



International  
Energy Agency

# CARBON CAPTURE AND STORAGE

*Legal and Regulatory Review*

Edition 1

OCTOBER **2010**

## INTERNATIONAL ENERGY AGENCY

The International Energy Agency (IEA), an autonomous agency, was established in November 1974. Its mandate is two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply and to advise member countries on sound energy policy.

The IEA carries out a comprehensive programme of energy co-operation among 28 advanced economies, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The Agency aims to:

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This *CCS Review* contains contributions from various governments and other organisations. Users of this publication should note that the *CCS Review* contains only selected updates on CCS regulation. It is not intended to be exhaustive and does not constitute legal advice. The IEA makes no express or implied warranties concerning any part of the *CCS Review*, including no warranty of accuracy, completeness or fitness for a particular purpose. The IEA will not be held liable for loss or damage resulting from any inaccuracy, error or omission. The *CCS Review* does not necessarily represent the views or policies of the IEA Secretariat or individual IEA Member countries.

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## Introduction

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 emissions. The IEA has estimated that the broad deployment of low-carbon energy technologies could reduce projected 2050 emissions to half 2005 levels – and that CCS could contribute about one-fifth of those reductions. Reaching that goal, however, would require around 100 CCS projects to be implemented by 2020 and over 3 000 by 2050.<sup>1</sup>

Such rapid expansion raises many regulatory issues, so in 2008 the IEA established the International CCS Regulatory Network.<sup>2</sup> In response to a suggestion that the IEA produce a regular review of CCS regulatory progress worldwide, made at the network's second meeting (Paris, January 2010), the IEA is pleased to now be launching the *IEA Carbon Capture and Storage Legal and Regulatory Review (CCS Review)*. This publication aims to help countries develop their own CCS regulatory frameworks by providing a forum for sharing knowledge on CCS legal and regulatory issues. It also identifies steps taken towards the legal and regulatory goals in the 2009 IEA *Technology Roadmap: Carbon capture and storage*. The IEA intends that the *CCS Review* be produced every six months.

## Analysing trends

The *CCS Review* gathers contributions by national, state, provincial and regional governments, at all stages of CCS regulatory development. The first half of each contribution provides an overview of CCS advances over the preceding six months and those expected to occur in the following six months, with links provided to publicly available documents. The second half addresses a particular CCS legal and regulatory theme, such as long-term liability. Each contribution is limited to two pages to ensure the information is concise and easy to consult. Where CCS legal and regulatory development has not begun or is still at an early stage, contributors might provide an update on broader CCS progress. To introduce each edition, the IEA provides a brief analysis of key advances and trends. It is based only on the information in the contributions, but the themes discussed may be relevant beyond the jurisdictions mentioned. In addition to contributions from public authorities, the *CCS Review* also includes contributions from leading international 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/ccs](http://www.iea.org/ccs)).

<sup>1</sup> *Energy Technology Perspectives 2010* (IEA).

<sup>2</sup> The Network provides a neutral forum for stakeholders to discuss global developments via topical web-based seminars and an annual meeting in Paris. As at October 2010, the Network had over 1 000 members.

## The debut of the CCS Review

In this first edition of the *CCS Review*, each contribution offers in its second, thematic part an overview of CCS legal and regulatory developments to date, to provide context for future editions. Contributors to this edition include:

### *Jurisdictions*

Australia	Korea	Spain
Canada	Netherlands	Switzerland
European Commission	New Zealand	United Kingdom
France	Norway	United States - Environmental Protection Agency
Germany	Slovak Republic	United States - Department of Energy
Japan	South Africa	

### *Organisations*

CCSReg

Global Carbon Capture and Storage Institute (Global CCS 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 (UCL-CCLP)

World Resources Institute (WRI)

IEA

### *Looking forward*

Starting with the next edition of the *CCS Review*, scheduled for the first quarter of 2011, the IEA would like to provide a more comprehensive overview of CCS legal and regulatory advances by involving more governments and organisations, especially from developing countries and emerging economies. Contributions will also be encouraged from state and provincial governments – particularly in the United States, where several states have made considerable regulatory progress – and from member countries of the European Union, which are required to transpose the EU CCS Directive by 25 June 2011.

For more information about the *CCS Review* or to offer suggestions on how it could be improved, please contact Brendan Beck at [brendan.beck@iea.org](mailto:brendan.beck@iea.org) and Justine Garrett at [justine.garrett@iea.org](mailto:justine.garrett@iea.org).

## Governments embrace change

The contributions in this edition by 17 government organisations from 16 countries<sup>3</sup> show that significant progress is being made towards developing CCS legal and regulatory frameworks worldwide. Australia, the European Union, the United Kingdom and the United States have been at the forefront of such developments for some time, but this edition demonstrates that many other countries are implementing or considering CCS regulation, including New Zealand, Korea and South Africa.

Countries usually begin to develop CCS legal and regulatory frameworks when they acknowledge that the technology may contribute significantly to reducing their CO<sub>2</sub> emissions. Jurisdictions that depend heavily on domestic coal and other fossil fuels, such as the United States, Canada and Australia, are likely to see CCS as one of the few ways of reducing CO<sub>2</sub> emissions without increasing energy imports or compromising the viability of local or regional industries, which are often substantial. Other countries, such as the United Kingdom, may be interested in CCS more from a desire to ensure a diverse energy portfolio that does not rely too heavily on any one energy source or supplier. The United Kingdom has also made it clear that it would like to help prove CCS technology domestically as a way of aiding its worldwide deployment. In addition, CCS regulatory development may be motivated by other general considerations, such as promoting sustainable development, making the transition to low-carbon energy systems, contributing to job creation and enhancing economic competitiveness.

Beyond the countries and regions that have made early moves towards CCS, many others are developing CCS regulatory frameworks. As shown by the contributions from France, the Netherlands, the Slovak Republic and Spain momentum is gathering in Europe, where EU member states are obliged to transpose the EU CCS Directive<sup>4</sup> by June 2011. Significant activity is also occurring in other regions of the world. Korea, which intends to have a CCS legal and regulatory scheme in place by 2011, has undertaken preliminary consultations and aims to finalise a roadmap for CCS deployment by the end of 2010. South Africa is identifying domestic legislation that might be relevant to CCS or that it could amend to facilitate CCS deployment. It appears CCS is being increasingly acknowledged as an important carbon abatement technology worldwide.

Even countries that do not see CCS as an immediate priority – for example, because it is not currently envisaged as reducing overall emissions significantly – are making early preparations for CCS regulation. New Zealand's CO<sub>2</sub> emissions are concentrated in the agricultural sector and in the form of tailpipe emissions, so CCS is unlikely to play a significant role in reducing them. In addition, New Zealand has a largely renewable electricity system, which limits the potential for deploying CCS on fossil fuel-fired electricity generators. However, the relevant ministry has a medium-term goal of developing a framework for CCS as a way of encouraging responsible development. The technology is already contemplated as a carbon reduction activity in the New Zealand Emissions Trading Scheme. Switzerland also sees little immediate potential for CCS. To cope with a potential energy supply gap by 2020, however, it may have to build combined cycle gas turbine power plants – and under Swiss law, such plants are required to fully compensate for their CO<sub>2</sub> emissions, making associated CCS deployment a potential solution. The

<sup>3</sup> There were two US government contributions, from the Department of Energy and the Environmental Protection Agency.

<sup>4</sup> Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide (EU CCS Directive).



government has commissioned a study on research and industrial development of CCS, and has started to assess geological storage potential. A research project on the feasibility of deploying CCS systems in Switzerland has also begun. The Federal Council has said that it will provide CCS guidelines when necessary.

Several countries that were not involved in this edition of the *CCS Review* are also considering and developing CCS legal and regulatory frameworks.

### Who regulates CCS?

Jurisdictions considering CCS regulatory frameworks need to clearly define where authority lies for different aspects of CCS. While some countries regulate CCS at a centralised, national level, in others the process is more complex. In Australia, Canada and the United States, for example, regulatory competence is shared between national entities and state or provincial bodies, consistent with the governmental structures in place. Under Australia's federal system of government, states and territories have jurisdiction over CO<sub>2</sub> storage onshore and up to three nautical miles offshore, while the federal government has jurisdiction from three nautical miles offshore to the edge of Australia's continental shelf. Legislation is already in place to regulate CCS activities in offshore Commonwealth waters and onshore Victoria, Queensland and South Australia, but is still being developed in New South Wales and Western Australia.

Similarly, regulatory competence for CCS in Canada is divided between the federal and provincial governments. Provinces' jurisdiction over natural resources within their boundaries, including the exploration and development of non-renewable natural resources and the management of electrical generation facilities, gives them authority over certain aspects of CCS. Other elements of CCS are subject to federal jurisdiction due to powers over trade and commerce, international and interprovincial undertakings, taxation and criminal law. Federal and provincial governments share powers over environmental protection, including climate change mitigation measures. In practice, the nature of a particular project will determine the balance of federal and provincial involvement.

In the European Union, both member states and the European Commission are involved in regulating CCS, with countries required to put in place measures that reflect EU-level directives and regulations. In the case of CCS, this primarily means meeting the CCS Directive, but the EU Emission Trading System (EU ETS) Directive<sup>5</sup> also applies. The CCS Directive has to be transposed into member state law by June 2011. This process allows each country to develop a CCS framework that takes into account its particular circumstances, while ensuring that all member states share some core framework elements. While the division of regulatory competence in the European Union is not completely analogous to the situation in individual countries, it can raise similar complexities, especially with regard to the European Commission's more detailed guidance on transposition.

### Starting from existing laws

When developing a CCS legal and regulatory framework, it is crucial to have a thorough understanding of existing laws that may be relevant, as CCS may be most easily regulated by modifying frameworks that are already in effect. This generally occurs in jurisdictions with a

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<sup>5</sup> Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC.

history of oil and gas production, which is similar to some components of CCS. This approach has already been applied in the Canadian provinces and Norway.

Norway's existing petroleum and pollution-control legislation covers two of the world's five large-scale CCS ventures, the Sleipner project, operating since 1996, and the Snøhvit project, begun in 2007. To facilitate commercial CCS deployment and to implement the EU CCS Directive, the government is working on new regulations covering CO<sub>2</sub> storage and transportation on the Norwegian Continental Shelf that will continue to be based on existing petroleum legislation. In Canada, where current oil and gas regulations are also expected to form the foundation for future CCS frameworks, outstanding legal and regulatory issues have been identified and recommendations made on how to address gaps in federal and provincial frameworks. In Australia, too, federal CCS laws are based on oil and gas legislation. CCS regulations are not always adapted from existing oil and gas legislation, however. In Spain, CCS has been regulated through amendments to existing mining laws.

## Heading offshore

In the last few years, amendments to allow CO<sub>2</sub> injection and transboundary transportation of CO<sub>2</sub> have been made to two major marine treaties, known as the London Protocol<sup>6</sup> and the OSPAR Convention.<sup>7</sup>

Such amendments are often highlighted as success stories in the CCS legal and regulatory field, but it is important to note that some of them require ratification by a certain number of countries to enter into force. The 2006 amendment to the London Protocol to allow CO<sub>2</sub> injection was made to the Annex, which means it does not have to be ratified and is already in force. The 2009 amendment to allow transboundary CO<sub>2</sub> transport, however, was made to the body of the text and requires ratification by two-thirds of the parties to the protocol. If the amendment does not enter into force, there will be a limit on the degree to which two countries that are parties to the protocol can co-operate on offshore CO<sub>2</sub> storage. This may restrict the options available to land-locked countries, or countries that would like to use their offshore storage as international hubs. In the case of the OSPAR Convention, the 2007 amendment to allow CO<sub>2</sub> injection into the sub-seabed must be ratified by at least seven parties before entering into force for those parties. If it is not ratified, parties to the convention may be reluctant to embark on offshore CO<sub>2</sub> storage.

Certain contributions highlight progress in ratifying these treaties. Japan has ratified the London Protocol amendment and made corresponding changes to its Marine Pollution Prevention Law. The United Kingdom has ratified the amendments to the OSPAR Convention Annexes II and III relating to CCS. France has made progress towards ratifying OSPAR.

## Providing incentives for CCS

Jurisdictions are increasingly acknowledging that as well as developing clear laws and regulations, they may need to provide incentives to foster large-scale CCS deployment. The European Union, which has amended the EU Emission Trading System Directive to fully include CCS from 2012, has also allocated the revenue from the sale of 300 million EU ETS allowances to

<sup>6</sup> The 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.

<sup>7</sup> The Convention for the Protection of the Marine Environment of the North-East Atlantic.

support CCS and novel renewable technologies. Details of this scheme have yet to be finalised, but it is intended to help up to 12 CCS and innovative renewable energy demonstration projects to start operating by the end of 2015, in the power and industrial sectors.

In addition to being eligible for EU financial support, the United Kingdom is in the process of putting in place a levy on electricity production to help pay for the capital and operational costs of up to four CCS demonstration plants. Details of this incentive mechanism will be set out in regulations that are due to be released in spring 2011. Several other countries have established funds for similar purposes.

### ***Building "CCS-ready" plants***

While governments are putting in place the regulations and incentives needed to encourage large-scale CCS deployment, it will be vital to build new installations that are "CCS ready". The EU CCS Directive included provisions on CCS readiness that member states were required to transpose into law by 25 June 2009 – immediately after the directive was finalised – rather than by the directive's principal deadline of 25 June 2011. Accordingly, CCS-readiness measures have been implemented in France and in the United Kingdom, where guidelines have been published on building CCS-ready thermal power stations. Outside Europe, South Africa has also focused on CCS readiness, placing a CCS-ready requirement in the environmental approval process for the proposed Kusile power plant.

### ***Gaining public acceptance***

Technical, financial and regulatory issues dominated initial discussion of CCS. As projects and enabling frameworks have started to take form, however, public engagement is also being acknowledged as a critical factor, from communities near proposed CCS sites to voters in regions considering CCS. Shell's Barendrecht project in the Netherlands illustrates the significance of public perceptions of CCS and of the role communities are likely to play in deciding whether projects proceed. Despite public information meetings with the municipal council and strong support from the national government, the project has met with widespread opposition from the municipality of Barendrecht. After a decision by ministers in the Upper House of the Dutch Parliament, the Minister of Economic Affairs and of Housing, Spatial Planning and Environment allowed the project to proceed, but the project's proponents have had to cope with considerable delays.

