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Carbon Capture and Storage: Wishful Thinking or a Meaningful Part of the Climate Change Solution

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ARTICLE

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INTRODUCTION

In the lead-up to the climate change negotiations that are scheduled to take place in Copenhagen towards the end of 2009, pursuant to the United Nations Framework Convention on Climate Change, and in order to reach agreement on a post-Kyoto Protocol international climate change regime, many countries around the globe are considering the options available to them to reduce greenhouse gas (GHG) emissions in a manner that will minimize the cost impacts to economies already battered from the onslaught of the 2008 global financial crisis. In addition to confronting a markedly changed geopolitical landscape including the election of a new administration in the United States under the Democrats and President Barack Obama, the ongoing military confrontation between Hamas and the Israelis in Gaza, an outbreak of terrorist attacks in Mumbai, and Iran drawing ever closer to the possible development of nuclear weapons, the international community is facing what is predicted by some to be the most severe and prolonged economic downturn since the 1930s and the Great Depression. The collapse of the banking systems in several countries triggered in part by the sub-prime

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mortgage crisis in the United States has inevitably led to a credit crisis around the globe as job layoffs are expected to climb throughout 2009 and into 2010.

The impact of these events on the ability of the international community to address the climate change challenges that lie ahead is fraught with uncertainty and the reluctance of the world's major coal producers to abandon or curtail an industry of vital economic importance in terms of both jobs and exports, has elevated carbon capture and storage (CCS) to increasing levels of importance in the consideration of available energy options. It remains to be seen whether the attention and investment dollars presently committed to the development of CCS technologies around the globe is warranted. This paper will endeavor to outline how CCS is currently viewed by Australia and the European Union as part of their respective energy strategies.

The Australian government has been a keen supporter of research and development into "breakthrough" low emissions technologies, which would enable Australia to continue to meet its energy demands from its relatively abundant fossil fuel supplies. In the last six years the Australian government has commenced or supported a number of research initiatives into both carbon capture and storage technologies, as well as the necessary regulatory regime to govern GHG injection, long-term storage, and liability. The Rudd government has recently announced funding of possibly more than one billion dollars to companies willing to develop commercial scale CCS projects in Australia.[1] The passage into legislation of the Offshore Petroleum Amendment (Greenhouse Gas Storage) Act of 2008 provides the legislative framework for CCS in Commonwealth offshore areas. These amendments to the Offshore Petroleum Act of 2006 comprise a fundamental component of the government's strategy of reducing Australian GHG emissions by 60% of 2000 levels by 2050.[2]

1. Lenore Taylor, *Billion Dollars from Federal Government to Clean Up Coal*, THE AUSTRALIAN, Jan. 29, 2009, *available at* http://www.theaustralian.news.com.au/story/0,25197,24977686-2702,00.html. For the purposes of this article all monetary amounts will be in Australian dollars (AU) unless otherwise specified. Prime Minister Kevin Rudd, the leader of the Australian Labor Party was sworn into office on Dec. 3, 2007.

2. COMMONWEALTH OF AUSTRALIA, AUSTRALIA'S NATIONAL EMISSIONS TARGET FACT SHEET (2008), http://www.climatechange.gov.au/whitepaper/factsheets/pub

Part I of this paper will briefly provide a timeline of the CCS initiatives that have been pursued and supported by the Australian Government over the last few years. This paper then proceeds to discuss the Gorgon and Otway demonstration projects, through which both government and industry are exploring opportunities for commercialization of CCS technology. This paper will then analyze the key provisions of the recently passed Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, which prescribes the legislative framework in which CCS may be undertaken in Commonwealth offshore areas. Following from this is an assessment of the submissions made to a Senate Committee that inquired into the Commonwealth Offshore Bill prior to its passage in order to gauge whether state governments considered the legislation a suitable model for mirror legislation to be enacted within State jurisdictions, and whether industry considered the legislative framework an effective system of property rights, which in turn would provide the necessary commercial certainty for long-term investment in CCS technology.

Part II will discuss CCS in the context of developments in the European Union and will trace in a similar manner how the E.U. has also embraced CCS technology as a means of ensuring a continuation of the coal industry in several of its member states well into the twenty-first century. Although it is recognized that the integration of CCS within the larger context of an emissions trading scheme may be of critical importance to a country's overall emission reduction strategy, this complex issue is not dealt with in any depth in this paper due to both time and space constraints.

PART I

AUSTRALIAN GOVERNMENT CARBON CAPTURE AND STORAGE INITIATIVES 2002-2008

In 2002, the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) published a paper, *Beyond Kyoto* –

s/031-australias-national-emissions-targets.pdf.

Innovation and Adaptation,[3] which stated that producing electricity from coal gasification and GHG geosequestration provided the best options for GHG mitigation on a large scale,[4] and recommended that Australia "establish a national program to scope, develop, demonstrate and implement near-zero emissions from coal-based electricity generation."[5] Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO) and Geoscience Australia were then partnered with the Cooperative Research Centre for Greenhouse Gas Technologies (CO_2CRC) to assess the feasibility of the geological storage of carbon dioxide (CO_2).[6] Sixty-five sites were originally identified as being suitably close to a GHG point source, and geologically suitable for GHG storage.[7]

The role of the CO_2CRC is to:

> research[ ] the logistic, technical, financial and environmental issues of storing industrial CO_2 emissions in deep geological formations . . . develop and deploy technologies that can achieve significant cuts in capture cost (75-80%) and provide Australia with a research and education capability to support industries using these technologies.[8]

3. PRIME MINISTER'S SCIENCE, ENGINEERING AND INNOVATION COUNCIL, BEYOND KYOTO – INNOVATION AND ADAPTATION (2002), http://www.dest.gov.au/NR/rdonlyres/5AC44381-611C-42D48A05072DA9E3C8A0/1945/BeyondKyotoreport.pdf [hereinafter BEYOND KYOTO].

4. *Id.* at 1.

5. *Id.* at 33.

6. THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA, HOUSE OF REPRESENTATIVES STANDING COMMITTEE ON SCIENCE AND INNOVATION, BETWEEN A ROCK AND A HARD PLACE: THE SCIENCE OF GEOSEQUESTRATION 4 (2007), http://www.aph.gov.au/house/committee/scin/geosequestration/report/fullreport.pdf. [hereinafter BETWEEN A ROCK AND A HARD PLACE].

7. John Bradshaw et al., *The Potential for Geological Sequestration in Australia: Preliminary findings and implications for new Gas Field Development*, 42 APPEA JOURNAL 25 (2002), *available at* https://extra.co2crc.com.au/modules/pts2/download.php?file_id=586&rec_id=85.

8. Barry Hooper & Luke Murray, *Overview of the CO_2CRC Capture Program*, CO_2CRC, Jun. 19, 2006, at 1, *available at* http://www.co2crc.com.au/ (select the "Publications" hyperlink and then the "Search All" feature; in the Title search box type in "Overview" and type in "Hooper" for the Author; scroll down to record # ABS05-0103) (executable file).

The CO_2CRC identified the following options for long-term geological storage:

- saline aquifers;
- depleted gas and oil fields;
- unmineable coal seams;
- injecting into existing oil and gas reservoirs to enhance recovery;
- injecting into coal bed methane reserves to extract the methane; and
- injecting into other geological formations such as basalts, oil shales and cavities.[9]

In 2003, the Australian Government became a founding member of the Carbon Sequestration Leadership Forum (CSLF).[10] The CSLF's charter established a broad outline for cooperation with the purpose of facilitating development of cost-effective techniques for capture and safe long-term storage of CO_2. Among other goals the CSLF seeks to:

- Identify key obstacles to achieving improved techn-ological capacity.
- Identify potential areas of multilateral collaborations on carbon separation, capture, transport and storage technologies.[11]

In September 2003, the Council of Australian Governments (COAG) and the Ministerial Council on Minerals and Petroleum Re-sources (MCMPR) established a Geosequestration Regulatory Working Group (consisting of all federal, state and territory jurisdictions) to develop draft regulatory guiding principles for a CCS legal regime.[12] In the 2004, Australian Government White Paper, *Securing Australia's Energy Future* (Energy White Paper),[13] the Energy Task Force took an integrated approach in

9. BETWEEN A ROCK AND A HARD PLACE, *supra* note 6, at 31-32.

10. *Id.* at 16.

