth's *Offshore Petroleum and Greenhouse Gas Storage Act 2006*, including the approach taken for identifying storage formations, site closure and long-term liability.

A consultation draft of the bill, together with an outline of the main provisions of the legislation, was circulated to stakeholders for a five week period for comment on 8 September 2011. The exposure draft of the bill was in a mark-up format to assist consideration of the proposed amendments. Comments received during the consultation process are under consideration in order to complete drafting of the bill, which will then be circulated for final consultation.

Developments expected in next six-twelve months

It is anticipated that the bill will be introduced into parliament shortly.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

Western Australia does not expect to include specific legislation requiring community engagement for CCS projects. However, the Environmental Protection Authority as part of its project assessment expect there to be public engagement.[128] A stakeholder engagement plan was developed with the objective of supporting the business case for the Collie Hub project. Implementation of the stakeholder engagement plan has commenced and will continue throughout the life of the project. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) held a workshop in February 2011 in Harvey. Following the workshop CSIRO compiled a report on the participant views towards low emission technologies and the potential for CCS in Western Australia's South West.[129] To ensure the community plays a critical role in the assessment and evaluation of The Collie Hub, the WA Minister for Mines and Petroleum the Hon. Norman Moore MLC, established the Lesueur Community Consultative Committee (LCCC). The first meeting of the LCCC was held on 31 August 2011 and regular meetings will be held on a quarterly basis.

[126] http://my.lawlex.com.au/default.asp?itid=0&ntid=0&nid=&cid=15632&jurid=&alpha=&alphaid=&ihl=&nhl=&fp=&rdt=&vaftype=&requirelogin=&tab=ind&pact=coredoc&top=exp&nav=col&docview=true

[127] www.dmp.wa.gov.au/13887.aspx

[128] See www.epa.wa.gov.au/EIA/proponent-guides/Documents/10%2001_EIA%20Guide%20Env%20Principles-Factors-Objectives_REVISION%20IN%20PREP%20(2).pdf. While community engagement is a one dot point item, in practice the EPA attaches significance to a well-constructed, well-organised community engagement plan.

[129] www.globalccsinstitute.com/publications/collie-ccs-hub-community-consultation-and-workshop-reports

Organisation contributions

Asia-Pacific Economic Cooperation

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Part 1: Developments expected in next six-twelve months

Permitting Issues Related to Carbon Capture and Storage for Coal-Based Power Plant Projects in Developing APEC Economies

This APEC project, currently in progress, is reviewing current activities regarding legal, regulatory, and permitting aspects of CCS implementation in national administrations and international bodies, and synthesising the elements of these that are likely to require particular attention by permitting bodies in developing APEC economies contemplating future CCS implementation.

The project specifically examines permitting regimes in nine developing APEC economies: China, Chinese Taipei, Indonesia, Malaysia, Mexico, Philippines, Republic of Korea, Thailand, and Viet Nam. It assesses regulations that could apply to CCS in five of the economies in depth, and relies on assessments completed for the Asian Development Bank for the other four economies.

The final report, due shortly, will include the results of this review and analysis, identifying the essential elements of a permitting process for CCS projects in these economies, as well as additional mechanisms and structures that might need to be put in place to support the CCS permitting process and monitoring of CCS projects. The report will also include a set of recommendations for cost-effective capacity building in this area for developing APEC economies.

Feasibility of Accelerating the Deployment of Carbon Capture, Utilization and Storage (CCUS) in Developing APEC Economies

At present, without specific regulatory requirements and/or some form of carbon pricing, the economics of CCS do not favour deployment unless a project receives some form of financial support. There are however some situations where the disposition of the captured CO_2 can serve a useful purpose, rendering the project economics more feasible. The most short-term economically practicable example of CCUS is in EOR.

This new project received approval from APEC in late 2011, with the detailed project proposal being developed early in 2012. Its objectives are:

To produce a feasibility assessment for CCUS-EOR in APEC developing economies, including: data and information needs for evaluating CCUS-EOR opportunities; barriers to exploitation of these opportunities; policies and programmes to facilitate the development of large-scale CCUS-EOR demonstration projects; elements of CCUS-EOR permitting frameworks that are likely to require particular attention by the relevant authorities in developing APEC economies; and recommendations for cost-effective capacity-building activities in the area of CCUS-EOR in these economies.

To share experiences in and disseminate the most up-to-date information from APEC, the CSLF and other international fora concerning the identification of potential opportunities for reuse of CO_2 from fossil fuel power generation in developing APEC economies, in particular for enhanced oil or gas recovery.

The project should be completed by the end of 2012.

Annex 1: Progress to end-2011

About APEC

Established in 1989, Asia-Pacific Economic Cooperation (APEC) is a 21-member association of economies[130] from the Asia-Pacific region working together to advance regional economic integration and prosperity. Working Groups carry out APEC's work in specific sectors as directed by APEC Economic Leaders, APEC Ministers, APEC Sectoral Ministers, and Senior Officials. The Energy Working Group (EWG), launched in 1990, seeks to maximise the energy sector's contribution to the region's economic and social well-being, while mitigating the environmental effects of energy supply and use. The EWG is assisted by four Expert Groups, including the Expert Group on Clean Fossil Energy (EGCFE), which is chaired by the United States. The EGCFE promotes clean and efficient production and use of fossil fuels through gathering and sharing timely information regarding the technical, economic, and policy aspects of clean fossil energy and technologies within the APEC region. The EGCFE implements a variety of activities, including projects, studies, workshops, conferences and other meetings.

Why APEC is interested in CCS

The APEC region is the fastest growing region of the world with regard to CO_2 emissions, especially from coal power generation. The main objective of the EGCFE's CCUS activities is knowledge transfer to and capacity building in developing APEC economies to prepare them for when CCS implementation becomes necessary. There is a clear need for capacity building in this area in these economies, and for bringing their representatives into the international discussion. This is especially the case for Southeast Asian economies, which not only have rapidly increasing CO_2 emissions, but also potentially significant CO_2 storage opportunities.