At a national level, Germany provides a striking example of the impact that public opposition can have on CCS regulatory frameworks. The German federal cabinet approved a draft CCS law in April 2009. Public consultations, which had begun before the cabinet's approval and continued with the German federal parliament into May, highlighted concerns over the risk of leakage, contamination of drinking water, safety and liability, and land rights. This led first to the inclusion in the draft law of a "sunset" clause, requiring the law to be reviewed in 2015, and then to the law being postponed until after the German federal elections in September 2009. The new government expressed its intention to implement the CCS law promptly in its coalition agreement of October 2009, but has acknowledged the importance of public acceptance. The draft law is being amended to enhance the rights of site owners and emphasise that CCS must be technically proven before it is commercially applied – effectively limiting the law to CCS demonstration.

Several existing regulatory frameworks recognise the importance of public opinion by integrating measures such as compulsory public notification or consultation into legislative or other regulatory instruments.

## Organisation contributions

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This edition also includes contributions by five international organisations that together represent a significant source of CCS legal and regulatory information. As well as providing extensive analysis of existing and developing frameworks, these organisations consolidate and make easily accessible information relevant to CCS framework development. They also provide tools to assist in the development of frameworks and guidance on how best to address various CCS legal and regulatory issues.

Of particular note are the CCS legal and regulatory resources provided by UCL-CCLP and the CCSReg programme. The UCL-CCLP website provides a comprehensive database of worldwide CCS regulatory frameworks, together with succinct analysis and summaries of those frameworks. The CCSReg website provides similar resources but with a particular focus on US regulation. The IEA GHG, the Global CCS Institute and WRI also do extensive work in this area and provide resources to those who want to know more about CCS legal and regulatory developments. All these organisations generally provide their information free of charge.

In addition to the above five, the IEA itself is actively involved. The IEA aims to provide resources for those interested in CCS legal and regulatory frameworks via analysis and publications, as well as by fostering information exchange through the International CCS Regulatory Network.

## Government contributions

### Australia

**Jurisdiction:**

Australian Commonwealth and State jurisdictions

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### *Developments in last six months*

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. Legislation is currently in place to deal with the injection and geological storage of CO<sub>2</sub> in Commonwealth waters, onshore Victoria, Queensland South Australia. Legislation is being developed by New South Wales and Western Australia for those states' onshore areas.

**Commonwealth**

Since January 2010, the following regulations underpinning the Commonwealth CCS legislation, *Offshore Petroleum and Greenhouse Gas Storage Act 2006*, have been finalised:

- *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009* – came into effect on 1 January 2010  
([http://www.comlaw.gov.au/ComLaw/Legislation/LegislativeInstrumentCompilation1.nsf/0/EC4F33DAFDEEEB13CA25769000157FB7/\\$file/OffshorePetGreenGasStoreEnvRegs2009.pdf](http://www.comlaw.gov.au/ComLaw/Legislation/LegislativeInstrumentCompilation1.nsf/0/EC4F33DAFDEEEB13CA25769000157FB7/$file/OffshorePetGreenGasStoreEnvRegs2009.pdf)).
- *Offshore Petroleum and Greenhouse Gas Storage (Management of Greenhouse Gas Well Operations) Regulations 2010* – came into effect on 25 February 2010  
([http://www.comlaw.gov.au/ComLaw/Legislation/LegislativeInstrument1.nsf/0/4696108409F673AECA2576D6001BC501/\\$file/0925407C100226A.pdf](http://www.comlaw.gov.au/ComLaw/Legislation/LegislativeInstrument1.nsf/0/4696108409F673AECA2576D6001BC501/$file/0925407C100226A.pdf)).
- *Offshore Petroleum and Greenhouse Gas Storage (Datum) Regulations 2010* – came into effect on 25 February 2010  
([http://www.comlaw.gov.au/ComLaw/Legislation/LegislativeInstrument1.nsf/0/385B55648CCA4EDACA2576D60015BBF0/\\$file/0925407B100105EV.pdf](http://www.comlaw.gov.au/ComLaw/Legislation/LegislativeInstrument1.nsf/0/385B55648CCA4EDACA2576D60015BBF0/$file/0925407B100105EV.pdf)).
- *Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2009* – came into effect on 3 June 2010  
([http://www.comlaw.gov.au/ComLaw/legislation/LegislativeInstrument1.nsf/0/0116F450B99061FBCA2577370081106C/\\$file/1001361A100419EV.pdf](http://www.comlaw.gov.au/ComLaw/legislation/LegislativeInstrument1.nsf/0/0116F450B99061FBCA2577370081106C/$file/1001361A100419EV.pdf)).

The Commonwealth has developed draft *Offshore Petroleum and Greenhouse Gas Storage (Injection and Storage) Regulations 2010*, which are the principal regulations that will regulate offshore injection and storage operations. These draft regulations were circulated to all stakeholders, for comment, on 3 May 2010.

### Victoria

Victoria's offshore CCS legislation, *Offshore Petroleum and Greenhouse Gas Storage Act 2010* received royal assent on 23 March 2010. This Act mirroring the Commonwealth legislation is to commence on 1 January 2012 if not at a date proclaimed earlier. This Act is available at: [http://www.legislation.vic.gov.au/Domino/Web\\_Notes/LDMS/PubStatbook.nsf/f932b66241ecf1b7ca256e92000e23be/6D3C2CCB18FB08C3CA2576EF001E64F4/\\$FILE/10-010a.pdf](http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/PubStatbook.nsf/f932b66241ecf1b7ca256e92000e23be/6D3C2CCB18FB08C3CA2576EF001E64F4/$FILE/10-010a.pdf).

Further information on CCS activities in Victoria is at: <http://new.dpi.vic.gov.au/energy/projects-research-and-development/carbon-capture-and-storage-ccs>.

### Queensland

New CCS regulations *Greenhouse Gas Storage Regulation 2010* came into force on 9 April 2010 and are available at: <http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/G/GreenGasSR10.pdf>. These regulations underpin Queensland onshore CCS legislation.

Tender for areas released for CCS exploration was gazetted on the 22nd May 2010 and will close on 15th June 2010. Information on the Greenhouse Gas Storage exploration permit call for tenders can be found at [http://www.dme.qld.gov.au/mines/exploration\\_permit\\_greenhouse\\_gas\\_storage.cfm](http://www.dme.qld.gov.au/mines/exploration_permit_greenhouse_gas_storage.cfm).

### Western Australia

On 26 May 2009, the Western Australian Minister for Mines and Petroleum approved the development of a legislative framework for onshore legislation. The legislation will take the form of an amendment to existing *Petroleum and Geothermal Energy Resources Act 1967*. Preliminary drafting instructions were sent out to targeted stakeholders on 9 June with a closing date for responses of Friday 24 July.

### New South Wales

New South Wales developed a position paper on proposed onshore CCS legislation, which was released for public comment over a four week period which closed on 15 September 2010.

## Developments expected in next six months

- **Commonwealth:** The *Offshore Petroleum and Greenhouse Gas Storage (Injection and Storage) Regulations 2010* are expected to be finalised by early 2011.
- **Victoria:** Victoria will mirror the Commonwealth's Regulations that sit under this Bill when they are finalised later this year.
- **Queensland:** Following the closure of tender on 15 June 2010, Green House Gas Exploration permits are expected be granted before the end of 2010.
- **Western Australia:** Drafting of the Western Australian onshore CCS legislation will commence.
- **New South Wales:** Once the position paper is finalised, legislation will be drafted and presented to Parliament in the second half of 2010.



## Canada

### Jurisdiction:

Canadian Federal and Provincial jurisdictions

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### Progress to 2010

Canada has a federal constitutional structure, with the Canadian Constitution distributing legislative power between the federal and provincial governments.<sup>8</sup> Some CCS-related matters are within provincial jurisdiction, stemming primarily from provincial authority over natural resources within their boundaries, including the exploration and development of non-renewable natural resources and the management of electrical generation facilities. Some CCS-related matters are within federal jurisdiction, stemming from federal powers over trade and commerce, international and interprovincial undertakings, taxation, and criminal law. Responsibility for environmental protection, including climate change, is shared by the two levels of government. Therefore, depending on the particular CCS project, a level of government may have more or less jurisdiction over the project.

Canada has decades of experience with various components of CCS from its activities in the oil and gas sector. A number of public-private-academic advisory groups and third party experts have reported that the regulatory frameworks in place for the oil and gas sector in Canada form a solid foundation for future regulation of CCS projects.<sup>9</sup> These groups and experts have also identified outstanding legal and regulatory issues and made recommendations on how to address gaps in federal and provincial legal and regulatory frameworks.

### Federal government

The federal government has the ability to regulate greenhouse gas emissions under the *Canadian Environmental Protection Act, 1999*. Overall, the Government of Canada supports an approach to climate change that achieves real environmental and economic benefits for all Canadians, including through harmonization of its climate and energy policies with the United States. The 2020 economy-wide greenhouse gas reduction target Canada has inscribed in the Copenhagen Accord is a 17 per cent reduction from 2005 levels, which is aligned with the US

<sup>8</sup> *Constitution Act, 1867*: [http://laws.justice.gc.ca/en/const/3.html#anchorbo-ga:s\\_91](http://laws.justice.gc.ca/en/const/3.html#anchorbo-ga:s_91).

<sup>9</sup> Canadian Standards Association, *A Summary of Existing Regulations and Development Opportunities for CCS*, March 2006; Canada-Alberta ecoENERGY CCS Task Force, *Canada's Fossil Energy Future: The Way Forward on CCS*, January 2008: <http://www.nrcan.gc.ca/com/resoress/publications/fofos/fofos-eng.php#dowtel>; Alberta CCS Development Council, *Accelerating CCS Implementation in Alberta*, March 2009: [http://www.energy.alberta.ca/Org/pdfs/CCS\\_Implementation.pdf](http://www.energy.alberta.ca/Org/pdfs/CCS_Implementation.pdf); Bankes, N, Poschwatta-Yearsley, J, and Ference, T, *The Legal and Regulatory Treatment of CCS in Canada and the US*, March 2010; Zurovsky, R, *The Regulatory Framework Governing Injection and Storage of CO<sub>2</sub> at the Cenovus Weyburn and Apache Midale Enhanced Oil Recovery Operations in Saskatchewan*, March 2010: [http://www.ccs101.ca/regulatory\\_framework\\_governing\\_injection\\_and\\_storage\\_of\\_carbon\\_dioxide\\_at\\_the\\_Cenovus\\_veyburn\\_and\\_apache\\_midale\\_enhanced\\_oil\\_recovery\\_operations\\_in\\_saskatchewan](http://www.ccs101.ca/regulatory_framework_governing_injection_and_storage_of_carbon_dioxide_at_the_Cenovus_veyburn_and_apache_midale_enhanced_oil_recovery_operations_in_saskatchewan).

target. Moving forward with the development of clean energy technologies, such as CCS, will help Canada reach this target and balance our need for energy with protecting the environment.

The Government of Canada has announced its intention to develop greenhouse gas regulations that will require new coal-fired power plants and those reaching the end of their economic life to meet a stringent emissions performance standard. This standard could encourage investment in cleaner power generation technologies such as CCS.

CCS projects may trigger federal responsibilities under the *Canadian Environmental Assessment Act*.<sup>10</sup> Examples of triggers include federal funding for CCS projects, projects on federal lands, and transboundary projects.<sup>11</sup>

The National Energy Board (NEB), an independent federal agency that regulates international and interprovincial aspects of the oil, gas and electric utility industries, has jurisdiction over interprovincial and international commodity pipelines. In 1998, the NEB approved the construction and operation of Canada's first international CO<sub>2</sub> pipeline, the Souris Valley pipeline, which transports CO<sub>2</sub> from North Dakota to the Weyburn and Midale oil fields in Saskatchewan.<sup>12</sup>

In fulfilling the Government of Canada's obligations and commitments under the London Protocol and London Convention, the Government of Canada participated from 2004 on in the evaluation and enabling of permits for storage of CO<sub>2</sub> streams into sub-seabed geological formations through an amendment to Annex 1 of the London Protocol. The Government of Canada formally accepted that amendment in 2006. The Government of Canada participated in the legal negotiations as well as on the Scientific Groups of these treaties.<sup>13</sup> The Government of Canada was also involved in the approval of 2009 amendments to the London Protocol that would permit the transboundary movement of CO<sub>2</sub> for sub-seabed geological storage in another country.

### Provincial governments

Alberta has well-developed regulatory frameworks in the oil and gas sector that are applicable to CCS projects. The Alberta CCS Development Council, comprised of members from industry, academia and government, concluded in its March 2009 report that Alberta's regulatory preparedness for the first CCS projects is well advanced. The Council made a number of recommendations on how outstanding issues such as pore space ownership and long term liability could be addressed.<sup>14</sup>

<sup>10</sup> *Canadian Environmental Assessment Act*: [http://laws.justice.gc.ca/eng/C-15.2/page-3.html#anchorbo-ga:s\\_5](http://laws.justice.gc.ca/eng/C-15.2/page-3.html#anchorbo-ga:s_5).

<sup>11</sup> The federal government owns or leases a total land area of over 30 million hectares. These lands include such things as national parks, experimental farms and wildlife areas. In addition, there are approximately 240 million hectares of federal crown land in Nunavut and the Northwest Territories.

<sup>12</sup> Reasons for Decision document is accessible from the NEB at <https://www.neb-one.gc.ca/ll-eng/livlink.exe?func=ll&objId=92830&objAction=Open>.

<sup>13</sup> Environment Canada, Natural Resources Canada and the Departments Justice and Foreign Affairs and International Trade were involved in these efforts. Comments or questions can be addressed to Linda Porebski, Canada's Focal Point for London Convention and London Protocol: [linda.porebski@ec.gc.ca](mailto:linda.porebski@ec.gc.ca); +1 819 953 4341.