11. Carbon Sequestration Leadership Forum, About the CSLF, http://www.cslforum.org/aboutus (last visited Sept. 7, 2009).

12. BETWEEN A ROCK AND A HARD PLACE, *supra* note 6, at 91-92.

13. COMMONWEALTH OF AUSTRALIA, SECURING AUSTRALIA'S ENERGY FUTURE (2004) [hereinafter ENERGY WHITE PAPER], *available at* http://www.efa.com.au/Library/CthEnergyWhitePaper.pdf.

their examination of the economic, social and environmental aspects of energy policy; the group focused on the "investment[s] [necessary] to meet energy demand[s]," while "recognising that [this] investment in the energy sector [must] . . . respond to climate change."[14] In the Energy White Paper the Australian government announced a funding commitment of $522.9 million over sixteen years to establish a Low Emissions Technology Demonstration Fund to support industry led projects to explore the commercial viability of low GHG emissions technology;[15] another $209 million was allocated through a range of renewable energy programs.[16] The Energy White Paper also referred to the "significant challenges" that CCS technology presents such as when,

> separating carbon during electricity generation processes, combining carbon dioxide capture and storage in an electricity generation context, [and] ensuring long-term storage and meeting competitive requirements for reliability and cost. Demonstrating the commercial applicability of these technologies is likely to be expensive and take at least 10 years.[17]

In March of the same year the Australian Government committed an additional $500,000 to support initial research under the industry-government partnership, COAL21.[18] The objectives of the COAL21 National Action Plan are to facilitate the

14. COMMONWEALTH OF AUSTRALIA, OFFICIAL COMMITTEE HANSARD, SENATE, ENVIRONMENT, COMMUNICATIONS, INFORMATION TECHNOLOGY AND THE ARTS REFERENCES COMMITTEE, REFERENCE: ENERGY WHITE PAPER § 2.10 (2004) (statement of Kathleen Mackie, Assistant Secretary, Policy Development Branch, Department of the Environment and Heritage), *available at* http://www.aph.gov.au/SENATE/COMMITTEE/ecita_ctte/completed_inquiries/2004-07/energy_white_paper/report/c02.htm.

15. ENERGY WHITE PAPER, *supra* note 13, at 182.

16. AUSTRALIAN GOVERNMENT, AUSTRALIAN GREENHOUSE OFFICE, GOVERNMENT RESPONSE TO TAMBLING MANDATORY RENEWABLE ENERGY TARGET (MRET) REVIEW RECOMMENDATIONS 2 (2004), *available at* http://www.climatechange.gov.au/renewabletarget/pubs/mret-response.pdf.

17. ENERGY WHITE PAPER, *supra* note 13, at 143.

18. AUSTRALIAN GOVERNMENT, AUSTRALIAN GOVERNMENT SUBMISSION INTO THE HOUSE OF REPRESENTATIVES INQUIRY ON GEOSEQUESTRATION 5 (2006), *available at* http://www.aph.gov.au/House/committee/scin/geosequestration/subs/sub41.pdf.

demonstration and commercialization of near-zero emissions and "breakthrough" technologies for coal-based electricity generation.[19]

In 2005, after consultation with relevant stakeholders,[20] an agreed set of CCS Regulatory Guiding principles were developed.[21] According to the Australian government six issues were seen as fundamental to an effective national regulatory framework for CCS. They were an,

- Assessment and approvals process;
- Access and property rights;
- Transportation issues;
- Monitoring and verification;
- Liability and post-closure responsibilities; and
- Financial issues.[22]

Moreover, "[b]arriers and obstacles to widespread deployment of CCS are often summarised in four overarching categories: technological, economic, legal/regulatory and social."[23] Therefore the CSLF determined that a proposed Regulatory Framework for CCS was required to,

- Deliver a consistent transparent and flexible basis for regulation of CO_2 carbon capture and storage projects
- Potential to deliver investment certainty for carbon capture and storage projects
- Public confidence that CO_2 will be safely and effectively stored

19. COAL21, REDUCING GREENHOUSE GAS EMISSIONS ARISING FROM THE USE OF COAL IN ELECTRICITY GENERATION: A PLAN OF ACTION FOR AUSTRALIA 2 (2004), *available at* http://www.coal21.com.au/Media/COAL%20Action%20Summary.pdf; *see also* Asia-Pacific Partnership on Clean Development and Climate, Welcome to the Asia-Pacific Partnership on Clean Development and Climate, http://asiapacificpartnership.org/About.htm (last visited Sept. 7, 2009).

20. Relevant stakeholders included peak industry bodies and environmental representatives.

21. BETWEEN A ROCK AND A HARD PLACE, *supra* note 6, at 91-92.

22. *Id.* at 92.

23. STEFAN BAKKER, HELEEN DE CONINCK & HELEEN GROENENBERG, CARBON CAPTURE AND STORAGE, ENERGY RESEARCH CENTRE OF THE NETHERLANDS 10 (2008), http://www.theclimategroup.org/assets/resources/Carbon_Capture_and_Storage.pdf.

- Public confidence that natural resource management, environmental impacts, health and safety issues [are] addressed
- Increased research development and transfer of technology
- Consistency in the application and regulation of CO_2 carbon capture and storage technologies and processes [24]

In January 2006, the Australian Government hosted the launching of the Asia-Pacific Partnership on Clean Development and Climate (AP6)[25] and announced an initial commitment of $100 million to the partnership.[26] The Work Plan of the AP6 seeks to develop sustainable solutions to shared challenges, through the establishment of eight public-private sector Task Forces covering:

(1) cleaner fossil energy;
(2) renewable energy and distributed generation;
(3) power generation and transmission;
(4) steel;
(5) aluminum;
(6) cement;
(7) coal mining; and
(8) buildings and appliances. [27]

24. Martin Squire, Mgr. of CCS Section Res. Div., Presentation at the Carbon Sequestration Leadership Forum Workshop, Developing Australia's Legislation and Regulatory Guidelines for CCS (May 10, 2007) (slideshow at 5), *available at* http://www.cslforum.org/publications/documents/SquireAustraliaRegulatoryCSLFWorkshop051007.pdf.

25. The AP6 Partnership includes the following countries: Australia, China, India, Japan, Republic of Korea and the United States. *See* Asia-Pacific Partnership on Clean Development and Climate, Welcome to the Asia-Pacific Partnership on Clean Development and Climate, http://asiapacificpartnership.org/About.htm (last visited Sept. 7, 2009).

26. CO_2CRC, The Need for Geosequestration,, Global and National Response, Asia-Pacific Partnership on Clean Development and Climate, http://www.co2crc.com.au/needgeo/response.html (last visited Sept. 7, 2009) (scroll down to the article); *see also* U.S. Government Website for the Asia-Pacific Partnership on Clean Development and Climate, Founding Documents, http://www.app.gov/about/key/index.htm.

27. Asia-Pacific Partnership on Clean Development and Climate, *Work Plan* 1 (2006), *available at* http://www.asiapacificpartnership.org/pdf/resources/work

The Intergovernmental Panel on Climate Change stated that the costs of stabilizing CO_2 concentrations would be reduced by 30% or more if CCS is included in the mitigation portfolio.[28] Furthermore, the deployment of CCS would account for 10% – 15% of the total CO_2 reduction in 2050, i.e. up to 10 $GtCO_2$ per year.[29] Therefore, because coal and gas will continue to remain the source of fuel for energy demand well into the foreseeable future, the AP6 partnership is seeking through its collaborative research partnership to accelerate the development, demonstration, and deployment of affordable low emissions technologies. The objectives of the AP6 work plan for the Cleaner Fossil Energy Taskforce are therefore to:

- Build on the range of existing national (and other international) measures and initiatives to develop an Asia-Pacific Partnership cleaner fossil energy technology development program.
- Identify the potential for, and encourage the uptake of, CO_2 geosequestration opportunities in Partnership countries.
- Further develop coal bed and waste coal mine methane gas and LNG [liquefied natural gas]/natural gas opportunities and markets in the Asia-Pacific region.
- Build the research and development base, as well as the market and institutional foundations of Partners through technology supporting initiatives, such as education, training and skills transfer.[30]

In 2007, the Australian Federal Parliament's House of Representatives Standing Committee on Science was asked to inquire into and report on the science and application of geosequestration technology in Australia, and in August 2007 the

plan.pdf.

28. WORKING GROUP III OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IPCC SPECIAL REPORT ON CARBON DIOXIDE CAPTURE AND STORAGE 12 (Bert Metz et al. eds., Cambridge University Press 2005).

29. *Id.* at 24. The term "Gt" refers to gigatons, a unit of measure equaling one billion tons.

30. *Work Plan*, *supra* note 27, at 2.