The Final Declaration of the ninth Meeting of APEC Energy Ministers (EMM10), held in St. Petersburg, Russia, in June 2012, instructed the APEC Energy Working Group (EWG) "to continue its analysis of technologies for carbon capture use and storage (CCUS) and its dissemination of best practices for applying these technologies to new and existing power plants and industrial processes using fossil fuel energy." The legal and regulatory framework that applies in APEC developing economies will have a key influence on the technology options and best practices.

APEC CCS capacity-building workshops

During the past 7 years APEC has held a successful series of CCS capacity-building workshops in South Korea, China, Indonesia, Mexico and Vietnam. The workshops engage senior cadres of government, industry and academia and are based on the use of extensive CCS workshop training materials developed early in the programme and periodically updated. The materials cover different aspects of CCS in a number of training modules, one of which deals with legal and

[130] APEC Member Economies: Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; Republic of the Philippines; the Russian Federation; Singapore; Chinese Taipei; Thailand; The United States; and Vietnam.

regulatory aspects of CO_2 storage. The latest two workshops in Mexico have focused on training undergraduate students in the geosciences in the area of CO_2 storage and on facilitating the implementation of a CCS curriculum in the Mexican educational system.

Planning and Cost Assessment Guidelines for Making New Coal-Fired Power Generation Plants in Developing APEC Economies CO_2 Capture Ready

This APEC project report was published in March 2010. It identifies a number of issues that potentially impact the development and implementation of capture-ready plants both globally and within developing APEC economies. These include some legal and regulatory issues. The final report may be downloaded from the APEC website:

www.egcfe.ewg.apec.org/projects/EWG_APEC_CO2_capture_ready_plants_3-2010.pdf

Carbon Sequestration Leadership Forum

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Part 1: Developments since the second edition

While CSLF activities over the last 12 months have not specifically focused on legal and regulatory issues, activities of the CSLF Policy Group have brought together policymakers and stakeholders to address issues that have implications for legal and regulatory decision making. In particular, the Policy Group's Task Force on Financing Carbon Capture Utilization and Storage (CCUS) has held a series of workshops to address various models for financing CCUS, which have highlighted legal and regulatory barriers to the financing of CCUS projects.

Developments expected in next six-twelve months

The CSLF has initiated a project to understand the relationship between geologic risk and legal liability. The relationship between risk and liability is at present often poorly defined or understood. Liability is a legal, accounting and financial concept for a responsibility, duty or obligation. It could be money owed (*e.g*. to compensate for financial damages) or the obligation to do something (*e.g*. remediate a release of CO_2 from a storage operation), or both. Liability may arise from contracts, either expressed or implied, from torts (*i.e.* wrongful acts) committed, or from the provisions of legislation or regulation.

In the case of geologic storage, liability will be set primarily by legislation and regulation based on perceptions and assessments of risks, as well as other factors such as perceptions of equity among various stakeholders and the public. A clear gap exists between geologists and policy makers. The project will facilitate interactions and creative analyses to bridge that gap and will produce a report to the CSLF and its member governments. It will kick off with a *Workshop on Risk and Liability of Geologic Storage*, sponsored in conjunction with the IEA and Global CCS Institute, at the IEA in Paris in July 2012.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

The CSLF does not engage the public directly, but rather supports its members in their public engagement activities. It provides this support in three ways – through the development of public outreach materials, through its capacity-building activities, and general stakeholder engagements.

Public outreach support

The CSLF Public Outreach Task Force is following a strategic plan to address the barriers to public awareness and acceptance of CCS technology. The principal objectives of the strategic plan are to engage key audiences in a timely manner and meet CSLF Strategic Plan requirements for communications and outreach. The Task Force conducts proactive efforts to engage the public, media and stakeholders. It has developed DVDs and a communications kit and talking points on CCUS. This includes a standard speech and a PowerPoint presentation. These informational materials are used by CSLF members and others. The Task Force maintains the CSLF website, provides news clips to CSLF members and stakeholders on a daily basis and co-sponsors

conferences and meetings based on an event recognition agreement. The CSLF is now starting to use social media, including Twitter and Facebook, to convey messages about CCUS.

Capacity building

The CSLF has an extensive programme of capacity building for its developing country members. One area of this support is public engagement. Public engagement activities supporting CSLF member countries include development of a Chinese website on CCUS and workshops in South Africa. The CSLF is working with China to establish the first website focusing on CCS technologies and its development in China. The website will be in both the Chinese and English languages. The aims of the website are to serve as a platform to share information and knowledge on technology advancements and good practices and to educate the public. In South Africa, two workshops were held in October 2011 for South Africa's CCS week to disseminate information on CCS to relevant stakeholders. In addition, the CSLF is funding a study to improve the understanding of how CCS impacts South Africa's national priority issues beyond CO_2 mitigation and climate change, such as sustainable development, improved local infrastructure, job creation and protection, poverty alleviation, and social upliftment.

Stakeholder engagement

CSLF activities are open to stakeholders from both industry and civil society. Stakeholders are active participants in CSLF projects and attend CSLF events, where they can learn about CCUS. For example, approximately 300 stakeholders participated in the 2011 CSLF Annual Meeting in Beijing, China.

Annex 1: Progress to end-2011

CSLF is an organisation of national governments that provides a framework for international cooperation in research, development, demonstration, and commercialisation for the separation, capture, transportation, utilisation and storage of CO_2. The CSLF seeks to realise the promise of CCUS over the coming decades, and to ensure that CCUS is both commercially competitive and environmentally safe.

The CSLF is currently comprised of 25 members, including 24 countries and the European Commission. CSLF member countries represent over 3.5 billion people, or approximately 60% of the world's population. Membership is open to national governmental entities. The CSLF also collaborates closely with other international organisations working to advance CCUS, including the IEA, the Global CCS Institute and the Major Economies Forum CCUS Working Group.

The CSLF Policy Group has engaged in many activities related to legal and regulatory issues since the inception of CSLF in 2003. In its early years, the CSLF focused directly on legal and regulatory issues by providing a platform for members to exchange information about regulatory development. A CSLF Task Force developed a report on regulatory issues in 2004 that provided the basis for further consideration by member governments. The CSLF held joint workshops with the IEA on legal and regulatory issues, including workshops in 2006 and 2007 that led to recommendations to the G8 on how to advance CSS, including developing legal and regulatory frameworks. In recent years, the focus of the CSLF activities has not been directly on legal and regulatory issues. Rather the focus has been on working with the IEA, which has the lead in multilateral collaborations in this area, and developing information on relevant topics (such as liability) which have legal and regulatory implications.