<sup>14</sup> Alberta CCS Development Council Final Report: [http://www.energy.alberta.ca/Org/pdfs/CCS\\_Implementation.pdf](http://www.energy.alberta.ca/Org/pdfs/CCS_Implementation.pdf).

British Columbia has a mature oil and gas industry supported by a strong regulatory framework that is applicable to CCS development. The province has legislation and regulations in place governing storage reservoir rights, underground storage and disposal relating to oil and natural gas operations.<sup>15</sup> British Columbia is in the process of creating a regulation listing prescribed substances that will allow substances such as CO<sub>2</sub> from any source, to be disposed or stored in underground storage reservoirs.

Saskatchewan has an existing regulatory framework that accommodates CO<sub>2</sub> injection. Commercial-scale EOR projects which result in CO<sub>2</sub> storage are already underway in the province governed under existing statutes and regulations. Saskatchewan is reviewing the need for additional regulations that will reflect the role of GHG emissions reduction credits that may arise with the implementation of future climate change policies. Saskatchewan also continues to review whether additional regulatory clarification is required to assist the development of CCS projects.

### **Documents released in last six months**

In March 2010, the IEA GHG R&D CO<sub>2</sub> Monitoring and Storage Project released *The Regulatory Framework Governing Injection and Storage of CO<sub>2</sub> at the Cenovus Weyburn and Apache Midale Enhanced Oil Recovery Operations in Saskatchewan*, by R. Zurowsky ([http://www.ccs101.ca/regulatory\\_framework\\_governing\\_injection\\_and\\_storage\\_of\\_carbon\\_dioxide\\_at\\_the\\_Cenovus\\_weyburn\\_and\\_apache\\_midale\\_enhanced\\_oil\\_recovery\\_operations\\_in\\_saskatchewan](http://www.ccs101.ca/regulatory_framework_governing_injection_and_storage_of_carbon_dioxide_at_the_Cenovus_weyburn_and_apache_midale_enhanced_oil_recovery_operations_in_saskatchewan)).

### **Developments expected in next six months**

CCS Nova Scotia, a public-private-academic research consortium, is developing a legal and regulatory roadmap for implementing a pilot CCS project in Nova Scotia. Expected completion is fall 2010.

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<sup>15</sup> *Petroleum and Natural Gas Act*, ss, 1, 126-132: [http://www.bclaws.ca/EPLibraries/bclaws\\_new/document/ID/freeside/00\\_96361\\_01](http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96361_01).

## European Union

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### *Progress to 2010*

The 2007 Spring European Council called for the European Union (EU) to be at the forefront of efforts to combat climate change and endorsed ambitious targets aimed at setting the European energy system on a sustainable path. To ensure that these targets are met, the European Commission (EC) put forward a set of proposed policy instruments, the so-called *Climate Action and Renewable Energy Package*, in January 2008. After only a little over a year of negotiations in Council and European Parliament, the Package was adopted by the co-legislators in April 2009 and entered into force on 25 June 2009. A key element of the Package is Directive 2009/31/EC on the geological storage of carbon dioxide (CCS-Directive), which constitutes one of the first comprehensive legal frameworks for the management of environmental and health risks related to carbon capture and storage (CCS) worldwide, including requirements on permitting, composition of the CO<sub>2</sub> stream, monitoring, reporting, inspections, corrective measures, closure and post-closure obligations, transfer of responsibility to the State, and financial security. The CCS-Directive has also amended a number of other EU laws to establish requirements on capture and transport operations and to remove existing legal barriers to the geological storage of CO<sub>2</sub>.

At the same time, Directive 2009/29/EC amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community (revised ETS-Directive), a further major element of the *Climate Action and Renewable Energy Package*, has provided that 300 million allowances in the new entrants reserve of the Emissions Trading System (ETS) shall be available until 31 December 2015 to help stimulate the construction and operation of up to 12 commercial demonstration projects that aim at the environmentally safe capture and geological storage of CO<sub>2</sub> as well as demonstration projects of innovative renewable energy technologies in the territory of the Union. Over the course of 2009, the Commission services have prepared and discussed with Member States a draft Decision establishing criteria and measures for project selection, monetisation of the allowances and disbursement of the revenues (NER 300 Decision).

### *Developments in last six months*

With the exception of its Article 33 (capture-readiness assessment), which had to be transposed by 25 June 2009, the CCS-Directive has to be transposed by EU Member States by 25 June 2011.

The EC is providing guidance to the Member States on the transposition and implementation of the Directive through an informal Information Exchange Group (IEG), which meets regularly to discuss questions on the interpretation and implementation of the Directive. Member States have reported to be on track to complete transposition by the transposition deadline, and some Member States envisage transposition will already be complete by the end of 2010/ early 2011.

Over the past six months, the EC has also prepared and discussed with the IEG guidance documents on various elements of the Directive. They concern CO<sub>2</sub> storage life cycle risk management, site characterisation, CO<sub>2</sub> stream composition, monitoring and corrective measures, transfer of responsibility, financial security and financial contribution. Drafting has now been completed, and the documents have been submitted for a wide stakeholder consultation until the end of July.

In addition, Decision 2007/589/EC establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC was amended to include monitoring and reporting guidelines for greenhouse gas emissions from the capture, transport and geological storage of carbon dioxide (see link below).

As regards the financing of demonstration projects, Member States gave a positive vote in the Climate Change Committee in February 2010 on the draft NER 300 Decision. Following successful completion of a three month scrutiny period in the European Parliament and Council, the draft Decision is now ready for adoption by the Commission. At the same time, preparations for the launch of the call for proposals have been made internally, and a co-operation agreement has been prepared and negotiated with the European Investment Bank (EIB) to specify the details of their involvement both in the selection of projects and the monetisation of the allowances.

### ***Documents released in last six months***

Commission Decision 2010/345/EU of 8 June 2010 amending Decision 2007/589/EC as regards the inclusion of monitoring and reporting guidelines for greenhouse gas emissions from the capture, transport and geological storage of carbon dioxide: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:155:0034:0047:EN:PDF>.

### ***Developments expected in next six months***

On the CCS-Directive, discussions on national transposition measures are expected to continue and intensify in the coming months. From the end of 2010, the first transposition measures may be officially communicated to the EC and will then have to be checked for conformity with the Directive.

Discussions on the implementation of the Directive in the IEG will continue. The guidance documents should be published by the end of 2010. The Commission will also set up a Scientific Panel to prepare for the review of draft permit decisions from the Member States.

On the financing of demonstration projects, the NER 300 Decision should be adopted, the co-operation agreement with the EIB signed, and the call for proposals launched.

## France

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### *Progress to 2010*

France is a centralised state. As a consequence, legal and regulatory development takes place centrally and come into force across the territory.

CCS legal and regulatory developments started in the framework of the writing of the EU directive on the geological storage of carbon dioxide, in which France has been heavily involved.

The EU 2009/31/CE directive was adopted on the 23rd of April 2009 along with an obligation for Member States to bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 25 June 2011.

A few months later, on the 3<sup>rd</sup> of August 2009, France adopted new legislation<sup>16</sup> providing a framework for a government programme resulting from national round tables on the integration of sustainable development principles into public policy.<sup>17</sup> This core legislation states, amongst other things, under art 19. VI<sup>18</sup> that any new coal power station project should be CCS ready and should be accompanied by a CCS full scale demonstration program.

Since then, France has been working on the transposition of the EU CCS directive into national legislation. The General Directorate for Energy and Climate Change,<sup>19</sup> under the umbrella of Ministry of Ecology, Energy and Sustainable Development, is in charge of this work.

The transposition activity consists of bridging the EU CCS directive's requirements with existing national principles, and when necessary, amending them.

EU directive requirements fall either within the category of law, regulation or administrative provisions depending upon the principle and level of details they introduce. Only core principles are turned into law. It therefore requires the adoption of a stepwise approach by working out complementary law, regulation, etc, to cover the full scope of the directive and its practical implementation.

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<sup>16</sup> Loi n° 2009-967 du 3 août 2009 de programmation relative à la mise en œuvre du Grenelle de l'environnement.

<sup>17</sup> Grenelle de l'environnement, see <http://www.legrenelle-environnement.fr/>.

<sup>18</sup> [http://www.legifrance.gouv.fr/affichTexte.do;jsessionid=7BFFA2CB5838CE9A50F2224080027618.tpdjo14v\\_1?cidTexte=JORFTEXT000020949548&categorieLien=id](http://www.legifrance.gouv.fr/affichTexte.do;jsessionid=7BFFA2CB5838CE9A50F2224080027618.tpdjo14v_1?cidTexte=JORFTEXT000020949548&categorieLien=id).

<sup>19</sup> <http://www.developpement-durable.gouv.fr/-Energie-et-Climat,123-.html>.



So far, exploration permit principles and granting processes have been adopted by parliament on the 10<sup>th</sup> of May 2010.<sup>20</sup> This section is anchored to the environmental code<sup>21</sup> through articles L.229-27 to L.229-31 under the greenhouse gas section, with cross reference to the mining code.<sup>22</sup> The mining code handles access rights to underground resources.

In accordance with mining code rules, the section mostly submits exploration activities, drilling and injection tests to permitting by respectively ministries in charge of mines and local representatives of the government. Beyond authorisation, injection tests must be accompanied by the set up of a public consultation committee at the expenditure of the prospector.

Finally, in order not to hold up CO<sub>2</sub> pipeline network development, article L.229-31 provides that CO<sub>2</sub> pipeline network development is of public interest.

Since then, France is working on the drafting of the related regulation. At the same time, France is concentrating on the transposition of the remaining requirements of the directive. Draft text has been open to public consultation last summer via the Ministry of Environment website.<sup>23</sup> Consultation is now closed and the text is under review by the State Council.

Moreover, provisions of article 33 of the directive which submit new large combustion installations to a CCS feasibility study have also been transposed for boilers into administrative provisions. Though already applicable, this text should be published shortly.

In parallel with EC CCS directive implementation activities, the ministry of the environment is working on the ratification of the amendment of annexes II and III of the OSPAR<sup>24</sup> convention, that introduce the principle of CO<sub>2</sub> storage in marine geological formation.

### *Developments in last six months*

As noted, over the last six months the transposition work met a first achievement. Exploration permits principles and granting were adopted by parliament on the 10<sup>th</sup> of May 2010.<sup>25</sup> The related regulation is now in progress in order to offer in the short term an appropriate legal framework for new storage projects exploration activities.

Besides, the draft proposal on third party access to transport and storage site has been submitted to an independent authority likely to endorse dispute settlement activities.

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<sup>20</sup> See article 28 under document presented at <http://www.assemblee-nationale.fr/13/ta/ta0458.asp>.

<sup>21</sup> <http://www.legifrance.gouv.fr/affichCode.do?cidTexte=LEGITEXT000006074220&dateTexte=20100114>.

<sup>22</sup> <http://www.legifrance.gouv.fr/affichCode.do?cidTexte=LEGITEXT000006071785&dateTexte=20100126>.

<sup>23</sup> <http://www.developpement-durable.gouv.fr/Presentation-du-projet-d.html> – see article 5 of the downloadable draft text.

<sup>24</sup> The OSPAR Convention is the current legal instrument guiding international cooperation on the protection of the marine environment of the North-East Atlantic.

<sup>25</sup> See article 28 under document presented at <http://www.assemblee-nationale.fr/13/ta/ta0458.asp>.

Legislation on exploration activities can be found in articles L.229-27 and following of the environmental code. Draft legislation on the other chapters of the directive can still be consulted on the internet though the public consultation is now closed.<sup>26</sup>

Over the last six months, French delegates from the ministry and from institutes (BRGM, IFP Energies Nouvelles) have also been involved in reviewing EU guidance documents. These documents aim at assisting to assist Member States when transposing and implementing directive 2009/31/CE on CO<sub>2</sub> storage.

### ***Developments expected in next six months***

Over the next six months, significant breakthroughs are expected. First of all, transposition of all legislative matters of the directive is to be completed. In addition, complementary regulations will be drafted to cover the full scope of the directive and its practical implementation.

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<sup>26</sup> <http://www.developpement-durable.gouv.fr/Presentation-du-projet-d.html> – see article 5 of the downloadable draft text.

## Germany

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### *Progress to 2010*

Germany's preparation for a CCS law started in late 2008. The Ministries in charge - the Ministry of Environment and the Ministry of Economics - worked in close cooperation. The first draft was approved by the Federal Cabinet in April 2009 (draft law: Bundestags-Drucksache 16/12782, see: <http://dipbt.bundestag.de/dip21/btd/16/127/1612782.pdf>). The draft law integrated all stages of CCS technologies, capture, transport, exploration of storage sites, injection and decommissioning.

The main provisions, including a review clause for 2015, were:

- National storage site potential analysis (Federal Geological Survey and Federal Environment Agency).
- Procedure for exploration permit (each storage requires prior exploration).
- Licensing process through a comprehensive plan approval procedure for storage permit conditions, inter alia guaranteeing long-term security of the storage sites.
- Obligations for operators of CCS storage sites (i.e. responsibilities, removal, remediation, reporting).
- Liabilities during injection, after decommissioning and up to transfer of responsibility
- Conditions for decommissioning and long-term monitoring.
- Condition for the transfer of responsibilities from operator to state not earlier than 30 years after closure (as a general rule).
- Regulation of environmental liability, Environmental Impact Assessment, capture readiness for large combustions plants.

Public consultations started ahead of approval by the Federal Cabinet (February/March 2009) and continued with the Environmental Committee of the Bundestag in May. The draft CCS law was generally well-received by the experts. Criticism was apparent from opponents of CCS technology and there were differences of opinion on the question of whether the CCS law should be permanent or limited in time: [www.bundestag.de/dokumente/textarchiv/2009/24464626\\_kw22\\_umwelt/index.html](http://www.bundestag.de/dokumente/textarchiv/2009/24464626_kw22_umwelt/index.html); [www.bundestag.de/presse/hib/2009\\_05/2009\\_146/01.html](http://www.bundestag.de/presse/hib/2009_05/2009_146/01.html).