Committee made five key recommendations to the federal government:

1. To progress research being conducted through the CO_2CRC in order to assess the "storage potential for permanent CO_2 geo-sequestration in sedimentary basins in New South Wales, particularly the off-shore Sydney Basin, and the economic viability of these sites;"

2. To "fund one or more large-scale projects which will demonstrate the operation and integration of the CCS – capture, transportation and sequestration and monitoring;"

3. To call upon the Australian Government to "implement a rigorous regulatory environmental risk mitigation framework for CCS" that includes: criteria for site selection; assessment of risks and appropriate responses for short and long term leakage; and requirements for long-term monitoring and reporting;

4. Employ direct and tax based fiscal incentives that encourage industry to invest in research and development of CCS technology;

5. And to "develop legislation to define the financial liability and ongoing monitoring responsibilities at a geosequestration site."[31]

However, the Standing Committee noted that CCS is not destined to be a "magic bullet" for reducing global CO_2 emissions[32] since Australia can realistically only store a maximum of 25% of the total annual net emissions through geological storage of CO_2.[33] Therefore geosequestration by itself cannot meet the reductions necessary for Australia to be on target to reduce its emissions by 15% – 30%.[34] Furthermore, CCS has not yet been applied at a

31. BETWEEN A ROCK AND A HARD PLACE*, supra* note 6, at xxi–xxiii.

32. *Id.* at 45.

33. J. Bradshaw et al., *Australia's CO2 geological storage potential and matching of emissions sources to potential sinks*, 29 ENERGY 1623-31 (2004).

34. PARLIAMENT OF AUSTRALIA SENATE, ENVIRONMENT, COMMUNICATIONS, INFORMATION TECHNOLOGY AND THE ARTS COMMITTEE, LURCHING FORWARD, LOOKING BACK: BUDGETARY AND ENVIRONMENTAL IMPLICATIONS OF THE GOVERNMENT'S ENERGY WHITE PAPER 47 (2005).

large coal-based power plant.[35] The challenge is to demonstrate CCS technology in large coal-fired power stations,[36] the viability of which depends on "finding suitable long term and secure storage sites within reasonable distance from the major stationary energy hubs."[37]

Conservative estimates have put Australia's total capacity for capture and storage at 740 billion tons of CO_2.[38] Additionally, in the oil and gas fields, the potential capacity is estimated at 14,000 million tons of CO_2.[39] However, the oil and gas fields may be unavailable for a number of years, as their normal economic lives have been extended due to the current high prices for oil and gas in the world market[40].

In 2008, Professor Ross Garnaut's Report, prepared for the Australian Government, stated that the economic cost of reducing GHG emissions would be lower if an emissions trading regime was supported by a cost-effective method of CCS.[41] Professor Garnaut also believed that Australia was in a position to play a leading role in the international effort to research and develop CCS technologies,[42] and that "in the end, the future of coal depends on successful carbon capture and storage, through geo-sequestration or biosequestration."[43] However, Professor Garnaut also acknowledged that although the individual technologies have

35. Within industry "a large power plant is generally defined as having a capacity of 500 megawatts (MW) or above." BETWEEN A ROCK AND A HARD PLACE, *supra* note 6, at 27 n.6.

36. BETWEEN A ROCK AND A HARD PLACE, *supra* note 6, at 27.

37. *Id.* at 59.

38. *Id.* at 33.

39. *Id.*

40. *Id.*

41. ROSS GARNAUT, THE GARNAUT CLIMATE CHANGE REVIEW: FINAL REPORT 48 (2008), *available at* http://www.garnautreview.org.au/index.htm (scroll down view specific chapter pdfs). Ross Garnaut, an economics professor at the Research School of Pacific and Asian Studies at the Australian National University and a Vice-Chancellor's Fellow and Professorial Fellow of Economics at The University of Melbourne was commissioned by the Australian Government in 2007, to conduct an independent study in order to examine the "impact of climate change on the Australian economy." Garnaut Climate Change Review, About, http://www.garnautreview.org.au/CA25734E0016A131/pages/about (last visited Sept. 7, 2009).

42. *Id.* at xxxi.

43. *Id.* at 392.

been proven, there are still issues of economics, scale, and overall technology integration, which remain as Australia's greatest challenge.[44] The Garnaut Report concluded that because of the urgency of reducing emissions, there is a strong case for accelerated work to commence on retrofitting CCS technology to existing power plants.[45] Further, a failure to do so will see the growth in price of Australia's coal exports damaged by mitigation measures which are being pursued in our major world markets for coal.[46] Furthermore, Australia is relatively well endowed with geological formations suitable for carbon capture and storage, and "our sequestration sites seem to be of superior economic quality across the range of possible technologies."[47]

There are thirty coal-fired power stations fuelled by pulverized coal in mainland Australia.[48] Of these, only four power stations operate using subcritical technology.[49] That is, operating at between 33% – 37% efficiency for power.[50] Therefore "the current stock of Australian and international pulverised coal-fired power plants can only make use of post-combustion capture technology."[51] Post-combustion technology involves separating the gases through the use of an absorptive chemical solvent[52] that has the potential to capture up to 95% of the CO_2.[53] However, international energy corporations such as BP believe that it is not "economically feasible" to retrofit existing plants that operate only at 20% efficiency with post-combustion technology.[54] Meanwhile Stamwell Corporation, a major Australian electricity generator, has stated that it would be more economically feasible to build new power generation plants than to retrofit post-combustion capture technologies to existing power plants.[55]

44. *Id.* at 495.
45. *Id.* at 500.
46. GARNAUT, *supra* note 41, at 578.
47. *Id.*
48. BETWEEN A ROCK AND A HARD PLACE, *supra* note 6, at 30.
49. *Id.* at 30.
50. *Id.* at 28.
51. *Id.* at 30.
52. *Id.* at 27.
53. *Id.* at 28.
54. BETWEEN A ROCK AND A HARD PLACE, *supra* note 6, at 30.
55. *Id.*

Both the Federal and State Australian governments have shown strong support for CCS, as part of a "suite of options" to reduce CO_2 emissions from the energy sector.[56] On September 19, 2008, the Rudd Labor Government announced a $100 million investment to create a Global Institute designed to: 1) accelerate the development of CCS technology; 2) facilitate demonstration projects; and 3) to identify appropriate regulatory settings and frameworks. [57] Initially the institute will have the objective of assisting the G8 Summit in meeting its commitment to have in operation at least twenty industrial scale CCS plants by 2020.[58] Presently there are five such pilot projects, including the Otway scheme in Victoria, which is discussed further in this paper.[59]

The Australian Government has also recently established a National Low Emissions Coal Council (NLECC), which will bring together key stakeholders from government, industry, and the coal research community, and play a key role in helping to deliver the new global initiative of twenty demonstration plants by 2020.[60] The NLECC is backed by the Australian government's commitment of $500 million, and more than $1 billion from industry.[61]

In addition, the Australian Government has established a Carbon Storage Task Force, which is in the process of developing the National Carbon Mapping and Infrastructure Plan to identify large-scale geological storage sites for CO_2.[62] The Carbon Storage

56. *Id.* at 21.

57. Official Website of the Australian Labor Party, Carbon Capture and Storage Initiative, Media Statement 19th September 2008, http://www.alp.org.au /media/0908/mspmrese190.php (last visited Sept. 7, 2009).

58. *Rudd Unveils Carbon Capture Scheme,* WORLD NEWS AUSTRALIA, Sept. 19, 2008, *available at* http://www.sbs.com.au/news/article/558029/Rudd-unveils-carbon-capture-scheme.

59. *See infra* Part I, at The Otway Basin Project.

60. The Hon. Martin Ferguson, AM PM, Announcing the Low Emissions Coal Initiative (Jul. 28, 2008) (excerpts), *available at* http://minister.ret.gov.au/ TheHonMartinFergusonMP/Pages/LOWEMISSIONCOALINITIATIVESANNO UNCED.aspx.

61. *Id.*

62. The Hon. Martin Ferguson, AM PM, Announcement Regarding the Launch of the National Low Emissions Coal Council and the Carbon Storage Taskforce (Jul. 28, 2008) (transcript), *available at* http://minister.ret.gov.au/The HonMartinFergusonMP/Pages/LAUNCHOFTHENATIONALCLEANCOALCOU NCILANDTHE.aspx.

Task Force is comprised of representatives from "coal, power generation, petroleum and pipeline sectors," and expertise from the geological community in Australia.[63]

The Australian Government Treasury Report *Australia's Low Pollution Future: The Economics of Climate Change Mitigation,* confirmed in October 2008 that "[c]oal's long-term future depends on developing new technologies—most importantly, carbon capture and storage."[64] Additionally, the widespread development and deployment of CCS technologies will "reduce the impact of emission pricing on coal mining."[65]

I. CCS DEMONSTRATION PROJECTS

> If the world, by 2020, can implement perhaps 10-20 full-scale demonstrations in a variety of CO_2 sources, geological reservoirs, and countries, it is expected that most of the early barriers [to adoption] can be overcome.[66]

A. Gorgon Project, Western Australia

The Gorgon project plans to undertake the largest CCS initiative in the world, by re-injecting 4 to 5 million tons (MT) per year of CO_2 (estimated at 125 million tons over the life of the project) permanently underground in a saline aquifer.[67] A data

63. *Id.*

64. COMMONWEALTH OF AUSTRALIA, AUSTRALIA'S LOW POLLUTION FUTURE: THE ECONOMICS OF CLIMATE CHANGE MITIGATION x (2008), http://www.treasury.gov.au/lowpollutionfuture/summary/downloads/Australias_Low_Pollution_Future_Summary.pdf.