CCSReg

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Part 1: Developments since the second edition

The objective of the CCS Regulatory (CCSReg) Project was to develop recommendations that, if adopted, would create a US regulatory environment conducive to capture, transport, and deep geological sequestration of CO_2. Anchored in the Department of Engineering and Public Policy at Carnegie Mellon University, the project involved co-investigators at the Vermont Law School, the Washington, DC law firm of Van Ness Feldman, and at the University of Minnesota. The project was launched in early-2010 by a USD 1.85 million grant from the Doris Duke Charitable Foundation. Additional support came from the National Science Foundation (NSF) Center for Climate Decision Making, which supported more fundamental technical and decision analytic work on CCS.

Since the last edition of the *CCS Review*, the CCSReg project has finalised its draft legislation[131] and prepared a book that builds on the interim report[132] and the six policy briefs[133] from the project. The book is titled *Carbon Capture and Sequestration: Removing the Legal and Regulatory Barriers* and was published by RFF Press in 2012.[134] The book identifies current law and regulation that applies to geologic sequestration in the United States, the regulatory needs to ensure that geologic sequestration is carried out safely and effectively, and barriers that current law and regulation present to timely deployment of CCS. The authors find the three most significant barriers to be: an ill-defined process to access pore space in deep saline formations; a piecemeal, procedural, and static permitting system; and the lack of a clear, responsible plan to address long-term liability associated with sequestered CO_2. The book provides legislative options to remove these barriers and address the regulatory needs, and makes recommendations on the best options to encourage safe, effective deployment of CCS.

Developments expected in next six-twelve months

The CCSReg project has now fulfilled its objective of developing comprehensive, US-focused recommendations for CCS and the project is winding down. However, participants in the project will continue to work on CCS-related law and policy through other endeavours. For example, work in the NSF sponsored Center for Climate and Energy Decision Making (CEDM)[135] will examine the role of adaptive regulation for energy technologies. The CCSReg website will be preserved and publications from the project, such as the interim report and policy briefs, will continue to be available.

[131] www.ccsreg.org/pdf/CCS%20Legislation%20October%202011.pdf
[132] www.ccsreg.org/pdf/CCSReg_3_9.pdf
[133] www.ccsreg.org/policy_briefs.html
[134] www.routledge.com/books/details/9781617261015/
[135] http://cedm.epp.cmu.edu/

Part 2: Stakeholder engagement in the development of CO_2 storage projects

In the United States, injection of CO_2 for the purposes of geologic storage (GS) is regulated according to the Underground Injection Control (UIC) programme, Class VI rule or a state-level equivalent, where a state has primary enforcement responsibility (*i.e.* primacy) for Class VI wells. In the preamble to the Class VI rule, which was promulgated in December 2010, the US EPA acknowledges the importance of early and frequent public participation. However, the public participation requirements for the Class VI well are largely the same as for wells injecting other fluids. A wealth of literature exists that examines the general approach to risk communication, which could be applied to CCS. [136] Furthermore, best practice for community engagement for CCS projects has been examined by the World Resources Institute[137] and the U.S. Department of Energy, National Energy Technology Laboratory.[138] We believe key elements of these guidelines should be incorporated into GS permitting rules, to insure that all GS projects plan for community engagement, just as they plan for well testing, monitoring, and remediation.[139] This could be accomplished using a two-tiered approach that makes expectations clear for both project developers and regulators. First, development and approval of a site-specific community engagement plan should be a requirement for a Class VI permit. Second, the permitting agency should communicate with the local community about geologic sequestration, how geologic sequestration and CCS fit into broader climate change mitigation policy, and the steps in the permitting process.

[136] For one example, see: Morgan, M., B. Fischhoff, A. Bostrom & C. Atman. 2002. *Risk Communication: A mental models approach*. New York: Cambridge University Press.

[137] www.wri.org/publication/ccs-and-community-engagement

[138] www.netl.doe.gov/technologies/carbon_seq/refshelf/BPM_PublicOutreach.pdf

[139] Morgan, M. G., S. T. McCoy, J. Apt, M. Dworkin, P. S. Fishbeck, D. Gerard, K. A. Gregg, R. L. Gresham, C. R. Hagan, R. R. Nordhaus, E. R. Pitlick, M. Pollak, J. L. Reiss, E. S. Rubin, K. Twaite & E. J. Wilson. 2012. *Carbon Capture and Sequestration: Removing the Legal and Regulatory Barriers*. New York: RFF Press.

Global CCS Institute

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Part 1: Developments since the second edition

In the past 12 months, the Global CCS Institute has continued to examine and address the variety of legal and regulatory issues that impact upon the global deployment of CCS. The Institute's legal and regulatory activity has focused upon the following areas in particular.

Global Status of CCS

The Institute's annual flagship review of global project developments and key issues affecting CCS deployment worldwide was published in early October 2011. The report contains a detailed Institute-authored chapter addressing the policy, legal and regulatory developments and challenges for the technology, which for the first time also includes a project-level perspective of the legal and regulatory environment.

Extensive surveying and interviewing of projects revealed a number of significant legal and regulatory issues that have either been positively or negatively addressed by the nascent permitting regimes enacted in many jurisdictions. The Institute has continued to work closely with project proponents and regulators since the report's publication to monitor how these issues have been addressed. A new edition of the Status Report will be published in October 2012; however the 2011 report may be downloaded from the Institute's website.[140]

Deployment of the regulatory toolkit in Romania

Following its publication in early February 2011, the Institute successfully completed the first deployment of the *Carbon Capture and Storage Regulatory Test Toolkit*[141] (regulatory test toolkit) with the Romanian government, which also builds upon our engagement in the 2010 Scottish exercise. The toolkit exercise was undertaken by the Romanian government to test and improve the legislative framework governing the implementation of CCS projects in Romania; the Getica project's application for funding under the European Commission's NER300 was used as a case study.