Despite the positive feedback in general the process came to a dead stop and the draft CCS law was not debated further in the German Bundestag or the Bundesrat. Instead the CCS law was postponed until after the federal election in September 2009. This postponement was not solely because of the overlap with the election campaign, but also because of growing public rejection of CCS technology. This opposition started in Schleswig-Holstein - at that time a potential area for CO<sub>2</sub> storage which a utility had selected for detailed exploration - and subsequently spread

to different organisations such as the water and farmers' associations. Concerns primarily related to the risk of leakage, pollution of drinking water, long-term safety and liability, as well as land owner rights and public consultations. Before the draft law was postponed, the concerns had been addressed to some extent in questions from members of parliament and answers from the government in document Drucksache 16/16333 of 12 June 2009: <http://dipbt.bundestag.de/dip21/btd/16/133/1613333.pdf>.

As a result of this, in its coalition agreement of October 2009 (<http://www.cdu.de/doc/pdfc/091026-koalitionsvertrag-cducsu-fdp.pdf>), the new government expressed the will to implement the CCS law promptly. The importance of public acceptance is recognised e.g. in the creation of a geothermal atlas to analyse possible competition between geothermal use and CO<sub>2</sub> storage. The experience of 2009 has shown that CCS is a technology which cannot be implemented in a hurry or without adequate discussion among all public and private stakeholders.

### ***Developments in last six months***

Work on the CCS law resumed in March 2010. The Federal Environment and Economics Ministries are improving the draft with regard to several legal provisions affecting acceptance among the public and the Länder, e.g. by endeavouring to enhance the rights of site owners and emphasising that CCS must first prove to be feasible before it can be applied commercially (i.e. after 2020). Therefore, the CCS law should become a limited CCS demonstration law, restricted in terms of time but not in terms of safety and environmental standards. Low public acceptance, especially in regions with potential CO<sub>2</sub> storage sites, remains one of the main obstacles to prompt implementation.

### ***Documents released in last six months***

- [http://www.stk.brandenburg.de/media\\_fast/bb2.a.5599.de/Eckpunktepapier\\_MWE\\_Neues\\_CCS\\_Gesetz.pdf](http://www.stk.brandenburg.de/media_fast/bb2.a.5599.de/Eckpunktepapier_MWE_Neues_CCS_Gesetz.pdf).
- <http://www.iz-klima.de/materialien/veranstaltungsdocumentation/regionale-infoveranstaltung-29032010/>.

### ***Developments expected in next six months***

The energy concept of the German government currently being developed will identify possible CCS needs. The CCS law will provide the legal framework with very stringent safety and environmental standards to demonstrate the feasibility of CO<sub>2</sub> capture, transport and storage in deep geological formations – as a prerequisite but not a precedent for a decision on future commercial deployment.

Consultations are expected to start soon. The revised draft CCS law will be sent to Länder governments and organisations and hearings will be held before the CCS law moves to the parliamentary process, probably after the summer. The conclusion of the EU-CCS Directive's transposition into German law is envisaged for the end of 2010 or early 2011 at the latest.

## Japan

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## Progress to 2010

### Regulatory

*Amendment of the Marine Pollution Prevention Law (May, 2007)*

Amendment of the Marine Pollution Prevention Law was enforced in May 2007 in accordance with ratification of the London Protocol 1996. Amended items are as follows:

#### 1. Prohibition of disposal of oil, hazardous liquid substances, and wastes under the seabed

No one shall dispose oil, hazardous liquid substances, and wastes under the seabed except for CO<sub>2</sub> stream storage under the seabed with permit from Minister of the Environment (Article 18.7).

#### 2. Provisions for the permit for CO<sub>2</sub> stream storage under the seabed

(1) Anyone intending to dispose CO<sub>2</sub> stream under the seabed must obtain a permit from Minister of the Environment (Article 18.8).

(2) The Minister of the Environment shall not issue a permit for the CO<sub>2</sub> stream storage under the seabed unless it meets all conditions required such as “the storage site under the seabed and the method taken for the storage will not harm marine environmental protection at the storage site” and “there is no other appropriate disposal available other than storage under the seabed” (Article 18.9).

(3) A person holding a permit for CO<sub>2</sub> stream storage under the seabed must monitor status of the pollution at the storage site and report monitoring results to Minister of the Environment (Article 18.12).

#### 3. Designation of a registered area

(1) The Minister of the Environment designates a CO<sub>2</sub> storage site under the seabed as a registered area, in order to prevent potential impact on marine environment from CO<sub>2</sub> leakage by altering the seabed and the sub-seabed features (Article 18.15; details are provided by Cabinet Order).

(2) Notification to the Minister of Environment is required for activities which alter the seabed and the sub-seabed features within a registered area. The Minister of Environment has competence to order a change of project plan (Article 19.2).

#### 4. Validation

The Minister of Environment has competence to order submission of a report on CO<sub>2</sub> storage under the seabed and conduct inspection for the purpose of implementation of the Law (Article 48).

#### 5. Period of Permit

Re-permit is required every 5 years (Announcement of the MOE 2-2-(1)).

In addition, the following items were amended or established in accordance with the law:

- Amendment of the Cabinet Order (September, 2007)
- New Ordinance of the Ministry of the Environment for the determination of methods for measuring concentration of CO<sub>2</sub> stream (September, 2007)
- New Ordinance of the Ministry of the Environment for offshore CCS permission (September, 2007)
- New Notification of offshore CCS permission (September, 2007)

Reference: [http://www.iea.org/work/2008/ccs/pdfs/PanellI\\_4\\_Japan\\_Maeda.pdf](http://www.iea.org/work/2008/ccs/pdfs/PanellI_4_Japan_Maeda.pdf).

#### **Guideline**

*New Guideline for safe operation of a CCS demonstration project (August, 2009)*

This guideline is a standard desired to be followed from the safety and environmental viewpoints in implementing a large-scale CCS demonstration project and is not a preliminary safety to be set up when putting CCS into practice in the future.

Reference: [http://www.meti.go.jp/english/press/data/pdf/090807\\_02PDF.pdf](http://www.meti.go.jp/english/press/data/pdf/090807_02PDF.pdf).

#### ***Developments expected in next six months***

None



## Korea

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### *Progress to 2010*

Korea is the 9<sup>th</sup> largest emitter of greenhouse gases and in November 2009 voluntarily announced an ambitious mitigation commitment to reduce emissions by 30% from its 2020 BAU level. To meet this target Korea are looking to use a set of technology options including CCS. CCS was also included in the 17<sup>th</sup> new national growth engines announced in January 2009. Currently, Korea is developing a comprehensive national CCS action plan slated to be announced in 2010.

The Korean government investment in CCS R&D has been growing rapidly, reaching a total of 22 million US dollars in 2009 with most of the Ministry of Knowledge Economy funding being directed to capture technologies R&D. In 2009, Korea invested 5 million dollars in post-combustion R&D projects, such as 0.5MW-scale dry sorbent and 0.1MW advanced amine capture plants. They also invested a similar amount in pre-combustion technologies such as solid sorbent and membrane separation. Oxy-fuel and chemical looping projects also received our funding, though to the same extent as post- and pre-combustion. To date, storage has not been the focus of Korea's CCS efforts however a survey of the Ulleung Basin area near the Donghae gas field revealed a potential storage capacity of 250 million tons of CO<sub>2</sub>.

The need for a more strategic approach to CCS demonstration prompted the Korean government to draft a strategic CCS demonstration action plan. The goal of the action plan is to complete Korea's first integrated large-scale CCS demonstration project in 2018, and the second in 2020. The first project will commence this year beginning with a pair of 10-30MW pilot tests of post-combustion technologies. The pilot tests are going to be launched upon completion of the ongoing selection process. Assessment of the feedback from the competitive pilot projects will allow us to select and launch a 150-300MW demonstration project in 2014. The same process will apply to the second demonstration project, which will be launched and completed two years later than the first. The pilot tests for the second project will be selected among the most promising pre-combustion, oxy-fuel, or other advanced technologies at the time of selection. As to storage, the action plan includes the continued survey of the Ulleung Basin with an aim to complete site selection by 2015. When all the necessary facilities are in place by 2017, an integrated CCS demonstration will begin at a scale of more than 1 million tons of CO<sub>2</sub> per year. The necessary funds for this program will come from both the government and the private sector and will total 2 billion US dollars. The private sector will shoulder the same amount as the government for the pilot projects; four times the government funding for demonstration; and two-thirds for storage. Funding breakdown for the action plan can be seen in Table 1.

Table 1: Funding for Korean CCS action plan

Budget until 2020	Pilot (Million \$)	Demonstration (Million \$)	Storage (Million \$)	Total (Million \$)
Government	80	192	570	842
Private Sector*	80	767	380	1,227

\* Includes KEPCO, KOGAS, KNOC, etc.

### ***Developments in last six months***

Korea has undertaken internal consultation to prepare for the introduction of a CCS legal and regulatory system.

### ***Developments expected in next six months***

Korean government is planning to conduct research on a CCS legal and regulatory scheme with legal experts in the second half of 2010, for the preparation of drafting Korean CCS legislation by 2011. Korea will finalise a CCS roadmap for the coming years by the end of 2010.

## Netherlands

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<http://international.vrom.nl/pagina.html?id=41558>

<http://international.vrom.nl/pagina.html?id=41534>

[www.rijksoverheid.nl/CO2opslag](http://www.rijksoverheid.nl/CO2opslag)

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### Progress to 2010

- EU: Council Conclusions: The European (Environment) Council 2007 twelve large scale demonstration projects on CCS in the EU.
- The Netherlands: Dutch Climate Change policy in the policy document “New energy for Climate policy” (2008) states: “The aim of the Netherlands is to locate two (Groningen and Rijnmond) of the major demos desired by the EU for an electricity power plant with CO<sub>2</sub> capture and storage (CCS) in the Netherland.” [www.vrom.nl/pagina.html?id=2706&sp=2&dn=7421](http://www.vrom.nl/pagina.html?id=2706&sp=2&dn=7421) (English version available on request).
- EU: 23 January 2008 Proposal for a directive of the European Parliament and the European Council on the geological storage of carbon dioxide and amending several (Council) Directives.<sup>27</sup>
- January 2008 Communication of the European Commission to the European Parliament and the European Council on early stage demonstration on sustainable electricity production with fossil fuels.
- Dutch position on proposal for a Directive on the geological storage of carbon dioxide BNC fiche 2008.
- 23<sup>rd</sup> of April 2009 Directive 2009/31/EC of the European Parliament and the European Council on the geological storage of carbon dioxide and amending several (Council) Directives.
- [eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140...EN](http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140...EN).
- Transposition of Directive 2009/31/EC (in short CCS Directive) in Dutch Mining Law, in Environmental Management Law and in several General Governmental Decisions and Ministerial Rules, based on the Mining Law and the Environmental Management Law.
- The Environmental Management Law and Decisions and Regulation based hereon is the responsibility of the Ministry of Housing Spatial Planning and Environment.
- The Mining Law and Decisions and Regulation based hereon is the responsibility of Ministry of Economic Affairs.

<sup>27</sup> [http://ec.europa.eu/environment/climat/ccs/eccp1\\_en.htm](http://ec.europa.eu/environment/climat/ccs/eccp1_en.htm).

## *Developments in last six months*

### **24 March 2010**

Proposal from the Cabinet for amending the Mining Law in order to transpose Directive 2009/31/EC 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 and OSPAR Decision 2007/2 on the storage of carbon dioxide streams in geological formations. This proposal is accompanied by a Royal message, an explanatory note and a report on further information.

### **28th of April 2010**

Second report on further information.

## *Documents released in last six months*

- <https://zoek.officielebekendmakingen.nl/dossier/32343>.
- Royal Message: 24 03 2010 Kamerstuk 32343 nr. 1 Tweede Kamer.
- Proposal of Law: 24 03 2010 Kamerstuk 32343 nr. 2 Tweede Kamer.
- Explanatory Note: 24 03 2010 Kamerstuk 32343 nr. 3 Tweede Kamer.
- Report on further information: 24 03 2010 Kamerstuk 32343 nr. 4 Tweede Kamer.
- Second report on further information: 28 04 2010 Kamerstuk 32343 nr. 5 Tweede Kamer.

## *Developments expected in next six months*

- Parliamentary Discussion.
- December 2010 Amendment Mining Law.
- Amendment Environmental Management Act.
- December 2010 Amendment General Governmental Decision on Mining.
- Id. Amendment of Ministerial Mining Rules.
- Id. Amendment of General Governmental Decision on large combustion plants in order to transposition of a specific part of Directive 2009/31/EC.
- Id. Amendment of General Governmental Decision on environmental impact assessment in order to transposition of a specific part of Directive 2009/31/EC.

## New Zealand

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### Progress to 2010

#### Overview of New Zealand situation

The Ministry of Economic Development (MED) is the lead agency for the development of Carbon Capture and Storage (CCS) policy in New Zealand. In the acknowledgement that an enabling legislative and regulatory regime is an early necessity for the advancement of CCS, MED has a medium term goal to developing such an enabling framework for CCS in New Zealand.

Unlike many jurisdictions, CCS is unlikely to play a significant role in reducing New Zealand's existing emissions. Emissions from our economy are traditionally concentrated in the agriculture sector and in the form of tailpipe emissions. We have a largely renewable electricity system (~two thirds of our electricity comes from renewable sources) which limits the existing potential for deployment of CCS on fossil fuel fired electricity generators. For New Zealand, therefore, CCS is viewed more as a mechanism to encourage the responsible development of our existing resources, rather than as an immediate response to climate change.

#### Ongoing work towards an enabling CCS framework

There is currently no comprehensive legislative framework that contemplates CCS projects. However, there are a number of statutes which would be applicable to various stages of a CCS project including the Resource Management Act 1991 (environmental considerations), the Building Act 2004 (construction), and the Climate Change Response Act 2002 (CCS is contemplated as a carbon reduction activity in the NZ Emissions Trading Scheme). It is important that any enabling framework for CCS is cognisant of these existing legislative provisions.