65. COMMONWEALTH OF AUSTRALIA, AUSTRALIA'S LOW POLLUTION FUTURE: THE ECONOMICS OF CLIMATE CHANGE MITIGATION § 5.41 ¶ 4 (2008), http://www.treasury.gov.au/lowpollutionfuture/report/html/05_Chapter5.asp.

66. BAKKER, CONINCK & GROENENBERG, *supra* note 23, at 12.

67. Western Australia Government, Environment Portal, http://portal.environment.wa.gov.au/pls/portal/docs/PAGE/DOE_ADMIN/GREENHOUSE_REPOSITORY/TAB6327544/2007006CLIMATECHANGE.PDF; Stuart Smith, Remarks at the 19th World Energy Congress, Sydney, Australia: Regulatory Policy Issues For Carbon Dioxide Geosequestration – A Western Australian Case Study (Sept. 5-9, 2004); CO_2CRC, Demonstration in Australia, Gorgon Project – Western Australia, http://www.co2crc.com.au/demo/ausprojects.html (scroll down to view article) (last visited Sept. 7, 2009).

well has been drilled and a major study of the subsurface is currently underway.[68] The project is a joint venture between the Australian subsidiaries of Chevron, Exxonmobil and Shell.

To facilitate the operation of the Gorgon project, in 2003 the Barrow Island Act was passed to amend the definitions of "petroleum" and "pipeline" in Section 4 of the Petroleum Pipelines Act of 1969, so as to allow the transport of CO_2 for the purposes of disposal in an underground reservoir or other sub-surface formation.[69] The State legislation which permits CO_2 to be sequestered has referred to the process of sequestering CO_2 as "disposal," in order to clarify that the proponents do not have any rights to remove the CO_2 from the storage formation, once it has been "injected."[70]

Section 13 of the Barrow Island Act provides for the storage of CO_2 underground and:

- prohibits disposal of carbon dioxide without ministerial approval;
- sets out the process to apply for approval, including the information and materials that must accompany an application; and
- provides for consultation by the relevant minister with other government officials and third parties.[71]

Under Schedule 1 of the Barrow Island Act, otherwise known as the Gorgon Gas Processing and Infrastructure Agreement,[72] the signatories to the agreement known as "Joint Venturers" are required to submit both a proposal relating to the disposal of CO_2 and a closure plan that addresses the long-term management of

68. *CCS Activity in Australia 2009*, CO_2CRC 1 (Jan. 2009), http://www.co2crc.com.au/dls/gen/CCS_activities_2008.pdf.

69. Barrow Island Act, 2003, §§ 11(a)-(b) (W. Austl.), available at http://www.ucl.ac.uk/cclp/pdf/Barrow_Island_Act_Western_Australia_2003.pdf; Petroleum Pipelines Act, 1969, § 4 (1) (W. Austl.), *available at* http://www.austlii.edu.au/au/legis/wa/consol_act/toc-P.html (scroll down to the appropriate act).

70. Smith, *supra* note 67, at 6.

71. James McLaren & James Fahey, *Key Legal and Regulatory Considerations for the Geosequestration of Carbon Dioxide in Australia*, 24 ARELJ 45, 57-58 (2005), *available at* http://www.netl.doe.gov/technologies/carbon_seq/refshelf/Geosequestration%20Article.pdf.

72. Barrow Island Act, 2003, at Sch. 1 (W. Austl.).

the injected CO_2. The State Development Minister has the key responsibility for assigning conditions to the injection of CO_2 for the project. Approvals under the Barrow Island Act are subject to the environmental approval processes proscribed by the Environmental Protection Act of 1986.[73]

Pursuant to Section 13 of the Barrow Island Act, the disposal of CO_2 underground may be subject to any restriction or condition, including (without limitation):

a) the payment of money to the State;
b) indemnification of the State; or
c) the transferability or otherwise of the approval.[74]

However, under the specific terms of Section 5, subsection 1, of Schedule 1 of the Act, the Gorgon Gas Processing and Infrastructure Project Agreement, overall development must also conform with the Class A Nature Reserve status of Barrow Island, the provisions of the Ratifying Act, and the need to minimize environmental disturbances and to mitigate the impact on conservation values.[75] Under Section 11, subsection 1, the Joint Venturers shall also pay to the State $40 million, by installments, to be indexed in accordance with subsection 3, from January 1, 2004, for ongoing programs that will provide net conservation benefits.[76] In addition, under Section 27, of Schedule 1, the Joint Venturers are also required to indemnify the State with respect to any actions arising from, or in connection with work carried out by, or on behalf of the Joint Venturers.[77]

On March 10, 2007, the Gorgon Joint Venturers obtained State and Commonwealth environmental approvals for a 10 Mtpa[78] liquid natural gas development on Barrow Island.[79]

73. Environmental Protection Act, 1986, (W. Austl.), *available at* http://www.austlii.edu.au/au/legis/wa/consol_act/toc-E.html (scroll down to the appropriate act).

74. Barrow Island Act, 2003, § 13(6) (W. Austl.).

75. Barrow Island Act, 2003, at Sch. 1, § 5(1) (W. Austl.); *see also* The Government of Western Australia, Environmental Protection Authority, Gorgon Gas Project Information, http://www.epa.wa.gov.au/template.asp?area=EIA&ID=36&Cat=Gorgon+Gas+Project+Information (last visited Sept. 9, 2009).

76. Barrow Island Act, 2003, at Sch. 1, §§ 11(1), (3) (W. Austl.).

77. Barrow Island Act, 2003, at Sch. 1, § 27(1) (W. Austl.).

78. The term "Mtpa" stands for million tons per annum.

Specific conditions relating to the proposed CO_2 injection project are contained in Minister for the Environment and Water Resources' March 10, 2007, Approval Order.[80]

B. The Otway Basin Project, Victoria

The area chosen for this project is an undeveloped and depleted gas field near Naylor. The project involves extracting natural gas containing 80% CO_2 from the Buttress-1 well.[81] This gas will then be processed, compressed, transported by a pipeline and injected into a 2 km deep porous / permeable geological formation,[82] and then monitored to verify the behavior of the stored CO_2-rich gas.[83] The overall objective is to simulate the capture of CO_2 from power stations, and its compression and injection into various underground reservoirs to determine the feasibility and safety of geosequestration,[84] and also to "demonstrate many elements of likely commercial scale storage projects."[85]

The operating company for the Otway Basin Project is CO_2CRC Pilot Project Ltd.,[86] supported by researchers from around the world[87] and financial support from the Australian Government, Victorian government and the U.S. Department of

79. Gorgon Gas Project, *supra* note 75.

80. MINISTER FOR THE ENVIRONMENT AND WATER RESOURCES, APPROVAL, GORGON GAS DEVELOPMENT, http://www.environment.gov.au/epbc/notices/assessments/2003/1294/approval-decision.pdf.

81. Sandeep Sharma & Peter J. Cook (CO_2CRC), *CO2 Down Under*, WORLD COAL, Dec. 2007, at 50.

82. *Id.*

83. Peter Cook, *Castles in the Ground – The Prospects for Carbon Capture and Storage*, *in* CLIMATE CHANGE – GETTING IT RIGHT, at 94 (CEDA ed., 2007).

84. CO_2CRC, CO_2CRC Otway Project Overview, http://www.co2crc.com.au/otway/ (last visited Sept. 7, 2009).

85. Sharma & Cook, *supra* note 81.

86. The corporation includes the following companies: AngloCoal, BHP Billiton, BP, Chevron, Schlumberger, Shell, RioTinto Solid Energy, Woodside and Xstrata. CO_2CRC, CO_2CRC Pilot Project Ltd (CPPL), http://www.co2crc.com.au/about/cppl.html (last visited Sept. 9, 2009).

87. P. Cook & D. Van Puyvelde, *CCS Activity in Australia 2009*, CO_2CRC, Jan. 16, 2008, at 1, *available at* http://www.co2crc.com.au/ (select the "Publications" hyperlink and then the "Search All" feature; search for "CCS Activity in Australia" in the Title section) (executable file).