The project ran from April to September 2011 and culminated in a workshop, which was held in Romania in July 2011. A final report, detailing the processes involved in this deployment and outcomes of the workshop, was published on the Institute's website in November 2011.[142]

Carbon Capture and Storage Ready (CCSR)

Building upon its earlier reports and briefing paper, the Institute has continued to play an active role in discussions surrounding carbon capture and storage ready.

In July 2011 the Institute hosted a CCS Ready workshop as a side-event to the Asian Development Bank's Clean Energy Forum. The workshop included presentations from Institute staff, which

[140] www.globalccsinstitute.com/publications/global-status-ccs-2011

[141] www.globalccsinstitute.com/publications/carbon-capture-and-storage-regulatory-test-toolkit

[142] www.globalccsinstitute.com/publications/carbon-capture-and-storage-regulatory-test-toolkit-romania

provided an overview of CCSR and the minimum legal and regulatory requirements associated with the concept. The workshop also provided an opportunity for governmental representatives from Thailand, Philippines, Vietnam and Indonesia to discuss the issue in greater depth, as well as the potential for the implementation of CCSR in their jurisdictions.

The Institute's Policy, Legal and Regulatory team is presently developing a report, which provides a global status update of CCSR policy development and considers its potential to deliver government climate objectives. The report, which is to be released later this year, is aimed at providing a reference resource for those governments seeking to further develop CCSR policies as part of their broader climate mitigation policy agenda, as well as enhance the understanding of Institute members, potential project proponents and the broader CCS community on CCSR related matters.

International climate change agreements

The Institute has played a significant role in the United Nations Framework Convention on Climate Change dialogues since 2010, including processes leading up to and following the recent inclusion of CCS in the Clean Development Mechanism (CDM) at COP 17 in Durban.

A representative of the Institute's Policy, Legal and Regulatory team participated in the meeting of CCS experts in Abu Dhabi in September 2011, where experts engaged in a two-day discussion on the range of technical options for addressing outstanding issues as identified by the Subsidiary Body on Scientific and Technological Advice (SBSTA) on CCS.

Following on from its successful engagement at COP 16, the Institute hosted a number of successful side events at COP 17 in Durban and launched several factsheets and commissioned reports clarifying some of the key considerations for implementing CCS projects under the CDM.

More recently, the Institute attended the second and third meetings of the Technology Executive Committee and participated in the UNFCCC Subsidiary Bodies meeting in Bonn (SB36), where continued negotiations focused upon the practicalities of CCS's inclusion in the CDM, the Technology Mechanism, the Green Climate Fund (GCF), and establishment of New Market Based Mechanisms. In addition, the Institute has made three formal submissions to the UNFCCC's Subsidiary Body for Scientific and Technical Advice (SBSTA) regarding modalities and procedures for new market based mechanisms,[143] further consideration on the eligibility of transboundary CCS projects and the establishment of a global reserve of emission reduction units,[144] and pre-COP 17 issues relating to CCS in the CDM.

Developments expected in next six-twelve months

The Institute has a well-established regulatory work plan, interacting with projects, member countries and its strategic partnership organisations, to examine a range of key legal and regulatory issues. The Institute, in collaboration with the IEA, has been providing Secretariat support to the Carbon Capture, Use and Storage Action Group and provided a final report to the Clean Energy Ministerial in April 2012. The Institute has been tasked with a further programme of work following the meeting.

The Institute expects to undertake further deployments of the regulatory test toolkit in the next 6-12 months and has entered into discussions with a number of developed and developing jurisdictions worldwide. Several other key areas of interest for the Institute, and the focus of its

[143] http://cdn.globalccsinstitute.com/sites/default/files/publications/35951/gccsi-submission-nmbms-opt.pdf

[144] http://cdn.globalccsinstitute.com/sites/default/files/publications/35956/120302-gccsi-submission-ccs-cdm.pdf

work in the legal and regulatory field in the next six to twelve months, include: project-related long-term liability; engagement in the development of international CCS standards; and addressing those issues that will continue to impact upon the deployment of CCS projects.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

The Institute has long recognised the significance of effective public engagement and the importance of embedding public engagement best practices as a fundamental part of CCS project development. Working in collaboration with a number of international partners and project proponents, the Institute has produced a library of over 50 reports,[145] case studies and toolkits, capturing real project experiences and identifying and explaining public engagement best practices in the context of CCS demonstration delivery.

In recognition of the growing importance of this topic to the CCS community, public engagement formed a key theme of the Institute's 2011 Members Meeting in Melbourne, and is set to remain on the agenda of the Institute's key events throughout 2012. CCS education, and communicating the risks and benefits of CCS, will form particular areas of focus throughout 2012.

The 2011 Status Report recognised the multiple areas of stakeholder interaction being referred to in any discussion on public engagement, distinguishing between stakeholders with a key influence over project progress such as regulators and site communities, and stakeholder interaction with a much more broadly defined public, including media and environmental NGOs.

Chapter four of the report identifies the final stages of the development planning process as a crucial period for managing public engagement risk. Previous experiences will undoubtedly prove a valuable factor here and the report suggests that, '*lessons learnt from existing projects will help other project proponents or developing country governments to implement more effective approaches*'. The Status Report also solicited project-level information around public engagement this year, enabling a number of valuable conclusions, including the positive finding that 75% of all projects interviewed confirmed they had a public engagement strategy in place or in development.