A number of key pieces of legislation which might have a bearing on the future of CCS, including the Foreshore and Sea Bed Act 2004, the Crown Minerals Act 1991 and New Zealand's Exclusive Economic Zone legislation are currently being reviewed or developed. The outcome of these activities is uncertain.

As well as analysing existing legislation to understand the feasibility of a CCS project in New Zealand under the status quo, MED is investigating options for filling in legislative gaps and addressing the new issues that CCS gives rise to. This work will ultimately lead to the creation of a comprehensive and enabling framework for CCS in New Zealand.

#### International CCS Collaborations

In acknowledgement of the importance of CCS globally, as well as to inform domestic policy developments, New Zealand continues to participate in a number of international CCS collaborations. This includes participation in the Carbon Sequestration Leadership Forum (CSLF), the Global Carbon Capture and Storage Institute (GCCSI), and the International Energy Agency

Greenhouse Gas Programme (IEAGHG). New Zealand is also a member of the Australian CO2CRC programme.

### ***New Zealand CCS legal and regulatory information***

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- The New Zealand Ministry of Economic Development CCS website - [www.med.govt.nz/ccs/](http://www.med.govt.nz/ccs/).
- The New Zealand submission to the UNFCCC Secretariat in regards to CCS in geological formations in the Clean Development Mechanism: [www.med.govt.nz/upload/64824/Submission%20to%20UNFCCC%20-%20CCS%20in%20the%20CDM.pdf](http://www.med.govt.nz/upload/64824/Submission%20to%20UNFCCC%20-%20CCS%20in%20the%20CDM.pdf).

### ***Developments expected in next six months***

No information available at this time.



## Norway

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### Progress to 2010

Since 1996, CO<sub>2</sub> has been captured from gas produced at the Sleipner gas field in the Norwegian part of the North Sea, in order to bring the CO<sub>2</sub> produced to the right specification for transportation through the gas transportation pipelines on the Norwegian Continental Shelf. The CO<sub>2</sub> is being stored in the Utsira formation under the gas reservoir. This arrangement came into being as the most cost efficient, as there has since 1990 been levied a special tax on CO<sub>2</sub>-emissions from petroleum activities in Norway.

Issues relating to management of the petroleum resources in this respect are regulated under the existing petroleum legislation in Norway. Issues relating to the environmentally safe storage of CO<sub>2</sub> are regulated by the Ministry of Environment under the existing pollution control legislation.

Since 2007, CO<sub>2</sub> has also been captured from the gas produced from the Snøhvit field in the Barents Sea, so as to make it possible to cool the gas into LNG. The captured CO<sub>2</sub> is being transported back and injected for permanent storage in a formation under the Snøhvit field. This activity is regulated in the same way as the CO<sub>2</sub> being captured from the Sleipner field.

On 13 March 2009, a decision was made by the King in Council to delegate authority under the 1963 Continental Shelf Act to the Ministry of Petroleum and Energy and the Ministry of Labour with regard to exploration for, development and use of subsea reservoirs on the Norwegian Continental Shelf for permanent storage of CO<sub>2</sub>, and for transportation of CO<sub>2</sub> on the Continental Shelf. The area of responsibility for the Ministry of Labour is health, safety and work environment.

The Ministry of Environment is responsible for issues relating to pollution and protection of the environment. This implies, *inter alia*, the responsibility to permit injection of CO<sub>2</sub> into subsea reservoirs on the Continental Shelf to ensure the environmentally safe storage of the CO<sub>2</sub>, and to monitor the injected CO<sub>2</sub> to ensure that the storage is environmentally safe. In practice, this way of shared responsibility between different ministries implies the need for a considerable degree of cooperation between the said ministries.

### Developments in last six months

The Ministry of Petroleum and Energy is presently working on a new set of regulations for the storage and transportation of CO<sub>2</sub> on the Norwegian Continental Shelf. The new Regulation will also contain provisions on safety under the responsibility of the Ministry of Labour.

The Regulation will be based on the existing petroleum legislation in Norway, and on the provisions of the EU CO<sub>2</sub> storage directive (Directive 2009/31/EC).

In addition, the Ministry of Environment will include a new chapter on environmentally safe storage of CO<sub>2</sub> in its regulations on pollution prevention of 1 June 2004.

### ***Developments expected in next six months***

The two draft regulations will be submitted to public consultations in the autumn of 2010.

## Slovak Republic

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### *Progress to 2010*

**Relevant government departments**

- Ministry of the Environment of Slovak Republic ([www.enviro.gov.sk/](http://www.enviro.gov.sk/)):
  - a) is the authority of state control;
  - b) determines exploration territories and specific exploration territories for geological purposes;
  - c) evaluates and approves the final reports containing calculation of the volume of natural geological formation and the underground areas;
  - d) issues the final positions on the assessment of assumed environmental impacts
  - e) operating the information system;
- The Slovak inspection of the Environment (<http://www.sizp.sk>) is the authority of the state control (supervision).
- Ministry of Economy of the Slovak Republic (<http://www.economy.gov.sk>) represents a central authority of public administration for the purposes of CCS (Carbon capture and storage system):
  - a) administrates and supervises the execution of the public administration
  - b) is the authority of state control;
  - c) provides duty coordination in cooperation with the authorities of public administration in Slovak Republic and the authorities of European Union;
  - d) a central authority providing the international exchange of the information according to the international agreements binding the Slovak Republic;
  - e) provides the consultations and cooperation in case of the transboundary effects of the storages;
  - f) submits the reports to European Commission related to the application of this law;
  - g) issues certificates of the suitability of geological formations and underground areas.
- State mining authority (<http://www.hbu.sk>):
  - a) decides on the appeals of decisions made by District mining authorities issued in accordance with this law;
  - b) is the authority of state control;
  - c) administrates the overall storage evidence.

- District mining authority:
  - a) determine, change or call off specific protected areas against intervention to the Earth's crust for CO<sub>2</sub> storage purposes;
  - b) permit creation, use, changes and closure of the storage site;
  - c) approve the storages closure and manage the post closure obligations;
  - d) accept the operator announcement of creation of specific account to which a financial fund will be put, controls the amount of financial means and approve the use of this financial means;
  - e) inform the Ministry of Economy of Slovak Republic about the actualities indicating that operation of the storage site or some serious damage in storage site may have transboundary impacts;
  - f) provide the information system with the relevant data;
  - g) represent authorities of state control according to individual regulations;
  - h) carry out other task related to CCS in accordance with the law.
- Dionýz Štúr State Geological Institute (<http://www.geology.sk/co2neteast/co2net-east.htm>):
  - a) mapping the potential storage sites CO<sub>2</sub> on the territory of the Slovak Republic;
  - b) determine the storage sites that are in accordance with the requirements of the Directive 2009/31/EC and also with the Concept of the Energy security of Slovak Republic, that means they are not in competition with the storage of natural gas;
  - c) mapping CO<sub>2</sub> resources intended to be geologically stored- large sources of pollution (data are available at the Department of Atmosphere protection, Ministry of the Environment, Slovak Republic);
  - d) determination of those sites/formations that needs to be examined due to potential and suitability of CO<sub>2</sub> storage, including the specification of assumed time schedule exploration and financial expenses estimation for this procedure.

### ***Developments in last six months***

- Preparation of the working paper of transposition of 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 and Regulation (EC) No 1013/2006.
- Upcoming changes in the legislation related to the content of the Directive 2009/31/EC:
  - Act (Law) n. 245/2003 coll. on the integrated prevention and control of the environmental pollution and amending other acts;
  - Act n. 24/2006 coll. on assessment of influences on environment and amending some other acts;
  - Act n. 223/2001 coll. on waste and amending some other acts;
  - Act n. 359/2007 coll. on prevention and correction of environmental damages and amending other acts;

- Act n. 364/2004 coll. on water and amending the law of Nation Council of Slovak republic n. 372/1990 on misdemeanours in the latest amendments.

Regulation 338/2009 executing some regulation of Act on the atmosphere

### ***Developments expected in next six months***

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- Completion of the transposition of the Directive 2009/31/EC into the Slovak legislation and addition of others laws regarding this Directive.
- Implementation of Law- revision of data of CO<sub>2</sub> resources appropriate for geological storage, information analysis of the operators of CO<sub>2</sub> resources.
- Evaluation of the investment connected to the preparation and transport of the gas (CO<sub>2</sub>) regulated by the requirements of the Law (after January 2011).

## South Africa

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### *Progress to 2010*

The Government is currently trying to understand other countries' regulatory frameworks, and is also in the process of identifying legislation related to CCS or that can be amended to meet the requirements for the implementation of CCS. However the Government is in full support of development and implementation of CCS.

South Africa has also placed a carbon capture readiness requirement as part of the EIA approval process for the proposed 5400MW Coal-fired Kusile power station. This has been noted in the Record of Decision and requires the Applicant to submit a report detailing the preferred technology, for approval, before proceeding with construction.

### *Developments expected in next six months*

No information available at this time.

## Spain

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### *Progress to 2010*

So far, geological storage of carbon dioxide was regulated as a generic mining resource under the General Mining Law of 1973.

After the approval of the European Directive in April 2009, technical teams from the Ministry of Industry, Tourism and Trade and the Ministry of Environment worked on a draft which was published and opened to public participation, including the private sector and the regional bodies of government, from the first of August to the end of September 2009. Once the comments were reviewed and analysed, a second draft was elaborated. Finally, additional allegations were made by the State Council, and advisory board in the legislative process, and added by the Government.

### *Developments in last six months*

Well in advance of the timetable set by the DIRECTIVE 2009/31/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on the geological storage of carbon dioxide, which mandates to Member States to “bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 25 June 2011”, the Spanish government approved on 9 April 2010 a draft bill that transposes the Directive into an internal law. The draft bill is currently under parliamentary consideration.

The bill establishes the regulatory framework for the geological storage of carbon dioxide, which will enable and promote the definition and development of future projects.

Regulation covers the procedures for the granting of exploration and storage permits, the operation, closure and post-closure obligations and third party access. The bill has been drafted in order to achieve a triple objective: storage projects must be environmentally safe, financially appealing and to promote the long term development of the CCS technology, that is currently at its early stage.

One of the main concerns of the regulation of a prospective technology is to tailor the regulation to the likely development of the industry, regarding as well different paths of evolution. This concern has been present in the drafting of the bill. Currently, the most likely development of carbon storage is linked to large emitters of carbon dioxide, as industrial facilities or power plants. That has shaped the regulation, in particular of third party access. Finally, the draft bill provides a transitory period in order to regularise permits granted under the previous regulation.



### ***Documents released in last six months***

- [http://www.la-moncloa.es/ConsejodeMinistros/Referencias/\\_2010/refc20100409.htm#Carbono](http://www.la-moncloa.es/ConsejodeMinistros/Referencias/_2010/refc20100409.htm#Carbono).
- [http://www.congreso.es/public\\_oficiales/L9/CONG/BOCG/A/A\\_078-01.PDF](http://www.congreso.es/public_oficiales/L9/CONG/BOCG/A/A_078-01.PDF).

### ***Developments expected in next six months***

The draft bill is expected to become law, after parliamentary approval, in the next six months. However, a specific date is not possible to be set.

Regulation does not cover the transportation systems for carbon dioxide, which would complement the regulation, should the success of the technology make it necessary in the future.

## Switzerland

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### Progress to 2010

#### Relevant government units and their role in dealing with CCS:

The Federal Office for the Environment (FOEN) and the Swiss Federal Office for Energy (SFOE) have a shared competence in dealing with CCS. The FOEN is responsible for organising and coordinating all issues relating to climate change, whereas the SFOE is the competent authority to coordinate research projects linked to aspects of energy supply.

Both units are part of the Department of the Environment, Transport, Energy and Communications and therefore cooperate closely.<sup>28</sup>

#### Domestic Framework

Due to the domestic energy supply being mainly based on hydro and nuclear power, the potential for CCS in Switzerland currently is low. Approximately 5 percent of power is generated in fossil power plants, whereas 75 percent of all CO<sub>2</sub> is being emitted by non-point sources such as transport, commercial and residential heating. This results in relatively low CO<sub>2</sub> per capita emissions (5.8 t CO<sub>2</sub> in 2008). Except for a few cement production and waste incineration sites, there are no large point sources in Switzerland. Furthermore the geological storage potential of CO<sub>2</sub> is yet unknown.

#### Political developments

In August 2009, the Federal Council announced in its proposal for the amendment of the Swiss legislation on the reduction of CO<sub>2</sub> that guidelines concerning CCS will be provided when necessary.<sup>29</sup>

#### Outlook

Due to the expiry of electricity import agreements with France in 2020 and uncertainties concerning future nuclear energy generation after 2020 (decommissioning of nuclear power plants due to operational age), Switzerland might face an energy supply gap by the year of

<sup>28</sup> For more detailed information about the Federal System of Switzerland: <http://www.admin.ch/org/polit/index.html?lang=en>.

<sup>29</sup> <http://www.admin.ch/ch/d/ff/2009/7433.pdf>, p. 7479, in French, German or Italian.

2020.<sup>30</sup> Besides efforts to increase energy efficiency significantly, one option to face a possible gap could be by constructing combined cycle gas turbine power plants. According to the Swiss legislation, combined cycle gas turbine power plants have to fully compensate their CO<sub>2</sub> emissions.<sup>31</sup> In this context, a demand for CCS could arise.

### Research and Development

In order to gain more insight on CCS-related activities in Switzerland the FOEN has commissioned a study with the main focus on research and (industrial) development.<sup>32</sup>

The SFOE has launched an assessment of the geological storage potential in Switzerland. Results are expected by summer 2010.

In January 2009 the Swiss research project Carbon Management in Power Generation (CARMA)<sup>33</sup> was launched. It is supposed to be finalised in December 2011. CARMA aims to explore the potential and feasibility of CCS systems deployment in Switzerland, taking into account the future energy scenarios. Furthermore it aims to exploit available expertise and to develop new CCS technologies and know-how that might be applied in Switzerland. The project is co-funded by the SFOE and is carried out by a team of scientists from the Swiss Federal Institute of Technology Zurich, the Swiss Federal Institute of Technology Lausanne, the Paul Scherrer Institute, the University of Bern, the University of Applied Sciences Northwestern Switzerland and GeoForm.