Energy.[88] It is anticipated that up to 100,000 tons of CO_2 will be injected into the gas field over a period of one to two years.[89]

According to the Australian government:

> As demonstration projects are rolled out, these legal and regulatory complexities will be thoroughly examined and each project will add to the body of knowledge and help develop a more comprehensive set of rules and regulations that will govern future CCS projects.[90]

II. The Offshore Petroleum Amendment (Greenhouse Gas Storage) Act of 2008

In the delivery of the Australian Government Budget on May 2007, the government announced a commitment to amending the Offshore Petroleum Act of 2006, (Offshore Petroleum Act).[91] The government felt that amendments to the Act would "'facilitate access and property rights for offshore legislation'" for CCS and encourage the states to "'introduce mirror legislation to facilitate [CCS legislation] within their own jurisdictions.'"[92] On November 11, 2008, the Australian Senate passed the Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, (Amendments), and established the world's first regulatory framework for CO_2 capture and geological storage or CCS.[93]

Because of the similarities between the transportation, injection and storage of CO_2 and petroleum, the Offshore Petroleum Act, which has served as an effective long-standing regulatory regime, was determined to be the legislative model of choice.[94] It was also necessary for the legislative model to reflect the co-existence of petroleum rights and those of the GHG storage

88. *Id.*

89. Sharma & Cook, *supra* note 81.

90. BETWEEN A ROCK AND A HARD PLACE, *supra* note 6, at 98.

91. Offshore Petroleum Act, 2006 (Austl.), *available at* http://www.austlii.edu.au/au/legis/cth/num_act/opa2006221/.

92. BETWEEN A ROCK AND A HARD PLACE, *supra* note 6, at 94 (alteration in original).

93. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008 (Austl.), *available at* http://www.comlaw.gov.au/ComLaw/Legislation/Act1.nsf/0/413D01D98514999CCA25750D007CA95A/$file/1172008.pdf.

94. Squire, *supra* note 24, slideshow at 7.

assessment permittees, GHG holding lessees and GHG injection license holders. As a result, the GHG regime mirrors the petroleum regime. Hence the regime provides for:

1) An acreage release process
2) CCS Exploration Permit
3) CCS Retention Lease
4) CCS Injection License[95]

These 2008 Amendments to the original 2006 Offshore Petroleum Act, will be supported by regulations that are expected to prescribe a methodology for selecting potential GHG storage formations or acreages, and monitoring the storage activity. The regulatory regime will be expected to encompass:

- assessment and approval of proposed activities;
- risk and site analysis; and
- the monitoring required for long-term storage and data analysis.[96]

Thus far, the "regulatory framework for transporting, injecting and monitoring is yet to be determined but [the methodology] will be informed by the MCMPR's [Ministerial Council on Minerals and Petroleum Resources] Guiding Regulatory Principles.[97]

A. Acreage Releases

Prospective acreages for exploration will be short-listed following a call for public nominations of areas from interested parties, and in consultation with state and territory governments. The next stage in the process of acreage release will be for Geoscience Australia,

> [to] prepare a data package for each site, which will include the geotechnical information currently held by the government; the location and type of any petroleum wells that have been drilled in the area; any 3D seismic work that has been done; whether there are defence [sic]

95. *See generally* Greenhouse Gas Storage Act, 2008 (Austl.).
96. BETWEEN A ROCK AND A HARD PLACE, *supra* note 6, at 92.
97. *Id.* at 96.

interests or shipping in the area; and crucially, if there are any overlapping petroleum titles.[98]

B. Tenure

There are three types of tenure created by the Amendments to the Offshore Petroleum Act for GHG storage operations:

1) a greenhouse gas assessment permit;
2) a greenhouse gas holding lease; and
3) a greenhouse gas injection license.[99]

1. The GHG Assessment Permit

The Minister may, by notice in the government gazette,[100] invite potential GHG assessment permittees to make an application[101] for either a work-bid or cash-bid GHG assessment permit[102] for the exploration phase of GHG storage development in a defined permit (block) area.[103] An applicant for a work-bid permit or cash-bid permit must provide with the application a description of the proposed work and expenses in the permit area, and the financial and technical resources available to it.[104] In making a decision as to whether to grant approval, the Minister

98. THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA, HOUSE OF REPRESENTATIVES STANDING COMMITTEE ON PRIMARY INDUSTRIES AND RESOURCES, DOWN UNDER: GREENHOUSE GAS STORAGE REVIEW OF THE DRAFT OFFSHORE PETROLEUM AMENDMENT (GREENHOUSE GAS STORAGE) BILL, § 2.3 (2008), http://www.aph.gov.au/house/committee/pir/exposuredraft/report/fullreport.pdf [hereinafter DOWN UNDER REPORT].

99. *See* Offshore Petroleum Act, 2006, Parts 2.2-4 (Austl.), Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, at Sch. 4 (Austl.).

100. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008 § 249J (Austl.).

101. Application permits may be subject to additional "special conditions." REGULATION IMPACT STATEMENT, AMENDMENTS TO OFFSHORE PETROLEUM LEGISLATION TO PROVIDE FOR GREENHOUSE GAS TRANSPORT, INJECTION AND STORAGE IN COMMONWEALTH WATERS, at 12 (2008) [hereinafter REGULATION IMPACT STATEMENT], *available at* http://www.ret.gov.au/resources/Documents/ccs/Regulation_Impact_Statement.pdf.

102. Greenhouse Gas Storage Act §§ 249AJ–249AO, 249AP-AS.

103. Paragraph fifty-three amends section six of the original Act to define the "permit area" according to whether it is an exploration permit or a greenhouse gas assessment permit.

104. Greenhouse Gas Storage Act § 249AJ(3).

consider the factors contained in Section 249AF.[105] In the case of a single applicant for a work-bid, the Minister may decide to offer an area to the applicant on specified terms and conditions, including the lodgment of a new security,[106] or the Minister may reject the application.[107] The failure to lodge the required security will also cause the offer to lapse.[108] If however there are competing applicants for the work-bid, the Minister may make an offer to the applicant, which in the Ministers opinion is "most deserving."[109] When accepting an offer for a work-bid the applicant must comply with the specified terms of the offer.[110]

In the case of cash-bid GHG assessment permits,[111] the applicant who submits the highest bid may be offered the assessment permit, depending on the Ministers assessment of the technical and financial resources available to the applicant.[112] As with the work-bid, the failure to lodge the required security will cause the offer to lapse.[113] However, no special conditions can be attached to the approval with regard to how much the permittee is required to spend in carrying out work.

Once the permit has been granted it is valid for six years.[114] However, it is subject to extension where the permittee applies for a declaration of an identified GHG storage formation, a GHG holding lease or a GHG injection license.[115]

2. Identification of a GHG Storage Formation

The next phase of the process is to obtain a declaration of an identified GHG storage formation.[116] A permittee may apply to

105. *Id.* at § 249AF(4-8).

106. *Id.* at § 249NCA.

107. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, §§ 249AK, 249JE, 249JF (Austl.).

108. *Id.* at § 249JGAA.

109. *Id.* at 249AL.

110. *Id.* at § 249AE.

111. *See id.* at Div. 3 for cash-bid greenhouse gas assessment permit requirements.

112. *Id.* at § 249AP(6).

113. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 249JGAA (Austl.).

114. *Id.* at § 249AH.

115. *Id.* at §§ 249AHA, 249AI.

116. *Id.* at § 249AU.

the responsible Commonwealth Minister for the declaration of a geological formation in a permit area[117] as an identified GHG storage formation. The permittee must set out the reasons for believing the area is an eligible GHG storage formation,[118] as well as the suitability determinants and the spatial extent of the formation.[119] The Commonwealth Minister may declare the site an "identified GHG storage formation"[120] if it is an "eligible greenhouse gas storage formation,"[121] and maintains a register of "Identified Greenhouse Gas Storage Formations" and information particular to them.[122] To be declared an "eligible greenhouse gas storage formation," the area must be "suitable" with or without "engineering enhancements" for the "permanent storage" of at least 100,000 tons of a GHG substance.[123]

Suitability "determinants" of a site are outlined in Section 15B(8).[124] The Minister may make a variation to the declaration of an identified GHG storage declaration on the Minister's own initiative,[125] according to the criteria in Section 249AUA(5), and in consultation with GHG assessment permittees, holding lessees, and GHG injection licensees.[126] The Minister may also give the GHG assessment permittee written directions to eliminate, mitigate and manage the risk if the operations could have a significant adverse impact on petroleum exploration operations or petroleum recovery operations under existing or future petroleum property rights.[127] These Ministerial directions must be complied with irrespective of previous directions or the regulations.[128]

117. *Id.* at §§ 249AU(b)(i), 249AU(b)(ii).

118. *Id.* § 249AU(3)(a).

119. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, at § 249AU(3)(b) (Austl.).

120. *Id.* at § 249AU.

121. *Id.* at § 15B(8).

122. *Id.* at § 249AUBA.

123. *Id.* at § 15B(1).

124. *Id.* at § 15B(8).

125. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, at § 249AU(3)(b) (Austl.).

126. *See id.* at §§ 249AUA(5-6).

127. *Id.* at § 249AV.

128. *Id.* at § 249AV(2).