There have been some key additions to the variety of public engagement themed reports the Institute has been developing, funding and collaborating on. Most important was the completion of a suite of practical guidance documents created in collaboration with CSIRO and the IEA-GHG Social Researchers Network, that provide expert guidance and tools around topics such as stakeholder mapping, creating a stakeholder and communication plan, and communicating CCS risk. These documents will continue to be updated and developed as the Institute receives more project feedback. Each of these documents and the international study that created them are available to download from the Institute website.[146]

[145] www.globalccsinstitute.com/publications/4551

[146] Communication/ Engagement Toolkit for CCS Projects: www.globalccsinstitute.com/publications/communication-and-engagement-toolkit-ccs-projects; Social Site Characterisation: From Concept to Application: www.globalccsinstitute.com/publications/social-site-characterisation-concept-application; Communicating the Risks of CCS: www.globalccsinstitute.com/publications/communicating-risks-ccs; Communication, project planning and management for carbon capture and storage projects: An International Comparison: www.globalccsinstitute.com/publications/communication-project-planning-and-management-carbon-capture-and-storage-projects-inter

IEA Greenhouse Gas R&D Programme

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Part 1: Developments since the second edition

IEAGHG is an international R&D programme established as an Implementing Agreement of the IEA in 1991, funded by 21 countries and 25 organisations. It aims to provide impartial and independent information on the role and issues around technologies to reduce GHG emissions from fossil fuel use, focussing primarily on CCS. One of IEAGHG's objectives is to provide information to ensure that CCS legal and regulatory developments can be based on a sound evidence-base. IEAGHG is involved in many activities to undertake this. It is an actively-contributing observer to the London Convention and UNFCCC meetings when CCS is under discussion or negotiation.

Consequently IEAGHG used its Research Network meetings in 2011 (Modelling, Monitoring, Risk Assessment) to consider the relevant parts of the UNFCCC Cancun Decision on CCS in the CDM, and contributed these into the UNFCCC Workshop on Modalities and Procedures for CCS in the CDM in Abu Dhabi (September 2011). IEAGHG also presented on transboundary issues.[147] Each of the Research Network meetings includes regulatory considerations, and this time the Monitoring Meeting (June 2011, Potsdam, hosted by GFZ) specifically focussed on the role of monitoring (with modelling) in addressing the EU criteria for liability transfer, specifically the conformity of actual CO_2 behaviour with modelled behaviour and absence of any detectable leakage. The meeting report and presentations are available on the Monitoring Network web page under www.ieaghg.org/index.php?/networks.html. The Research Networks that cover storage will have held a Joint Networks Meeting in June 2012, in the United States.

IEAGHG also attended the London Convention meeting of Parties in October 2011 as an observer, contributing to the CCS-related discussions (progress and transboundary issues).

Recently issued reports (last 12 months) relevant to the IEA International CCS Regulatory Network

- *Retrofitting CO_2 Capture to Existing Power Plants* (IC Consultants Ltd) - IEAGHG Report 2011-02, May 2011.
- *Effects of Impurities on Geological Storage of CO_2* (Canmet ENERGY) - IEAGHG Report 2011-04, June 2011.
- *Potential for Biomass and Carbon Dioxide Capture and Storage* (Ecofys) - IEAGHG Report 2011-06, July 2011.
- *Global Storage Resource Gap Analysis for Policymakers* (Global CCS Institute) (GeoGreen) - IEAGHG Report 2011-08, October 2011.
- *Ground Water Impacts* (CO2GeoNet) - IEAGHG Report 2011-10, October 2011.

[147] http://unfccc.int/files/methods_and_science/other_methodological_issues/application/pdf/technical_and_legal_complexities_presented_by_transboundary_issues.pdf

Developments expected in next six-twelve months

Studies that are underway most relevant to the IEA International CCS Regulatory Network include:

- Quantification techniques for CO_2 leakage.
- Feasibility of Monitoring Techniques for Substances Mobilised by CO_2 Storage in Geological Formations.
- CO_2 Capture in Iron and Steel Industry.
- Removal of impurities from CO_2.
- Abstraction of brine from geological storage formations.
- Financial Mechanisms for Long Term Liability.
- Capture in Gas Fired Power Plant.
- Operating Flexibility of CCS in Future Energy Systems.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

One of the international research networks run by IEAGHG is the Social Research Network, which focuses on the social science around public awareness and communication on CCS. However, the three meetings to date (November 2009, November 2010 and April 2012) have not covered regulatory aspects around this area. In terms of general work in the public communications area, as well as producing technical reports, IEAGHG produces more general, information glossy publications for a wider audience. These are used by others in specific public communication activities. These can be found on the web site. In addition, IEAGHG have recently commissioned work on key messages required for public communication needs, which will draw upon information in the IEAGHG technical reports, and produce information briefs, for use by others in their communication activities.

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Part 1: Developments since the second edition

In early 2011, UCL-CCLP launched its *European Union Case Studies Project*. The objective of the project was to analyse the transposition of the EU CO_2 Storage Directive in selected European jurisdictions: the United Kingdom, Germany, Poland, Romania, Spain, and Norway. Reports for each country were released at a one-day workshop on 7 November 2011, entitled *Implementing the CCS Directive: Challenges and Opportunities*.[148]

September 2011 marked the publication of a new book, *Carbon Capture and Storage: Emerging Legal Issues*, edited by UCL-CCLP Director, Professor Richard Macrory, along with Ian Havercroft (Global CCS Institute, UCL-CCLP Visiting Fellow) and Richard Stewart (New York University).[149] The book brings together some of the world's leading practitioners and scholars working in the field of CCS law and regulation to provide a critical assessment of progress to date and challenges on the horizon.

UCL-CCLP staff were also invited to contribute to the following international CCS events:

- 21-22 June 2011: Global CCS Institute Romanian Regulatory Test Toolkit Workshop, Poiana Brasov, Romania.[150]
- 28-29 July 2011: Asian Development Bank International CCS Conference, Beijing, China.[151]
- 7-8 September 2011: UNFCCC Technical workshop on CCS in the CDM, Abu Dhabi, UAE.[152]
- 14 November 2011: European Union Information Exchange Group.[153]
- Ongoing: Alberta Regulatory Framework Assessment process.[154]

UCL-CCLP continued to add new material to the Legal Resources section of its website, including pages on CCS legislation in onshore Australia, property rights in Canada, the EU CO_2 Storage Directive transposition, as well as a new Think Piece on the role of enhanced oil recovery in the CCS debate.[155]

Developments expected in next six-twelve months

In addition to ongoing analysis of global legal and regulatory developments published in the Legal Resources section of its website, UCL-CCLP will be focusing on the following projects:

[148] Further information on the *EU Case Studies Project* including country reports and conference materials available at www.ucl.ac.uk/cclp/ccsresearch.php

[149] Available from Hart Publishing www.hartpub.co.uk/books/details.asp?isbn=9781841132686

[150] www.ucl.ac.uk/cclp/ccsprojectnews.php?rn=1250

[151] www.ucl.ac.uk/cclp/ccsprojectnews.php?rn=1252

[152] www.ucl.ac.uk/cclp/ccsprojectnews.php?rn=1276

[153] www.ucl.ac.uk/cclp/ccsprojectnews.php?rn=1290

[154] www.ucl.ac.uk/cclp/ccsprojectnews.php?rn=1282

[155] Philip M. Marston, *From EOR to 'E^2R': Sequestering CO_2 while reducing dependence on imported oil*. 2011. www.ucl.ac.uk/cclp/pdf/Marston_thinkpiece_2011.pdf

- *South African Case Study* on the development of law and policy for CCS in South Africa, the first in a series of case studies on CCS in emerging economies.
- *Financial Security Study* that will explore the issues surrounding mandatory financial security in the context of CCS and wider environmental regulation.