The Project consists of six subprojects, one of which focuses on the public perception and the legal aspects of CCS.

### *Developments expected in next six months*

There are no ongoing legal or regulatory developments concerning CCS so far.

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<sup>30</sup> <http://www.bfe.admin.ch/themen/00507/00510/index.html?lang=en>.

<sup>31</sup> Article 1 of the federal decree on the compensation of CO<sub>2</sub>-emissions of combined cycle gas turbine plants (27th of March 2007), [http://www.admin.ch/ch/f/rs/c641\\_72.html](http://www.admin.ch/ch/f/rs/c641_72.html), in French, German or Italian.

<sup>32</sup> Federal Office for the Environment, Lasse Wallquist / Mischa Werner, Carbon dioxide Capture and Storage – CCS: Studie zum Entwicklungsstand von CCS in der Schweiz, 2008, only in German.

<sup>33</sup> <http://www.carma.ethz.ch/>.

## United Kingdom

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### *Progress to 2010*

The Energy Review of 2006 concluded that the next stage in the development of CCS, if it proved to be cost effective, should be commercial demonstration, and the Pre-Budget Report 2006 announced an assessment by consulting engineers to advise on a final decision in 2007.

In Budget 2007, the Government announced a competition to design and build full-scale demonstration of the capture, transport and storage chain, and this was launched in November 2007. Further details were included in the subsequent Energy White Paper (May 2007).

The Energy Act 2008 established the enabling provisions for regulating offshore carbon dioxide storage in the UK (November 2008).

Consultation on the proposed offshore carbon dioxide licensing regime, including draft regulations to implement that regime (September 2009).

### Relevant links:

- Energy Review 2006 (page 18): <http://www.berr.gov.uk/files/file31890.pdf>.
- HM Treasury “Carbon Capture and Storage: A consultation on the barriers to commercial deployment” (March 2006):  
[http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/carbon\\_capture\\_and\\_storage.htm](http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/carbon_capture_and_storage.htm).
- PBR 2006 and Budget 2007:  
[http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/budget/budget\\_06/bud\\_bud06\\_index.cfm](http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/budget/budget_06/bud_bud06_index.cfm).
- Energy White Paper 2007:  
[http://decc.gov.uk/en/content/cms/publications/white\\_paper\\_07/white\\_paper\\_07.aspx](http://decc.gov.uk/en/content/cms/publications/white_paper_07/white_paper_07.aspx).
- Energy Act 2008:  
[http://decc.gov.uk/en/content/cms/legislation/energy\\_act\\_08/energy\\_act\\_08.aspx](http://decc.gov.uk/en/content/cms/legislation/energy_act_08/energy_act_08.aspx).
- Consultation on the offshore carbon dioxide licensing regime, 2009:  
[http://www.decc.gov.uk/en/content/cms/consultations/co2\\_storage/co2\\_storage.aspx](http://www.decc.gov.uk/en/content/cms/consultations/co2_storage/co2_storage.aspx).

### *Developments in last six months*

“A framework for the development of clean coal” was published in November 2009 committing the UK to 4 commercial scale demonstrations of CCS, funded through a financial incentive and setting out the regulatory policy for the consenting new coal fired power stations in England and Wales. The framework prohibits the construction of new coal fired power stations without the demonstration of CCS, and sets out plans for the long-term transition to clean coal. Scottish

Ministers announced a similar approach in Scotland, to be implemented through revisions to the thermal guidance.

The Energy Act 2010 (April 2010), created a new financial incentive in the form of a levy on electricity suppliers to fund the demonstration of CCS in the UK.

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On 12 March 2010 contracts were signed awarding funding to E.ON and Scottish Power for Front End Engineering and Design studies as part of the UK competition to build one of the world's first commercial scale carbon capture and storage demonstration plants. The detailed engineering and design work will be completed within twelve months, after which the winner will be selected.

Publication of guidance on the implementation of carbon capture readiness for new thermal power stations in England and Wales (November 2009).

Publication of draft guidance to the Infrastructure Planning Commission concerning development consent for energy infrastructure including CCS power stations and infrastructure (November 2009).

Consultation by the Health and Safety Executive on proposed amendments to onshore and offshore pipeline safety regulation in the UK, including the treatment of pipelines carrying carbon dioxide under those regulations (December 2009).

Consultation on arrangements for authorising and monitoring new coal fired power stations (November 2009).

Ratification of amendments to Annex II and Annex III to the OSPAR Convention for the Protection of the Marine Environment in the North-East Atlantic in relation to the storage of carbon dioxide streams in geological formations (April 2010).

### *Documents released in last six months*

- A framework for the development of clean coal:  
[http://www.decc.gov.uk/en/content/cms/consultations/clean\\_coal/clean\\_coal.aspx](http://www.decc.gov.uk/en/content/cms/consultations/clean_coal/clean_coal.aspx)
- Energy Act 2010: [http://www.opsi.gov.uk/acts/acts2010/pdf/ukpga\\_20100027\\_en.pdf](http://www.opsi.gov.uk/acts/acts2010/pdf/ukpga_20100027_en.pdf)
- Draft CO<sub>2</sub> storage regulations:  
[http://www.decc.gov.uk/en/content/cms/consultations/co2\\_storage/co2\\_storage.aspx](http://www.decc.gov.uk/en/content/cms/consultations/co2_storage/co2_storage.aspx)
- Detailed guidance on capture readiness:  
<http://www.decc.gov.uk/en/content/cms/consultations/open/open.aspx>
- Energy National Policy Statements:  
<https://www.energynpsconsultation.decc.gov.uk/>
- Authorising and monitoring new coal fired power stations:
  - In England and Wales: [http://www.decc.gov.uk/en/content/cms/consultations/guidance\\_coal/guidance\\_coal.aspx](http://www.decc.gov.uk/en/content/cms/consultations/guidance_coal/guidance_coal.aspx).
  - In Scotland: <http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Thermal-Guidance/Thermal-2010>.

- Work underway on CO<sub>2</sub> pipelines safety guidelines: <http://www.hse.gov.uk/pipelines/co2conveying.htm>.

### *Developments expected in next six months*

- Detailed provisions concerning the financial incentive mechanism will be laid in regulations (spring 2011).
- Implementation of the EU Directive on the geological storage of carbon dioxide in the UK, including:
  - Regulations and guidance on offshore storage of carbon dioxide (Autumn 2010).
  - Regulations for third party access to CO<sub>2</sub> pipelines and storage sites (December 2010).

## United States: Environmental Protection Agency

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### *Progress to 2010*

EPA released Class V Experimental Technology Well Guidance for Pilot Geologic Sequestration Projects in March 2007 ([http://www.epa.gov/ogwdw000/uic/wells\\_sequestration.html](http://www.epa.gov/ogwdw000/uic/wells_sequestration.html)).

In July 2008, EPA published the proposed Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO<sub>2</sub>) Geologic Sequestration (GS) Wells Proposed Rule for public review and comment ([http://www.epa.gov/ogwdw000/uic/wells\\_sequestration.html](http://www.epa.gov/ogwdw000/uic/wells_sequestration.html)).

In August 2009, EPA published a supplemental publication to the proposed GS rule, the Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO<sub>2</sub>) Geologic Sequestration (GS) Wells; Notice of Data Availability and Request for Comment for public review and comment ([http://www.epa.gov/ogwdw000/uic/wells\\_sequestration.html](http://www.epa.gov/ogwdw000/uic/wells_sequestration.html)).

### *Developments in last six months*

On March 22, 2010, EPA proposed greenhouse gas reporting requirements for facilities that inject carbon dioxide underground, such as for the purpose of long-term geologic sequestration or to enhance oil and gas recovery (<http://www.epa.gov/climatechange/emissions/subpart/rr.html>).

### *Documents released in last six months*

Proposed Mandatory Reporting of Greenhouse Gases: Carbon Dioxide Injection and Geologic Sequestration: <http://www.epa.gov/climatechange/emissions/subpart/rr.html>

### *Developments expected in next six months*

EPA will continue its work in developing, finalizing, and implementing regulations that address the safety, efficacy, and environmental soundness of injecting and storing carbon dioxide underground; evaluating risks to human health and the environment; designing inventory and accounting methodologies; creating guidance materials; and evaluating and working to address other key issues.



## United States: Department of Energy

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### Progress to 2010

While the US Department of Energy's Office of Fossil Energy (FE) has no regulatory authority pertaining to CCS, FE's Research, Development, and Demonstration (RD&D) efforts help inform state and Federal regulators understand risk assessment, as well as project developers, by providing technical information necessary to write permits and better assess opportunities to geologically store CO<sub>2</sub>. Much of this information is publicly available through a series of best practice manuals and estimates of geologic storage potential, as described below.

### Best Practice Manuals

The National Energy Technology Laboratory (NETL) is publishing a series of Best Practice Manuals based on lessons learned from the nearly 30 completed, ongoing, and planned Regional Carbon Sequestration Partnerships (RCSP) CO<sub>2</sub> injection projects. A table of these manuals is shown below. After the initial publication date, the manuals will be updated as lessons are learned from larger scale injection projects.

Best Practice Manual	Initial Publication Date
Monitoring Verification and Accounting	2009
Public Outreach and Education	2009
Site Characterization	2010
Simulation and Risk Assessment*	2010
Well Construction, Operation and Completion*	2010
Terrestrial Sequestration Practices	2010

\* Regulatory Issues will be addressed within these Manuals

The Monitoring Verification and Accounting manual can be found here: [http://www.netl.doe.gov/technologies/carbon\\_seq/refshelf/MVA\\_Document.pdf](http://www.netl.doe.gov/technologies/carbon_seq/refshelf/MVA_Document.pdf). The Public Education and Outreach Manual can be found here: [http://www.netl.doe.gov/technologies/carbon\\_seq/refshelf/BPM\\_PublicOutreach.pdf](http://www.netl.doe.gov/technologies/carbon_seq/refshelf/BPM_PublicOutreach.pdf). The Best Practice Manual on Regulatory Compliance will provide a summary of the lessons learned from the field projects completed by the RCSPs. It will provide a summary of the different regulations that geologic projects face in the United States and Canada. A detailed comparison of the different requirements under the EPA Underground Injection Control (UIC) program will also be provided. This document is scheduled to be released by the end of 2010.

### National Carbon Sequestration Atlas of the United States and Canada

One of the important activities of the RCSP projects has been the National Carbon Sequestration Atlas of the United States and Canada. The Atlas contains estimates of the storage potential in 43 states as well as the four western Canadian provinces. Originally published in March 2007,

with a second edition published in November of 2008, the Atlas provides a resource capacity assessment for the geological storage of CO<sub>2</sub> in the subsurface. An update of the Atlas will be published in the fall of 2010. The current Atlas can be found here: [http://www.netl.doe.gov/technologies/carbon\\_seq/refshelf/atlasII/atlasII.pdf](http://www.netl.doe.gov/technologies/carbon_seq/refshelf/atlasII/atlasII.pdf). In addition, a North American Carbon Atlas, covering the United States, Canada, and Mexico, is being developed with a planned completion date of 2012.

### **Interagency Task Force on Carbon Capture and Storage**

On February 3, 2010, President Obama sent a memorandum to the heads of fourteen Executive Departments and Federal Agencies establishing an Interagency Task Force on Carbon Capture and Storage. The Task Force, co-chaired by the Department of Energy and the Environmental Protection Agency, is charged with proposing a plan to overcome the barriers to the widespread, cost-effective deployment of CCS within 10 years, with a goal of bringing five to 10 commercial demonstration projects online by 2016. The Task Force delivered a series of recommendations to the President on August 12, 2010. The report concludes that CCS can play an important role in domestic greenhouse gas emissions reductions while preserving the option of using coal and other abundant domestic fossil energy resources. The report reflects input from 14 Federal agencies and departments as well as hundreds of stakeholders and CCS experts. It addresses the incentives for CCS adoption and any financial, economic, technological, legal, institutional, or other barriers to deployment. The Task Force also considered how best to coordinate existing Federal authorities and programs, as well as identify areas where additional Federal authority may be necessary. See <http://www.fe.doe.gov/programs/sequestration/ccstf/CCSTaskForceReport2010.pdf>.

## Organisation contributions

### CCSReg

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### *Progress to 2010*

The objective of the CCS Regulatory (CCSReg) Project is to develop recommendations that, if adopted, would create a U.S. regulatory environment conducive to capture, transport, and deep geological sequestration (GS) of carbon dioxide (CO<sub>2</sub>). Anchored in the Department of Engineering and Public Policy at Carnegie Mellon University, the project involves co-investigators at the Vermont Law School, the Washington, DC law firm of Van Ness Feldman, and at the University of Minnesota.

The first step in the development of recommendations was to identify the most significant obstacles to the deployment of CCS in the US. We found the principal obstacles to be:

- Lack of an adequate regulatory framework for the construction of CO<sub>2</sub> pipeline infrastructure, particularly for pipeline siting and access to eminent domain;
- Limited authorization for the U.S. Environmental Protection Agency (EPA) to consider impacts beyond those to underground sources of drinking water (USDW) in their Underground Injection Control (UIC) program rule making process;
- A tendency for the EPA to create procedural rules under the UIC program;
- Gaps in knowledge necessary to create detailed regulations for GS today;
- A lack of clarity on ownership of pore space in deep geological formation and the means by which this space can be accessed for CO<sub>2</sub> sequestration;
- No system by which the liabilities (tort or otherwise) associated with CO<sub>2</sub> sequestration can be managed in the long-term (i.e., post-closure);
- Uncertainty over the structure of a future CO<sub>2</sub> emissions control program—cap and trade, or otherwise—and the way in which CCS will fit into this program; and
- Uncertainty surrounding the economics of capture and geological sequestration, the structure of a future carbon sequestration industry, and the relationships between organizations in this industry.