3. The GHG Holding Lease

The 2008 Amendments to the Offshore Petroleum Act also provide that the Minister may grant a holding lease[129] (subject to whatever conditions the responsible Commonwealth Minister thinks appropriate) to a GHG assessment permit holder or injection license holder.[130] The holding lease enables a GHG assessment permittee or injection license holder to retain land for a limited period of time if it does not yet have a source of GHG for injection purposes,[131] but expects to be able undertake GHG injection within fifteen years.[132] Otherwise, the Minister must refuse the application.[133] The GHG holding lease remains in force for five years and can be renewed once.[134]

A GHG holding lease is also subject to similar conditions as those for an assessment permit, including a requirement for approval to carry out "key GHG operations,"[135] specified work the lessee must carry out, the amount the lessee must spend on the work,[136] a requirement the lessee comply with directions from the Minister, and possibly requiring the lessee to lodge security.[137] If the lessee is not in full compliance the Minister has further discretion.[138]

The holding lease grants the holding lessee the right[139] within the permit area to:

- Explore for a potential GHG storage formation;
- Explore for a potential GHG injection site;[140]
- Inject GHGs into a part of a geological formation for appraisal purposes;

129. *Id.* at § 249BC.
130. *Id.* at § 249 BA.
131. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 249BN (Austl.).
132. *Id.* at §§ 249BI, 249BN.
133. *Id.* at §§ 249BJ, 249BP.
134. *Id.* at §§ 249BF, 249BT.
135. *Id.* at §§ 249BC(3), 249BD.
136. *Id.* at § 249BC(5).
137. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 249BC (Austl.).
138. *Id.* at § 249BV.
139. *See id.* at § 249BB.
140. *See id.* at § 15C.

- Store GHGs on an appraisal basis;
- Inject, air, water or petroleum on an appraisal basis;
- Store the same substances on an appraisal basis; and
- With the written consent of the Minister, recover petroleum in the permit area for appraisal purposes where such petroleum was discovered but once recovered, does not become the property of the permittee.[141]

4. Special Holding Lease

The 2008 Amendments to the Act also provide a Special GHG Holding lease to an applicant[142] who is denied an injection license because the operations carried out under the license will have a significant impact on petroleum exploration or recovery operations.[143] Where the circumstances are such that a significant adverse impact to petroleum operations would occur, the Minister must grant a Special Holding Lease[144] for an indefinite period.[145] The effect of the Special Holding Lease is that a GHG assessment permit or GHG holding lease will cease to be in force upon the granting of the Special Holding Lease.[146] However, within two years, the Special GHG holding lessee may be required to apply for a GHG injection license.[147] A failure to do so may result in the Minister canceling the Special Holding Lease.

5. The GHG Injection License

The injection license authorizes the licensee to undertake operations for the injection and permanent storage of CO_2 substances in the identified GHG storage formation.[148] A GHG title-holder can apply for a GHG injection license if either a GHG assessment permit or a GHG holding lease is in force for the area and one or more identified GHG storage formations is located

141. *See id.* at §§ 249 BB, 249AD(3).
142. *Id.* at § 249BSA.
143. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 249CI (Austl.).
144. *Id.* at § 249BSC.
145. *Id.* at § 249BF.
146. *Id.* at §§ 249BSD, 249BSE.
147. *Id.* at § 249BZB.
148. *Id.* at § 249CB.

wholly in the title area.[149] The Minister may grant an injection license subject to whatever conditions the Minister thinks is appropriate.[150] Furthermore, the *Regulation Impact Statement* recognises that essentially all of Australia's offshore potential CCS areas are subject to existing petroleum titles,[151] and therefore the existence of any petroleum title will always be a relevant consideration for the Minister in deciding whether or not to authorize significant GHG activities. As a result, the Minister has the power to give a direction in order to protect geological formations containing petroleum,[152] including situations in which a GHG license and pre-commencement petroleum interests overlap.[153]

The application for an injection license must include all of the matters that the applicant seeks to have specified in the license as mentioned in Sections 249CE(3)(d) to (k). Additionally, each of the matters specified in the license must be consistent with the suitability determinants.[154] The applicant must also provide details of the financial and technical resources available to it, and a draft site plan.[155]

The *Regulation Impact Statement* provides that:

> Such a site plan would have to demonstrate, to the satisfaction of the regulator, that the site and its management would result in 'safe and secure' storage. The site plan would need to identify risk factors and show that risks had been reduced as low as reasonable [*sic*] practical. The regulator would then have to decide whether these risks, taking into account potential mitigation and remediation strategies, were acceptable. [156]

The Amendments to the Offshore Petroleum Act define a site plan as follows:

149. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 249CH (Austl.).

150. *Id.* at § 249CE(1).

151. REGULATION IMPACT STATEMENT, *supra* note 101, at 30.

152. Greenhouse Gas Storage Act § 249CXA.

153. *Id.* at § 249CZC.

154. *Id.* at § 249CH(7).

155. *Id.* at § 249CH(9).

156. REGULATION IMPACT STATEMENT, *supra* note 101, at 18.

> For the purposes of this Act, a *site plan*, in relation to an identified GHG storage formation, is a document that:
>
> (a) relates to the identified greenhouse gas storage formation; and
> (b) complies with such requirements as are specified in the regulations; and
> (c) is divided into the following parts:
> (i) Part A, which sets out predictions for the behaviour of a greenhouse gas substance stored in the identified greenhouse gas storage formation;
> (ii) Part B, which deals with other matters. [157]

On the basis of the site plan, the Minister will then make a determination as to whether to make an offer to the applicant, and upon being satisfied that the applicant will be able to "permanently store the greenhouse gas substance in the identified greenhouse gas storage formation, or at least one of the identified greenhouse gas storage formations, concerned."[158] The Minister must also be assured that the site plan meets the requirements of the regulations.[159] In addition, before granting an injection license the Minister must be satisfied that there is no significant adverse impact on petroleum exploration or recovery operations. If there are no significant adverse effects, the Minister must offer an injection license to the applicant.[160] The procedures for approving site plans have been left to be developed further in the regulations.[161] According to the 2008, *Readers' Guide to the Offshore Petroleum Amendment (Greenhouse Gas Storage) Bill*,[162] regulations relating to site plans will be modelled on existing regulations, such as the Petroleum (Submerged

157. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 15E (Austl.).

158. Greenhouse Gas Storage Act § 249CI(1)(b)(ii).

159. *Id.* at § 249CI(1)(h).

160. *Id.* at §§ 249CI(1)(f), 249CI(2)(f).

161. *Id.* at § 249ND.

162. AUSTRALIAN GOVERNMENT SOLICITOR, READERS' GUIDE TO THE OFFSHORE PETROLEUM AMENDMENT (GREENHOUSE GAS STORAGE) BILL (2008) [hereinafter READERS' GUIDE].

Lands) (Management of Safety on Offshore Facilities) Regulations of 1996.[163]

Furthermore, the balancing of GHG rights and petroleum rights envisaged by the Offshore Petroleum Act requires that GHG interests are considered when granting a petroleum license. Therefore, when an application has been made for a post-commencement petroleum production licence, and the Joint Authority is satisfied there is a significant risk that operations under that licence will have a significant adverse impact on operations that are being, or could be, carried out under a GHG assessment permit or GHG holding lease, the Joint Authority may only grant the production licence if it is in the public interest.[164] If the production licence is not in the public interest (taking into account any agreement between the parties)[165] the Joint Authority must refuse to grant the application.[166]

6. Rights of the Greenhouse Gas Licensee

Under the Amendments the granting of a Greenhouse Gas Injection license includes the rights to:

- Inject a GHG substance into an identified formation area (in accordance with any conditions);
- To permanently store a GHG substance in the identified formation (as long as injection takes place in a well situated in the licensed area);
- To explore in the license area for potential GHG storage formations;
- To explore in the license area for potential GHG injection sites;
- To inject[167] and store[168] on an appraisal basis, GHG substances in the license area; and

163. Petroleum (Submerged Lands) (Management of Safety on Offshore Facilities) Regulations, 1996 (Austl.), *available at* http://www.comlaw.gov.au/comlaw/management.nsf/lookupindexpagesbyid/IP200400548?OpenDocument.

164. Greenhouse Gas Storage Act § 145(d).

165. Offshore Petroleum Act, 2006, § 146(6) (Austl.).

166. *Id.* at §146(4)(b).

167. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 249CD(e) (Austl.).