Part 2: Stakeholder engagement in the development of CO_2 storage projects

UCL-CCLP's November 2011 workshop also focused on practical examples of public engagement in CCS and the extent to which legal procedures can or cannot assist the public participation process. The session was a follow-up to UCL-CCLP's 2009 *Public Participation and the Law* conference, where lessons for CCS public engagement were drawn from previous experience with other novel technologies.[156] The 2011 workshop brought together a unique mix of speakers and participants, attracting – in addition to the usual CCS stakeholders – leading environmental lawyers and public participation specialists who were able to bring insights from the implementation of other EU directives and the introduction of other new technologies.

Key points that emerged from the workshop included the following:

- Strategies for engaging the public in CCS have evolved over the past few years. The focus has shifted from a message purely focused on climate change mitigation to one that incorporates economic considerations and compelling value propositions. Effective engagement should not explain only how CCS technology works, but also describe how the broader regulatory, economic, and social frameworks are being put in place. It is also important to convey the messages through dialogue with the public instead of one-way, non-reciprocal means.
- One of the lessons CCS can take from other novel technologies is that the end-use of a technology often matters to the public. For example, although there is strong opposition in Europe to the use of genetically modified organisms (GMOs) in food production, their use in manufacturing pharmaceuticals is more widely accepted. In the Netherlands, CO_2 is already treated differently depending on whether it is used (*e.g.* in greenhouses) or stored.
- CCS proponents are applying legal procedures for public participation in the EU as described by Article 6 of the Aarhus Convention. However, the Convention was devised for traditional activities where the risks are known and predictable, which is not always the case for CCS. For more effective engagement, it was suggested that public debate about CCS should take place at the level of policy decisions so that basic issues can be considered before moving to programme- and project-level activities.
- "What is the purpose of public engagement?" was a reoccurring question with diverse responses. Participants discussed if the purpose should be to determine whether to do CCS or how best to do CCS. Project developers emphasised the main purpose was to be a responsible operator and academics stressed its importance as an exercise in public democracy. Similarly, "How do you define its success?" was met with a variety of possible outcomes. The idea that successful engagement must lead to acceptance of a project was challenged, with community opposition leading to project cancellation cited as an example of effective engagement.
- When considering how to better engage with the public, CCS stakeholders should keep in mind that "NIMBY-ism" can be misunderstood as it is often the only remaining outlet to oppose a project and also not to assume that a more educated public will be more supportive of CCS.

[156] All conference materials, including recordings, are available at www.ucl.ac.uk/cclp/ccsthink.php#ppl

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Part 1: Developments since the second edition

Over the last six months, the World Bank has published its cross regional analytical study entitled *Carbon Capture and Storage in developing countries: a perspective on barriers to deployment: Regional Perspective in Developing Countries*.[157] One of the four programme elements of the report focused on regulatory and institutional frameworks related to CCS in the case study regions, namely in the Southern African and Balkan regions. The objectives of this programme element were two fold: 1) to identify gaps in the existing legal and regulatory frameworks that may prevent the development of cross-boundary and national CCS projects; and 2) to suggest approaches to address the identified gaps to remove the regulatory and legal barriers to CCS deployment. For the Southern African region, the review analysed the relevant laws at the multilateral, regional, and national levels in the Republic of Botswana, the Republic of Mozambique, and the Republic of South Africa, and within the regional electricity network, the Southern African Power Pool (SAPP). For the Balkan region, the same analysis was conducted for Bosnia and Herzegovina, Kosovo, Serbia and relevant EU Directives. The analysis focused on the following eight issues:[158]

- Classification of CO_2 and its legal definition, including proprietary rights of stored CO_2.
- Jurisdiction over the control and management of domestic and cross-boundary pipelines and reservoirs (including monitoring, reporting and verification requirements).
- Proprietary rights to cross-boundary CO_2 capture and storage sites and facilities.
- Regulatory and/or licensing (permitting) scheme related to the operation and management of storage and transportation facilities.
- Long-term management and liability issues arising out of accidents or leaks in domestic and cross-boundary CCS projects.
- Third-party access rights to transportation networks, transit rights and land rights with regard to pipeline routes.
- Regulatory compliance and enforcement schemes.
- Environmental impact (including cumulative impact) assessment process, risk assessment and public consultation.

One conclusion that emerged from the review of these two regions is that at present, there is no international convention that specifically addresses issues related to CCS. However, the study also noted that certain sectoral agreements and conventions are of general relevance to the CCS context (such as those agreements related to the transport of hazardous wastes or oceans) while

[157] For more information on this study, please refer to the World Bank's contribution to the second edition of the IEA *CCS Review*. The publication is available at: www.globalccsinstitute.com/publications/carbon-capture-and-storage-developing-countries-perspective-barriers-deployment

[158] The analysis for the Balkan region also focused on the issue of financial assurance for long-term stewardship.

some could be applied to regulate certain aspects of CCS activities (including conventions related to marine pollution and climate change). Furthermore, the study concluded that while none of the countries examined in the study has dedicated legislation on CCS or laws that include any explicit references to CCS, most of the countries appeared to have basic elements in their existing legal framework that could address certain aspects of the key issues. Moreover, the study found that, even with the absence of any specific laws or regulations, general rules and concepts (*e.g.* common law principles) relating to relevant issues, such as pollution control and liability, are often applicable to certain aspects of CCS activities.