These findings were published in a report titled "Carbon Capture and Sequestration: Framing the Issues for Regulation"<sup>34</sup> in January of 2009. The report itself is aimed at U.S. federal and state policy makers and, in addition to identifying barriers, presents an overview of CCS technology (capture, transport, and storage). We subsequently developed specific

<sup>34</sup> The report is available online at [http://www.ccsreg.org/pdf/CCSReg\\_3\\_9.pdf](http://www.ccsreg.org/pdf/CCSReg_3_9.pdf).

recommendations on how each of these obstacles could be overcome. Our recommendations have been published in a series of short policy briefs, each brief dealing with one of the barriers listed above. The table below lists the policy briefs, providing a brief description and the release date for each brief.<sup>35</sup>

Title	Description	Release Date
Comprehensive Regulation of Geologic Sequestration	An overview of our recommendations that would create a comprehensive U.S. federal permitting system for GS.	July 2009
Governing Access to and Use of Pore Space for Deep Geological Sequestration	Recommendations that would remove uncertainties over access to and use of pore space on both federal and private lands.	July 2009
Compensation, Liability and Long-Term Stewardship for CCS	Recommendations that would create a federally administered long-term stewardship program.	July 2009
Regulating Carbon Dioxide Pipelines for the Purpose of Transporting Carbon Dioxide to Geologic Sequestration Sites	Recommendations that would ease the construction of new interstate CO <sub>2</sub> pipelines in the U.S.	July 2009
Learning and Adaptation in Regulation of Geologic Sequestration	Recommends creation of a committee that would periodically review the regulations governing GS.	August 2009
Carbon Dioxide Accounting in Carbon Capture and Sequestration	Recommendations that would ensure that CO <sub>2</sub> captured and sequestered is properly accounted for under an emissions reduction program.	January 2010

### *Developments in last six months*

In the last six months, we completed and released the third and final major deliverable from the CCSReg project: model federal legislation that implements the recommendations made by the project.<sup>36</sup> There are five titles in this legislation, summarized below:

Title	Description
Carbon Dioxide Pipelines	Allows CO <sub>2</sub> pipeline developers to obtain powers of eminent domain through a certification process overseen by the Federal Energy Regulatory Commission (FERC).
Adaptive Performance-Based Approach to CCS Regulation	Creates a CCS Technical Advisory Committee that will periodically review regulations for GS and make recommendations to improve regulations and regulatory programs.
Licensing and Operation of Injection Sites	This title instructs the EPA to balance impacts to USDW with need to use CCS to reduce emissions and creates an opt-in permitting system to manage access to pore space.
Long-term Stewardship of Closed Injection Sites	Creates the Federal Geologic Sequestration Board which will accept all liability for GS sites that have received a certificate of closure, as well as creating the Carbon Sequestration Trust Fund that will fund the activities of the Board.
Accounting for Sequestered Carbon Dioxide	Establishes a CCS inventory accounting system, leakage monitoring and reporting procedures, and structures the relationship between CCS and GHG emission reduction programs.

<sup>35</sup> All of the policy briefs are available online at [http://www.ccsreg.org/policy\\_briefs.html](http://www.ccsreg.org/policy_briefs.html).

<sup>36</sup> The CCSReg model legislation is available online at [http://www.ccsreg.org/model\\_legislation.html](http://www.ccsreg.org/model_legislation.html).

We have also created a publicly accessible database on U.S. state CCS policies. This database is searchable by state, policy type and CCS component, and has a browsable interface.<sup>37</sup>

### *Developments expected in next six months*

In the coming six months, the CCSReg project will be revising the model legislation based on feedback that we receive from our stakeholders. We will also be releasing a further policy brief that examines the relationship between EOR and GS in the U.S. and makes recommendations on how EOR can best be incorporated into accounting frameworks for GS. Both the model legislation and the policy brief on EOR will be available on the CCSReg website<sup>38</sup> by the end of August, 2010.

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<sup>37</sup> <http://www.ccsreg.org/bills.php>.

<sup>38</sup> <http://www.ccsreg.org/>.

## IEA Greenhouse Gas R&D Programme<sup>39</sup>

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### Progress to 2010

IEAGHG is an international R&D programme established by the International Energy Agency in 1991, funded by 21 countries and 21 organisations. It aims to provide impartial and independent information on the role and issues around technologies to reduce greenhouse gas emissions from fossil fuel use, focussing primarily on carbon dioxide capture and storage. It undertakes a range of activities, including commissioning technical assessments and studies (and has published over 120 reports), facilitating or collaborating in demonstration projects, operating eight international research networks (Risk Assessment, Monitoring, Wellbores, Modelling, Post-combustion Capture, Oxy-firing, Chemical Looping, Social Research), running the International CCS Summer School and the GHGT-series of conferences.

One of IEAGHG's objectives is to assist legal and regulatory developments by providing information relevant to the needs of legal and regulatory developments, so that they can be based on a sound evidence-base, and so it 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, it advises the EC and other governments developing CCS regulation, and has produced reports addressing specific regulatory issues such as on Capture-ready power plant for G8 (which formed the basis for the EU and UK regulation), on Natural Analogues of Leakage, on Remediation of Leakage, on Methodology for CCS CDM, and on Market Impacts of CCS in CDM. IEAGHG also collaborated with IEA and UCL in the establishment of the IEA CCS Regulators Network and regularly chairs or presents in the webinars. As well as the International Energy Agency, IEAGHG also collaborates with other bodies such as GCCSI, CCSA, EU ZEP, CSLF, UCL, WRI, DNV, providing funding and/or expert input on legal and regulatory issues. IEAGHG has positions on many committees and groups directly working in and relevant to legal and regulation issues for CCS.

For more information see the website [www.ieaghg.org](http://www.ieaghg.org).

### Developments in last six months

#### Reports

Recently issued reports relevant to the IEA CCS Regulators Network include:

- A Review of Risk Assessment Terminology for use in CO<sub>2</sub> Geological Storage
- What Have We Learned from CCS Demonstrations?
- Safety in Carbon Dioxide Capture and Transport
- Site Characterisation Criteria
- Long term integrity of storage – well abandonment
- Site selection and qualification – CO<sub>2</sub>QUALSTORE (published by DNV)

<sup>39</sup> Implementing Agreement for a Co-operative Programme on Technologies Relating to Greenhouse Gases Derived from Fossil Fuel Use.

Studies which are underway most relevant to the IEA CCS Regulators Network include:

- Evaluation of the water usage and loss of power plants with CO<sub>2</sub> Capture
- Quantification techniques for CO<sub>2</sub> leakage
- Potential Effects of CO<sub>2</sub> Waste Stream Impurities on Geological Storage
- Pressurisation and Brine Displacement Issues for Deep Saline Formation Storage

IEAGHG provided significant input to the Experts Report to the CDM Executive Board on Implications of CCS in the CDM.

#### **Research Networks**

Recent Research Network meetings on Monitoring and on Risk Assessment have again included several sessions on regulatory issues in these areas, and represent the state-of-the-art in experience and knowledge around these issues. The Monitoring Research Network meeting in Natchez, USA (6-8 May 2010) included a session on monitoring in an evolving regulatory environment with a discussion session on the related uncertainties, and a Session on monitoring post-injection. The Risk Assessment Network meeting in Golden, USA (May 17-19 2010) included a session on regulatory requirements on risk assessment and a directly-related session on what risk assessments can deliver. The presentations and the reports from these Network meetings will be available on their respective web pages on the [www.ieaghg.org](http://www.ieaghg.org) web site.

#### ***Documents released in last six months***

See the web site [www.ieaghg.org](http://www.ieaghg.org).

#### ***Developments expected in next six months***

Reports published on topics above.

The second workshop on Environmental Impacts of Leakage will be held in November 2010 in Germany. This is helping to provide information directly relevant to Environmental Impact Assessments for storage projects, and related monitoring.



## Global Carbon Capture and Storage Institute

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### *Progress to 2010*

#### **Global CCS Institute perspective**

To facilitate and enable the cost effective, timely development and deployment of CCS technologies, appropriate and supportive regulatory frameworks are required. Not only does the certainty provided by such frameworks serve to protect human health and safety, it also serves to protect ecosystems, underground sources of drinking water and other natural resources and to ensure market confidence in emission reductions through regulatory clarity and proper GHG accounting.

Recognising that regulatory barriers present a key challenge to the broad based deployment of CCS, the Global CCS Institute commissioned a comprehensive analysis of existing regulatory regimes that was undertaken by Baker MacKenzie, as part of a Worley Parsons consortium.

The analysis sought to identify gaps in regulatory frameworks that will need to be overcome for project deployment. This work resulted in a number of recommendations to facilitate the development of comprehensive and effective CCS regulatory frameworks (see Table 1 below). 17 individual country reports were also produced along with a report on relevant international policy and legislation framing carbon capture and storage globally.

Importantly, it was recognised that development and implementation of appropriate regulation can be a lengthy process and there is an urgent time imperative to enable emission reductions within the timeframes required to avoid the effects of dangerous climate change.

Such action will constitute a significant undertaking for all governments wishing to host CCS projects. The challenge will be even greater in developing economies where there has been little work to enact specific CCS laws or steps to amend existing regulation to accommodate the CCS project cycle. Existing legal frameworks designed to deal with waste, transport, property rights and pollution liability, with which CCS projects intersect, do not readily accommodate the whole CCS project cycle, further hampering the task of developing CCS regulation. Additionally, legislation to address potential liability for leakage, storage site selection and securing and government approvals are all threshold issues that need to be addressed in the project planning phase.

Working to ensure clear laws and regulations will provide greater certainty and can also provide industry and investors with the confidence they need to progress CCS from demonstration facilities into large scale plants. This is particularly important for investments in developing economies whose reliance on hydrocarbons and resulting GHG emissions are predicted to increase markedly in future.

To make CCS a part of mainstream economies and to enable it to make a measurable contribution to climate change mitigation, CCS specific law reform programmes are required by most countries. To date, the EU is the only jurisdiction with legislative frameworks that are not still in a fragmentary state or incomplete.

Ideally initial development of legal and regulatory frameworks could draw on expertise and examples from states that have already undertaken to put CCS specific policy and legislation in place. The IEA CCS Model Regulatory Framework will constitute a useful tool in this regard.

Finally, commitment is required to ensure that CCS is included in international legal frameworks such as the flexibility mechanisms under the Kyoto Protocol, including CDM, or the Nationally Approved Mitigation Actions that form part of the Copenhagen Accord.

- a) Aspects of the CCS specific laws and policies adopted by some governments (including the EU, US, Japan and Australia) should be used as components of a "CCS friendly" legal framework in those countries wanting to host such projects;
- b) Where time or other circumstances do not permit the development of integrated or dedicated CCS legal schemes, governments should amend existing legislation applicable to the CCS project cycle with particular emphasis on transport, storage and leakage liability;
- c) All regulatory frameworks need to provide sufficient flexibility to accommodate evolving technological advances in CCS;
- d) All regulatory frameworks need to accommodate the very long time frames associated with storage - without clear allocations of liability for leakage, insurance and investment may not be available or attracted to CCS projects;
- e) Planning and environmental laws should be used to compel (or at least make commercially viable) the use of CCS in new or refurbished power plants and other GHG emitting facilities and enterprises; tax or other incentives may be required to address the costs associated with such requirements;
- f) Where feasible, CCS enabling laws should be harmonised across national and international borders;
- g) There should be an immediate completion of reviews of, and if necessary, amendments to, international agreements which could govern the transboundary movement of CO<sub>2</sub>, including the definitions of "waste" and "hazardous waste" under the Basel Convention; and
- h) In the EU, Member States should implement the CCS Directive as soon as possible.

**Table 1:** key recommendations resulting from the Baker & MacKenzie report into the status of policies and legislation framing carbon capture and storage globally.

A full copy of the report and individual country reports report are available on the Global CCS Institute's website [http://www.globalccsinstitute.com/general\\_information/reports\\_papers\\_documents.html](http://www.globalccsinstitute.com/general_information/reports_papers_documents.html).

**Future activity**

The Institute is putting in place a number of activities that will take an evidence based approach to strike a balance between rapid project delivery and the longer term strategic requirements for commercial deployment at scale. Through its policy, regulation and legal work, the Institute will seek to add value and provide strategic support for:

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- the further innovation required to make CCS commercially viable;
- projects that demonstrate CCS technologies at scale;
- investment in the essential enabling infrastructure required for achieving CCS; and
- appropriate regulatory frameworks for CCS.

It will do this by undertaking a series of activities in the areas below.

- *Global policy approach to climate change:*
  - Supporting a global policy approach to climate change;
  - Greenhouse gas accounting issues;
  - Supporting CCS in developing nations.
- *Innovation and industry:*
  - Supporting government policy actions required to overcome barriers to demonstration project deployment;
  - Maintaining a knowledge base and presenting detailed analysis of key industry issues, including a regular update on the state of the global CCS industry.
- *Legal and regulatory issues:*
  - Specific regulatory challenges or gaps where fast tracking solutions to specific issues will assist in the more rapid deployment of CSC projects.

Supporting this work will be a series of regional profiles and a global services network that will help ensure that the Institute's work is aligned to local needs.

## University College London Carbon Capture Legal Programme

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### *Progress to 2010*

The Carbon Capture Legal Programme (CCLP) was founded in 2007 and is based at University College London's Faculty of Laws. The Programme builds upon earlier CCS legal research undertaken by CCLP academics and aims to provide comprehensive and impartial analysis of the legal issues surrounding CCS technology, with a view to promoting informed discussion and analysis by decision-makers in government, industry and the wider community.

The Programme's core output remains its open-access website ([www.ucl.ac.uk/cclp](http://www.ucl.ac.uk/cclp)), which provides a means of disseminating its research into global regulatory and policy developments. The website's Legal Resources section contains detailed examinations of many of the emerging regulatory frameworks, as well as extensive studies of other legal issues and regulatory regimes. In addition to the legal analysis, further functions have been added to the site which aim to expand its utility. A fully-searchable database of CCS news and policy as well as a detailed bibliography of articles concerning CCS regulation has been included in the past twelve months, it is hoped that these will both prove to be a valuable resource for those working in this field.