- To recover petroleum in the license area for the sole purpose of appraising a discovery of petroleum that was made as an incidental consequence of injection.[169] (However, if petroleum is recovered by the licensee in the license area, the petroleum does not become the property of the licensee).[170]

The GHG injection license however, is subject to the establishment of regulations with regard to third party access to GHG storage formations, wells, equipment and structures, etc. for injection of GHG substances, and in the processing compressing or storing of GHG substances.[171] The Minister may also vary an injection license or impose additional conditions.[172] The GHG injection license remains in force indefinitely,[173] unless no operations to inject have been carried out continuously for at least five years.[174]

7. Application for Site Closure

The *Regulatory Guiding Principles* of the MCMPR state:

> Government will permit site closure when they are satisfied to a high degree of certainty that future land use objectives are met, residual risks of leakage and liability are at an acceptably low level, and ongoing costs associated with the site are acceptably low or can be otherwise managed.[175]

168. *Id.* at § 249CD(f).
169. *Id.* at § 249CD(i).
170. *Id.* at § 249CD(3).
171. *Id.* at § 249CE(11).
172. *Id.* at § 249CE(12).
173. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 249CF(1) (Austl.).
174. *Id.* at § 249CG(1)(ii).
175. MINISTERIAL COUNCIL ON MINERAL AND PETROLEUM RESOURCES, AUSTRALIAN REGULATORY GUIDING PRINCIPLES, CARBON DIOXIDE CAPTURE AND GEO-LOGICAL STORAGE, at 44 (2005), *available at* http://www.pir.sa.gov.au/__data/assets/pdf_file/0019/36019/Regulatory_Guiding_Principles_for_CCS20051124145652.pdf.

The process of closure starts with either a voluntary or mandatory application for a Site Closing Certificate.[176] The application must be accompanied by a report which states the applicant's modelling of the behaviour of the GHG substance, expected migration pathway(s), and the short and long-term consequences of the expected migration,[177] as well as providing suggestions as to how the Commonwealth should monitor the GHG plume stored in the formation. According to the *Readers' Guide to the Offshore Petroleum Amendment (Greenhouse Gas Storage) Bill*, when an application is received, the Minister may also give "site closing directions" to the GHG Injection licensee, which may require the licensee:

> to carry out remedial work on the storage formation and the post site closing migration path, including outside the injection licence area, in order to prevent (eg) escape of GHG substances into the atmosphere or unacceptable effects on other resources. For example, an injection license might be directed to plug abandoned petroleum exploration wells, whether in the injection licence area or outside it, if modelling shows that they are in the projected migration path of the injected GHG. [178]

When the Minister is in receipt of the application for closure, and is satisfied that GHG injection operations have ceased, the Minister may give written notice to the licensee (a pre-certificate notice) that he or she is prepared to issue a closure certificate.[179] However, before issuing a Site Closure Certificate, the Minister must consider whether the injection of GHG substance will have a significant adverse impact on navigation, fishing, lawful pipeline operations, and Native Title rights and interests, and must have regard to that significant risk.[180] The Minister may refuse a Site Closure certificate if the plume is not behaving as predicted,[181] or if the GHG plume will have a significant adverse

176. Greenhouse Gas Storage Act § 249CZE.

177. *Id.* at § 249CZE(2)(b).

178. READERS GUIDE, *supra* note 162, at § 7.9.

179. Greenhouse Gas Storage Act § 249CZF.

180. *Id.*

181. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 249CZF(4)(a) (Austl.).

impact on the conservation or exploitation of natural resources, the geological integrity of the formation, the environment, or human health and safety.[182]

When a pre-certificate notice certificate is issued to the licensee, it must specify a program of monitoring to be performed by the Commonwealth including an estimate of the total cost and expenses needed to carry out the monitoring program,[183] as well as the form and amount of a security to be lodged.[184] Once the security is lodged,[185] the Minister must grant a closing certificate. The site-closing certificate then remains in force indefinitely[186] and is automatically transferred with the licence.[187] Any cost the Commonwealth incurs in carrying out a monitoring program under the site-closing certificate is debt due to the Commonwealth and recoverable in a court of competent jurisdiction.[188]

C. Liability for "Serious Situations"

A serious situation exists if a GHG storage formation has leaked, is leaking, or if there is a significant risk of leakage,[189] which will have a significant adverse impact on the geotechnical integrity of the whole or a part of a geological formation or geological structure.[190] If the Minister is satisfied that a serious situation exists, the Minister may direct the licensee to undertake any such activities as necessary to eliminate, mitigate, manage or remediate the serious situation, including suspending or ceasing the injection or operations.[191] These Ministerial directions will prevail over anything in a licence or approved site plan.[192]

182. *Id.* at § 249CZF(4)(b).
183. *Id.* at §§ 249CZGAA(1)(a-b).
184. *Id.* at § 249CZGAA(1)(c).
185. *Id.* at § 249CZA.
186. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 249CZJ (Austl.).
187. *Id.* at § 249CZJA.
188. *Id.* at § 249CZM(2)(b).
189. *Id.* at § 249CZ.
190. *Id.* at § 249CZ(h).
191. *Id.* at § 249CZA(1)(c).
192. Offshore Petroleum Amendment (Greenhouse Gas Storage) Act, 2008, § 249CZA (Austl.).

While statutory obligations cease after the issuance of a Site Closure Certificate, the amendments to the Act are deliberately silent on long-term liability, and provide no indemnification for project participants. This is because the government is concerned with long-term liability being inherited by the Australian people.[193] Therefore future liabilities will be determined by the common law, however,

> [i]n the long-term, the risk would, in a sense, pass to the community because project participants may cease to exist or because of some other time related factor such as availability of witnesses.[194]

D. House Representatives Standing Committee Inquiry into the Offshore Petroleum Amendment (Greenhouse Gas Storage) Bill 2008

An assessment of the Offshore Petroleum Amendment (Greenhouse Gas Storage) Bill 2008 was made prior to its passage on November 11, 2008, by the House of Representatives Standing Committee on Primary Industries and Resources (Committee). In the Committee's opinion, the Bill established an effective system of property rights for injection and storage of GHG substances in offshore Commonwealth waters. However, it believed the legislative model presented in the bill was unlikely to be adopted by the States in its entirety, since the model framework was contested by the states,[195] "although elements of the Bill may be suited to consistent application nationally."[196] The Committee however did express concern as to how the system of property rights would operate, since a great amount of reliance is being placed on the regulations and guidelines, which have yet to be published.[197]

The Bill received little support from State Governments[198] as a model for legislation. The Victorian Government determined

193. DOWN UNDER REPORT, *supra* note 98, at § 4.28.
194. REGULATION IMPACT STATEMENT, *supra* note 101, at 27.
195. DOWN UNDER REPORT, *supra* note 98, at § 1.16.
196. *Id.* at § 1.9.
197. *Id.* at § 1.5.
198. *Id.* at § 1.22.

the Bill did not provide a framework that could be adopted on a national basis, as,

- The considerations for managing such things as the co-existence of CCS and petroleum activities are practically different in an onshore and offshore context.
- The Bill would provide existing petroleum rights holders with unwarranted monopoly rights, effectively delaying the development of a viable commercial CCS industry for Victoria.
- The proposed 'impact test' does not operate in a manner which promotes investment in CCS. Put differently, a CCS proponent is always to be measured against a petroleum operator, in determining whether a CCS activity can be approved, and how such test is to be applied is not clear.[199]

The South Australian Government also expressed caution with the concept of mirror legislation across all jurisdictions, and was not supportive of mirror legislation across inter-jurisdictional offshore and onshore areas.[200] Likewise, Western Australia was not committed to the model, and declared that it would assess alternative frameworks currently being developed by South Australia and Queensland, as they addressed both onshore and offshore carbon capture and storage.[201]

There was a mixed reception to the Bill by primary industry. While BP believed the Bill was acceptable as a national model and encouraged States to adopt mirror legislation,[202] Anglo Coal considered the Bill an "inherently biased piece of legislation,"[203] in which no effective balancing of petroleum rights with GHG injection and storage rights had been achieved. Anglo Coal's submission stated:

> The Draft Bill fails to provide a clear basis for determination of conflicts arising in the event of competing

199. *Id.* at § 1.22.
200. *Id.* at § 1.24.
201. DOWN UNDER REPORT, *supra* note 98, at § 1.26.
202. *Id.* at § 1.24.
203. *Id.* at § 1.15.

> petroleum and CCS priorities. As experience in Australia and elsewhere suggests, this is not a matter that should be left to Regulation.
>
> There has always been an inherent risk that incorporating CCS regulation into existing petroleum legislation would tend to subordinate the facilitation of CCS and the reduction of Greenhouse Gas emissions to the interests of petroleum exploration and production.[204]

Concern was also expressed to the Committee in relation to the administrative model presented in the Bill, which accorded the Commonwealth Minister wide and largely undefined discretionary powers over the approval of petroleum operations and their impact on GHG storage operations.[205] Concern was also expressed that the Bill did not provide for Commonwealth or State joint decision-making. Therefore, decision-making authority for the approval of CCS operations largely resided with the Commonwealth without State representation or an opportunity to be heard.[206] As a result, Victoria believed the Bill "fail[ed] to offer protection to [its] petroleum and non-petroleum entitlements and resources."[207]

The Australian Coal Association and the Minerals Council of Australia did not believe there was a "level playing field" in the acreage awarding process, on the basis that in relation to work-bids, petroleum title holders in possession of site data gathered from petroleum operations, would be at a distinct informational advantage in competition with third parties who do not have access to the site data.[208] This therefore gives petroleum title-holders a competitive advantage when they choose to enter into the GHG injection and storage markets.[209] It was also argued that this competitive advantage was also evident in relation to required expenditures.[210] This is because a petroleum licensee

204. *Id.* at § 1.35. (quoting Anglo Coal's Submission no. 24, at 4).