Three workshops were held (May 2011, in Dubrovnik, Croatia; June 2011 in Johannesburg, South Africa; and September 2011 in Washington, DC) to present the findings of the study and to discuss the work programmes of other multilateral development banks, international organisations and research institutes relevant to CCS in developing countries.

Developments expected in next six-twelve months

During the next 6-12 months the World Bank plans to launch a new project focusing on assessing potential for realisation of CCUS in industrial applications in selected developing countries. The objective of the proposed activity is to identify and inform government and industry about available low cost early opportunities for CCUS in industry sectors to enable the deployment of CCUS through public-private business models, and appropriate incentive regulations and policies to support such activities. The selection of countries for the subject assessment will be finalised based on the level of interest and data availability from potential counterparts.

IEA

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Part 1: Developments since the second edition

In addition to development of this third edition of the *CCS Review*, key IEA activities relevant to CCS law and regulation since publication of the second edition include: the fourth meeting of the IEA International CCS Regulatory Network (Network); continuation of the Network web conference series; publication of the IEA *Carbon Capture and Storage and the London Protocol: Options for Enabling Transboundary CO_2 Transfer* paper (*London Protocol paper*); initiation of the *IEA International CCS Law and Regulation Database* project (*CCS Database*); publication of the *Tracking Progress in Carbon Capture and Storage: International Energy Agency/ Global CCS Institute report to the third Clean Energy Ministerial*; and release of IEA flagship publication *Energy Technology Perspectives 2012*.[159] The IEA continued to engage with both IEA member and non-member country governments that are developing or planning to develop CCS regulation. We have also released several other reports on broader aspects of CCS policy, including *A Policy Strategy for Carbon Capture and Storage* (see section 6 above)*, Combining Bioenergy with CCS, and CCS Retrofit*.

Fourth IEA International CCS Regulatory Network meeting and web conferences

The fourth meeting of the Network was held at the IEA in Paris on 9 and 10 May 2012. The objective of the meeting was to: provide an update on government efforts to develop and implement CCS legal and regulatory frameworks; and consider ways in which governments are dealing with some of the more difficult or complex aspects of CCS regulation.

The meeting was organised into eight topical sessions spread over two days, in addition to opening and closing sessions. Each topical session was chaired by an expert in the field and included time for either open discussion or a panel discussion. Presentations on the first day provided updates on CCS regulatory developments in Africa, the Americas, Asia, Australia and Europe, as well as international legal developments relevant to CCS. Presentations and panel discussions on the second day focused on key CCS regulatory issues, including: assessing risk and managing liability; third party access to CCS infrastructure; competition between resources; transboundary issues; pore space management; calculating financial contributions to long-term stewardship; and regulatory issues associated with enhanced oil recovery.[160]

In addition to the fourth face-to-face meeting of the Network, the IEA hosted three web conferences: *Transposition of the EU CO_2 Storage Directive: Current Status and Outstanding Issues* (21 March 2012); *CCS outcomes from Durban and next steps for CCS in the CDM* (2 February 2012); and *Talking*

[159] See www.iea.org/etp/

[160] Further information is available at www.iea.org/newsroomandevents/workshops/name,27053,en.html.

process: Steps in Developing Regulatory Frameworks for CCS Demonstration and Commercial Deployment (18 July 2011).[161]

London Protocol paper

For CCS to reach its emissions reduction potential, the 2009 IEA publication *Technology Roadmap: Carbon capture and storage* recommends, amongst other things, that international legal obstacles associated with global CCS deployment be removed by 2012 – including the prohibition on transboundary CO_2 transfer under the London Protocol.

The London Protocol was amended by contracting parties in 2009 to allow for cross-border transportation of CO_2 for sub-seabed storage, but the amendment must be ratified by two-thirds of contracting parties to enter into force. It is unlikely that this will occur in the near term, given: the required number of ratifications; the number of ratifications to date; current contracting party interest in CCS; and difficulties associated with the ratification process.

The IEA therefore released the *London Protocol paper* in October 2011,[162] which identifies and evaluates options that might be available to contracting parties under international law to overcome the barrier to deployment presented by Article 6, pending formal entry into force of the 2009 amendment. The paper was presented to London Protocol contracting parties in October 2011.

IEA International CCS Law and Regulation Database

This year, the IEA began developing a publicly-available, internet accessible database of existing CCS law and regulation. The *IEA International CCS Law and Regulation Database* (CCS Database) will consolidate and make more accessible information on key global approaches to a broad range of CCS regulatory issues, building on IEA progress tracking and facilitating CCS regulatory developments world-wide. It is intended to:

- Enable the IEA to respond more effectively to requests from governments and other stakeholders for detailed guidance on CCS regulatory approaches and developments across various jurisdictions.
- Support ongoing efforts by national governments to implement regulatory frameworks for CO_2 storage, by facilitating access to information on existing and emerging frameworks.

The target audience for the *CCS Database* will be CCS policy makers, policy analysts and other individuals who are likely to support or advise governments in the development of CCS regulation, including lawyers, academics and industry. The *CCS Database* will catalogue, both in high-level summary form and by inclusion of relevant legislative extracts, how relevant legal instruments address key regulatory issues associated with CCS, as derived from regulatory issues identified in the IEA's 2010 *Carbon Capture and Storage Model Regulatory Framework* (*Model Framework*).[163] Users will be able to gain an understanding of whether and how a particular jurisdiction deals with any particular regulatory issue, and how specific issues are addressed across multiple frameworks. The *CCS Database* is being developed in collaboration with Baker & McKenzie (Sydney) and UCL-CCLP, amongst others.

[161] Further information, including recordings of the events, is available at: www.iea.org/topics/ccs/ccslegalandregulatoryissues/ieainternationalccsregulatorynetwork/

[162] Available at www.iea.org/topics/ccs/ccslegalandregulatoryissues/londonprotocol/

[163] www.iea.org/ccs/legal/model_framework.pdf

CCS Tracking Report to the third Clean Energy Ministerial

Legal and regulatory aspects of CCS deployment were addressed in the IEA/ Global CCS Institute *CEM 3 Progress Report*: see section 4 above.