In addition to this core activity, the CCLP has been engaged in many other activities, including fostering working partnerships with other organisations with similar interests and expertise. The CCLP, as a part of UCL more widely, is a founding legal member of the Global CCS Institute and its academics have been actively involved in the Institute's work on regulatory and policy issues. The Programme has continued to assist and collaborate with the International Energy Agency (IEA) on a number of CCS-related projects; most notably in association with the IEA and the IEA GHG Implementing Agreement, and in the creation of the International CCS Regulators' Network, where members of the CCLP regularly participate or chair network meetings and webinars. CCLP academics have also worked closely with the IEA on its recent CCS publications, as expert reviewers and providers of content, for both the 2007 publication 'Legal Aspects of CO<sub>2</sub> Storage: Update and Recommendations' and the Technology Roadmap for CCS.

Further information about the CCLP's activities can be found in the Activity section of the website: <http://www.ucl.ac.uk/cclp/ccsprojectnews.php>

### *Developments in last six months*

In March 2010, the CCLP hosted a 'Global Legal Symposium on Carbon Capture and Storage (CCS)', in conjunction with New York University School of Law - Guarini Centre for Environmental and Land Use Law. The event in New York, funded by the Global CCS Institute, assembled many of the world's leading regulatory and policy experts on CCS to consider the

scope and focus of the laws and regulations which will govern the various processes associated with CCS.

The symposium examined significant trends, regulatory success stories, and key legal gaps and obstacles that still need to be addressed to ensure effective CCS deployment. The event's focus was the comparative analysis of early regulatory regimes being developed in Europe, Australia and the United States; however it also provided an opportunity for the IEA to discuss its forthcoming CCS Model Regulatory Framework.

The Symposium will be the basis for a publication on global developments in CCS regulation, with contributions from key speakers at the event. An edited volume, to be published in late 2010/early 2011, will ensure wider distribution and a more permanent record of the discussions and outcomes of the event. Materials from the symposium, including speakers' presentations and edited audio files are available through the CCLP website.

The past six months has also seen a complete re-design of the CCLP website, including expanded sections of legal analysis and more tools to make the navigation quicker and easier. Detailed sections have been added to the Legal Resources pages examining the legal issues surrounding CO<sub>2</sub> transportation for both onshore and offshore storage, liability under the EU CCS Directive and European financial strategies to incentivise the technology.

### ***Documents released in last six months***

See [www.ucl.ac.uk/cclp](http://www.ucl.ac.uk/cclp).

### ***Developments expected in next six months***

The CCLP will continue to track the progress of CCS regulation worldwide and provide legal analysis of the emerging regulatory regimes through its website. In addition, the Programme will commence two separate work packages focusing upon Member State transposition of the EU storage Directive and the development of regulatory regimes for CCS activities in developing nations.

Richard Macrory and Ian Havercroft together with Dick Stewart of NYU Law School will be completing the manuscript of an edited book on CCS law to be published by Hart Publishing, Oxford.

## World Resources Institute

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### *Progress to 2010*

**Guidelines for Carbon Dioxide Capture, Transport, and Storage**

In 2008, WRI published the Guidelines for Carbon Dioxide Capture, Transport, and Storage, a set of best practices for CCS deployment which were developed in consultation with a diverse group of stakeholders.

The CCS Guidelines present recommendations and best practices for those involved in the development and implementation of CCS projects. The document also provides a comprehensive introductory reference for those new to CCS who seek to understand how to responsibly conduct projects.

A potential operator, financier, insurer, or regulator can use the CCS Guidelines as a benchmark in evaluating potential project plans and as a reference on the current technical understanding of best practices for CCS, and a policymaker can use them to establish regulatory and investment frameworks that enable successful and responsible CCS deployments. It is important to note that the CCS Guidelines are not intended to replace or provide the detailed technical knowledge that would be required to select the location for or to design and operate a CCS project. In fact, one of the findings derived from the process is that each CCS project will be unique, and a team of qualified experts will be needed to design and operate each project.

**Guidelines for Community Engagement on CCS**

WRI has developed guidelines for local community engagement and public involvement in anticipated CCS projects, with the goal of ensuring that future projects are executed with both technical success and community support. WRI sees the establishment of an effective community engagement process as a critical component of any CCS effort. The guidelines are due to be published in fall 2010. The publication provides engagement guidelines that evolved from a process through which WRI convened a group of stakeholders with differing perspectives and experiences with engaging communities to examine the issues concerning CCS projects.

The guidelines outline how local communities, particularly those living or working nearby a CO<sub>2</sub> storage site, should be engaged and how they can proactively help shape the engagement process around projects in their locales. This effort builds on WRI's previous two-year consensus building stakeholder effort which resulted in the publication of the Guidelines for Carbon Dioxide Capture, Transport and Storage, referred to above.

**China CCS Guidelines**

The US and China are in a unique position to act together as catalysts for advancing CCS deployment worldwide. CCS is a technology of great interest to China as a way to support the country's growing energy needs and reduce greenhouse gas emissions from coal facilities.

Tsinghua University has partnered with WRI to begin addressing how to ensure that CCS deployment in China meets environmental standards by drafting Guidelines for Safe and Effective CCS in China. The Tsinghua-WRI team will build capacity that supports regulatory

development by engaging technical experts and other stakeholders in building consensus surrounding guidelines and best practices. The project is modelled after the process that led to the Guidelines for Carbon Dioxide Capture, Transport and Storage, referred to above.

The project is led by a bilateral steering committee that includes leading CCS experts from China and the US. Each year the team spends a week in the other country, visiting leading CCS research facilities and relevant industrial facilities. At that time, the full bilateral steering committee meets to discuss the Guidelines. The steering committee includes a diverse set of stakeholders. From China, the leading enterprises involved in CCS are represented including the power sector, mining, oil and gas, and leading academics. From the United States the committee includes leading academic CCS experts as well as NGOs with legal expertise.

The Guidelines are being drafted in Mandarin by Tsinghua University. This effort leverages the Guidelines for Carbon Dioxide Capture, Transport, and Storage but the China Guidelines are an original document, drafted from a China-specific policy and technology perspective.

This project is currently being funded with support from the U.S. Department of State under the Asia Pacific Partnership and the UK Foreign Commonwealth Office.

### ***Documents released in last six months***

- <http://www.wri.org/publication/ccs-in-china>.
- CCS in China: Toward an Environmental, Health, and Safety Regulatory Framework. This brief frames how CCS might be regulated within the Chinese environmental policy context, with an emphasis on ensuring protection of people and the environment.

### ***Developments expected in next six months***

- Guidelines for CCS Community Engagement (Fall 2010).
- Carbon Dioxide, Capture, Utilization, and Storage: A Brief Review of Issues Raised in the UNFCCC Context (December 2010).



## International Energy Agency

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### Progress to 2010

The IEA has been working on CCS and CCS related issues for over 10 years with CCS featuring heavily in the World Energy Outlook (WEO) and Energy Technology Perspectives (ETP) publications. The 2010 ETP BLUE Map scenario ([www.iea.org/press/pressdetail.asp?PRESS\\_REL\\_ID=395](http://www.iea.org/press/pressdetail.asp?PRESS_REL_ID=395)), which assesses strategies for reducing GHG emissions by 50% by 2050, concludes that CCS will need to contribute one-fifth of the necessary emissions reductions to achieve stabilisation of GHG concentrations in the most cost-effective manner. The IEA therefore sees CCS as an essential part of the portfolio of technologies needed to achieve substantial global emissions reductions and it is these findings which have driven the IEA's work in this area.

Building on the work done in the 2008 ETP publication, the IEA *CCS Roadmap* was released in 2009 ([www.iea.org/Papers/2009/CCS\\_Roadmap.pdf](http://www.iea.org/Papers/2009/CCS_Roadmap.pdf)). The Roadmap provides detail on the scale and urgency required in the deployment of CCS if the technology is going to contribute one-fifth of the necessary emissions reductions to achieve stabilisation of GHG concentrations. In addition, the *CCS Roadmap* also outlines a number of specific actions and milestones for CCS legal framework development. The legal recommendations contained in the *CCS Roadmap* are as follows:

- Review and adapt existing legal frameworks to regulate CCS demonstration projects by 2011 in OECD countries, 2013 in early-mover non-OECD countries, and 2015 in all non-OECD countries with CCS potential.
- All countries with CCS activities review existing legal and regulatory frameworks for their ability to regulate CCS, identify barriers or gaps, and create a comprehensive CCS regulatory framework, if required, by 2020.
- Address international legal issues, including development of an international monitoring and verification protocol for CO<sub>2</sub> storage and allowance of transboundary CO<sub>2</sub> transfer under the London Protocol by 2012.

In producing the *CCS Roadmap*, the IEA consulted a wide range of stakeholders through two preparatory meetings: one on technology ([www.iea.org/work/workshopdetail.asp?WS\\_ID=398](http://www.iea.org/work/workshopdetail.asp?WS_ID=398)) and one on financing, legal and regulatory and public acceptance ([www.iea.org/work/workshopdetail.asp?WS\\_ID=401](http://www.iea.org/work/workshopdetail.asp?WS_ID=401)). The IEA also consulted with a number of developing countries and emerging economies through a series of CCS Roundtable discussions ([www.iea.org/subjectqueries/ccs/ccs\\_roundtables.asp](http://www.iea.org/subjectqueries/ccs/ccs_roundtables.asp)).

In addition to featuring CCS legal and regulatory issues in general IEA and IEA CCS work, there have also been a number of CCS legal and regulatory specific outputs including *Legal aspects of Storing CO<sub>2</sub>* ([www.iea.org/textbase/nppdf/free/2005/co2\\_legal.pdf](http://www.iea.org/textbase/nppdf/free/2005/co2_legal.pdf)) and the subsequent update, *Legal aspects of Storing CO<sub>2</sub>: Update and Recommendations* in 2007

([www.iea.org/textbase/nppdf/free/2007/legal\\_aspects.pdf](http://www.iea.org/textbase/nppdf/free/2007/legal_aspects.pdf)). In addition to these two publications, the IEA has also looked to address specific legal and regulatory issues around CCS and its application. Examples of such papers include:

- CO<sub>2</sub> capture and storage issues: Accounting and baselines under the UNFCCC (2004): [www.iea.org/papers/2004/css.pdf](http://www.iea.org/papers/2004/css.pdf).
- CO<sub>2</sub> capture and storage in the Clean Development Mechanism (2007): [www.iea.org/papers/2007/CCS\\_in\\_CDM.pdf](http://www.iea.org/papers/2007/CCS_in_CDM.pdf).
- CO<sub>2</sub> capture ready plants (2007): [www.iea.org/Papers/2007/CO2\\_Capture\\_Ready\\_Plants.pdf](http://www.iea.org/Papers/2007/CO2_Capture_Ready_Plants.pdf)

As well as the IEA's publications in this area, in 2008 the IEA launched the IEA International CCS Regulatory Network (the Network). The Network was launched with the aim of providing a neutral forum for CCS regulators, policy makers and stakeholders to share updates and views on CCS legal developments. The Network meets annually in Paris and runs quarterly web-based seminars on specific CCS legislative and regulatory issues. The Network is open to any interested parties and currently has a membership of over 1000 people from approximately 35 different countries around the world, including 14 developing countries. Details on the work of the Network, including information on all the webinars and meetings to date, can be found on the IEA CCS website - [www.iea.org/ccs](http://www.iea.org/ccs).

### **Developments in last six months**

In the last six months the IEA has continued its ongoing work programme on CCS legal and regulatory issues. This has included two webinars: one on the CCS outcomes from Copenhagen Climate Negotiations ([www.iea.org/work/workshopdetail.asp?WS\\_ID=441](http://www.iea.org/work/workshopdetail.asp?WS_ID=441)) and one on financial mechanisms to support CCS long-term liability ([www.iea.org/work/workshopdetail.asp?WS\\_ID=469](http://www.iea.org/work/workshopdetail.asp?WS_ID=469)). The IEA also held the second meeting of the IEA Regulatory Network in January, at the IEA's offices in Paris ([www.iea.org/work/workshopdetail.asp?WS\\_ID=444](http://www.iea.org/work/workshopdetail.asp?WS_ID=444)).

The IEA and the CSLF have also recently completed their latest report to the G8 meeting in Maskoka, Canada ([www.iea.org/papers/2010/ccs\\_g8.pdf](http://www.iea.org/papers/2010/ccs_g8.pdf)). The IEA, in conjunction with the CSLF, have been providing input and recommendations around CCS to the G8 since 2005. As part of this process the IEA and CSLF have tracked progress and made recommendations around the progress in developing CCS legal and regulatory frameworks.

### **Developments expected in next six months**

In October 2010, the IEA will release its third major publication that addresses CCS legal and regulatory issues: the IEA *Carbon Capture and Storage Model Regulatory Framework (Model Framework)*. The *Model Framework* identifies 29 key issues associated with the regulation of CCS activities. The *Model Framework* then draws on existing regulatory frameworks for CCS globally to synthesise and propose key principles on dealing with each issue based on current approaches, including examples of how the issues have been dealt with in existing or proposed frameworks around the world. For issues associated with CO<sub>2</sub> storage, the *Model Framework* also proposes Model Text that could form the building blocks of a CO<sub>2</sub> storage regulatory framework. The *Model Framework* aims to provide guidance for authorities seeking to develop

CCS regulatory frameworks within their own jurisdictions and is intended to be in a form appropriate to authorities around the world, operating in diverse legal and regulatory environments and in the context of varying existing resource extraction or environmental impact frameworks, and is therefore necessarily high level. It avoids prescribing how any particular issue should be translated into a domestic legal system, and rather provides a general, 'starting point' regulatory framework for CCS, around which jurisdictionally appropriate additions and amendments are intended to be incorporated.

In addition to the launch of the *Model Framework* and this IEA *Carbon Capture and Storage Legal and Regulatory Review*, in the next six months the IEA intends to hold a further two webinars and the 3rd meeting of the Network.





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