Energy Technology Perspectives 2012

In June 2012, the IEA released its biennial future energy scenarios study, Energy Technology Perspectives (ETP 2012). ETP 2012 aims to identify the technology and policy needs that will enable a global decoupling of economic activity, energy demand and emissions, limiting energy-related CO_2 emissions to those consistent with a 2°C global average temperature rise. The study examines the role that fuels and technologies – including CCS – will play in the 2°C scenario (2DS) across all sectors of the global economy. The study sees CCS contributing one-fifth of the total emissions reductions globally through 2050 in the 2DS. It also concludes that CCS is the only currently available technology that could allow industrial sectors, such as iron and steel, cement, natural gas processing, etc., to meet deep emissions reduction goals and that, in some regions, CCS plays a larger role in reducing emissions from industry than from electricity generation. Given the large role for CCS, ETP 2012 makes seven specific recommendations for policy actions, from better developing information on the distribution and cost of storage capacity to engaging the public at both project and policy levels.

ETP 2012's key conclusion on CCS law and regulation is that great strides have been made in the last few years in regulating CO_2 storage, but the absence or incomplete implementation of laws and regulations still present barriers to development of storage projects. Therefore, in jurisdictions that plan to undertake CCS, governments must ensure that legal and regulatory frameworks, or a lack thereof, do not unnecessarily impede demonstration and deployment of CCS.

Engagement

The IEA continues to engage with member and non-member countries on development and implementation of CCS regulation as part of the IEA CCS Unit's broader outreach programme.

On 28 July 2011, the IEA hosted a CCS legal and regulatory working meeting with the Indonesian Ministry of Energy and Mineral Resources (Directorate General Oil and Gas) in Jakarta, Indonesia. The aim of the working meeting was to support the Indonesian government's efforts in developing CCS regulation and associated policies. The working meeting addressed this aim by bringing together key Indonesian government stakeholders, regulators from countries advanced in CCS regulation and other experts, to: share experience and knowledge around some of the most challenging CCS legal and regulatory issues; and discuss and work through key technical issues relevant to CCS regulation and policy, as identified by Indonesian CCS agencies. The first half of the meeting provided an update on legal and regulatory developments in Indonesia, internationally and in a number of specific jurisdictions advanced in CCS regulation. The second half of the day involved focused discussions around four key CCS issues selected by the Indonesian government, both legal and technical.

In February 2012, the IEA and the Mexican Ministry of Energy (SENER) jointly hosted a workshop to discuss policy strategy options for CCS in Mexico, further develop understanding of CCS activities in the country, and identify key drivers and challenges for CCS in Mexico's national context. The workshop brought together approximately 40 participants from Mexican government, industry, and academia, and external experts from international organisations, companies and government. The meeting was two days long, the first day consisting of multiple

panel sessions on topics of interest to SENER, while the second day was a roundtable discussion that addressed detailed aspects of policy and regulatory development.

The IEA provided expert input into the Alberta RFA process, participating in the RFA's Regulatory Working Group, and also the work of the London Protocol contracting parties to update the 2007 *Specific Guidelines for Assessment of Carbon Dioxide Streams for Disposal into Sub-seabed Geological Formations* to reflect the 2009 amendment to enable transboundary transfer of CO_2 for sub-seabed storage.

The IEA also engaged directly with key stakeholders in South Africa, Mexico, Canada, Vietnam, Indonesia and several EU member states through a series of bilateral meetings.

In addition, the IEA presented IEA CCS legal and regulatory work and global developments in CCS regulation at numerous conferences and events globally.

Developments expected in next six-twelve months

The IEA will continue efforts to support national level CCS framework development over the next 6-12 months.

The IEA's key, anticipated output is the launch of the *CCS Database*, which is scheduled for the end of third quarter 2012.

The IEA will continue the activities of the IEA International CCS Regulatory Network, including holding a fifth face-to-face meeting in the first half of 2012, and quarterly web conferences.

The IEA is currently leading projects on long-term liability and CO_2-EOR. These projects seek to provide advice to our member governments, as well as others, on the possible options to manage long-term liability associated with CCS and their relative merits, and the technical, regulatory, and policy needs if CO_2-EOR is to be undertaken for the purposes of emissions mitigation (*i.e.* CCS). Both projects have expected completion dates in 2013.

The IEA welcomes suggestions for additional work in the area of CCS legal and regulatory analysis.

Previous editions of the *CCS Review*

Edition	1 (October 2010)			2 (May 2011)		
Theme	CCS legal and regulatory progress to 2010.			Long-term liability for stored CO_2.		
National Jurisdictions	Australia	Korea	Spain	Australia	Japan	Romania
	Canada	Netherlands	Switzerland	Canada	Korea	South Africa
	European Commission	New Zealand	United Kingdom	Czech Republic	Malaysia	Spain
	France	Norway	United States	Finland	Netherlands	Switzerland
	Germany	Slovak Republic		France	New Zealand	United Kingdom
	Japan	South Africa		Germany	Norway	United States
				Ireland	Poland	Vietnam
				Italy		
Regional jurisdictions				Alberta	Queensland	Victoria
				European Commission	South Australia	Western Australia
Organisations	CCS Regulatory Project Global CCS Institute IEA Greenhouse Gas R&D Programme UCL-CCLP WRI IEA			Carbon Capture and Storage Association CCS Regulatory Project Global CCS Institute IEA Greenhouse Gas R&D Programme North American Carbon Capture and Storage Association UCL-CCLP World Bank WRI IEA		
Key discussion points	Who regulates CCS? Starting from existing laws Heading offshore Providing incentives for CCS Building "CCS-ready" plants Gaining public acceptance			National and regional level progress continues • Long-term liability for stored CO_2 • Momentum in Europe on the EU CCS Directive Developments on the international CCS scene: London, OSPAR and Cancun • To ratify or not to ratify: the 2009 London Protocol amendment • Progress on OSPAR • From Cancun to Durban: international climate change		

	negotiations Talking process: how do you develop a CCS regulatory framework? • What comes first: regulation, or technology demonstration? • Co-ordinating within government: interagency working groups • "Gap and barrier" analyses: how do existing frameworks compare with the aims of future CCS regulation? • Ensuring regulation is fit for purpose

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