205. *Id.* at § 1.40.

206. *Id.* at § 1.44.

207. DOWN UNDER REPORT, *supra* note 98, at § 1.44 (quoting Victorian Government's Submission, no. 16 p. 9).

208. *Id.* at § 2.26.

209. *Id.*

210. *Id.* at § 2.27.

could provide the site data, including well data, drilling, and seismic testing, which is required to support a work-bid application for GHG injection and storage at "no or little additional real cost,"[211] as the data had already been collected from planned or completed petroleum operations. In the opinion of Monash Energy, "[i]t is important that this imbalance be addressed so that competing parties are competing on an equal footing."[212]

E. Long-Term Liability

The Committee believed that under strict conditions, the formal transfer of long-term liability from the GHG operator to the government could provide the necessary incentives for the proper management of the storage of GHG, and strict adherence to site closure responsibilities.[213] Furthermore, it would not prevent third parties from pursuing GHG operators for damages for deliberate misconduct or negligence.[214]

It remains to be seen whether the legislative framework to enable and encourage the development of large commercial scale CCS projects now in place at the federal level will over time be sufficient to make a meaningful difference in Australia's energy future. Notwithstanding the vitriolic opposition of the conservation movement within and outside Australia to any measures that are aimed at preserving, as opposed to phasing out, the long-term future of the coal industry in favor of renewable energy sources, it is clear that both the government and the Liberal Coalition in opposition are committed to protecting the jobs and markets that depend on coal, and are in large part pinning their hopes on the success of the CCS pilot projects now being undertaken. While the imminent demise of the coal industry in this country does not appear to be on the political horizon, the integration of CCS into the much touted, Labor Government's Carbon Pollution Reduction Scheme (CPRS) remains somewhat more problematic.

211. *Id.* (quoting Monash Energy's, Submission no. 13, at 16).
212. *Id.*
213. DOWN UNDER REPORT, *supra* note 98, at §§ 4.26-4.40.
214. *Id.* at § 4.44.

The Australian Prime Minister, Kevin Rudd, refuses to heed the warnings sounded by an increasingly vocal chorus of business leaders, political opponents, leading academics and other segments of society that it would be foolish to put in place any emission trading scheme before knowing what impact the climate change negotiations to be held in Copenhagen towards the end of 2009, will have in the reduction of global GHG emissions.[215] This uncertainty coupled with the global financial crisis has already forced the government to drastically scale back its reduction target for 2020 from 20% – 25% to a mere 5% below 2000 levels by 2020.[216] This could lead to a rise to as much as 15% if other major polluting nations such as the United States and China reach an agreement in Copenhagen to commit to similar reductions.[217] Moreover, the respected economist Professor Ross Garnaut, the government's chief climate change advisor, has criticized the assistance given to emission-intensive industries and a broad range of other emission-intensive "trade-exposed" industries.[218] The coal industry, for example, is set to receive $4 billion in free permits.[219]

The government insists that it will not back down from introducing the CPRS legislation into parliament by June 2009, and decided to abruptly cancel a parliamentary review of the proposed legislation in mid-February that it established when it became apparent that opposition to an emissions trading scheme was gaining traction, with many people now calling for the imposition of a carbon tax as a more effective way to reduce emissions.[220] The Australian CPRS is coming under heavy criticism from another unexpected quarter with the public now

215. *Australian Senate Kills Carbon Emissions Trading Scheme*, ENS, Aug. 14, 2009, *available at* http://www.ens-newswire.com/ens/aug2009/2009-08-1402.asp.

216. Emma Rodgers, *Rudd locks in 5pc emissions cut*, ABC News, Dec. 15, 2008, *available at* http://www.abc.net.au/news/stories/2008/12/15/2446466.htm.

217. *Id.*

218. *See generally* GARNAUT, *supra* note 41.

219. *Big Emission Cuts Ruled Out*, THE SYDNEY MORNING HERALD, Dec. 15, 2008 at 1, *available at* http://www.smh.com.au/news/environment/global-warming/big-emission-cuts-ruled-out/2008/12/15/1229189502260.html.

220. Richard Deniss, *Left and Right Agree on Carbon Tax*, THE AUSTRALIAN, Feb. 18, 2009 at 1, *available at* http://www.theaustralian.news.com.au/story/0,25197,25070069-7583,00.html.

realizing that anything they do as individuals to reduce their own carbon footprints will have no effect whatsoever on reducing the nation's total emissions of GHG.[221] Because of the way the government designed Australia's emissions trading scheme, fixing a cap that can be adjusted only five years in advance, the cap operates as both a ceiling and as a floor.[222] When individuals voluntarily cut back on their emissions, this does not reduce the total emissions but rather only frees up permits to allow the big industrial polluters such as the aluminum, steel or cement industries to increase their emissions and still remain within the cap.[223] This absurd position is clearly supported by a reading of Section 4.3.2 of the Government's CPRS White Paper released December 15, 2008.[224] Dr. Richard Denniss, Executive Director of the Australian Institute, among others has mounted an effective campaign to identify this as a fatal flaw in the design of the overall scheme.[225]

As the global financial crisis takes hold in Australia in the coming months and with many more jobs lost in the manufacturing and resource sectors, it will become increasingly difficult for the CPRS to clear the Senate where the government does not command a majority and they will have to look to the cross benches to secure passage of the legislation. It is relatively clear, however, that CCS is destined to play a role in the CPRS (if it is not abandoned completely in favor of a carbon tax and other measures), although the precise nature of that role is yet to be determined.[226]

221. Ross Gittins, *Emission Impossible: The Sad Truth*, THE SYDNEY MORNING HERALD, Feb. 25, 2009 at 1, *available at* http://www.smh.com.au/environment/global-warming/emission-impossible-the-sad-truth-20090225-8hr8.html.

222. *See* GARNAUT, *supra* note 41, at ch. 14.

223. Gittins, *supra* note 221.

224. AUSTRALIAN GOVERNMENT, CARBON POLLUTION REDUCTION SCHEME: AUSTRALIA'S LOW POLLUTION FUTURE, WHITE PAPER VOL. 1 § 4.3.2 (2008), http://www.climatechange.gov.au/whitepaper/report/index.html (scroll down to Chapter 4).

225. *See* The Australian Institute, Staff, Richard Deniss, https://www.tai.org.au/?q=node/4 (last visited Sept. 9, 2009); *see also* Economists Condemn Flawed Carbon Trading Scheme, GREEN LEFT ONLINE, Mar. 7, 2009, http://www.greenleft.org.au/2009/786/40489.

226. For an update on the status of this legislation *see infra* Part II, at Concluding Observations.

PART II

CARBON CAPTURE AND STORAGE IN THE CONTEXT OF THE EUROPEAN UNION

Fossil fuels are an important part of the energy mix in the European Union (E.U.), with fossil fuels (mainly coal and natural gas) currently representing 50% of the electricity supply.[227] The E.U. does not see it as a feasible option to replace coal with renewable energy in the near future. According to the Commission of the European Communities (Commission), coal can continue to make an important contribution both globally and in the E.U. if it is supported by technologies that allow drastic reductions of the carbon, which occurs during combustion.[228] This is not unlike the positions taken by the United States, Australia and other countries that derive significant proportions of their export revenue from coal and other forms of fossil fuels. Policy backing CCS and the establishment of an appropriate legislative framework has therefore been supported by the E.U. and its member states.[229] In 2005, the Commission stated that it would "review progress and explore new actions to systematically exploit cost and that it would pay special attention to CCS.[230] This was first addressed as a part of the Second European Climate Change Programme[231] (ECCP II). Under the ECCP II,

227. *Communication from the Commission to the Council and the European Parliament, Sustainable Power Generation from Fossil Fuels: Aiming for Near-Zero Emission from Coal After 2020*, at 3, COM (2007) 843 final (Jan. 10, 2007), [hereinafter *Sustainable Fossil Fuel Com.*], *available at* http://ec.europa.eu/energy/energy_policy/doc/16_communication_fossil_fuels_en.pdf.

228. *Id.* at 4.

229. Ian Havercroft & Ray Purdy, *Carbon Capture and Storage – A Legal Perspective*, http://www.un.org/esa/sustdev/sdissues/energy/op/ccs_egm/presentations_papers/havercroft_paper_legal.pdf.

230. *Communication from the Commission to the Council and the European Parliament, The European Economic and Social Committee and the Committee of the Regions, Winning the Battle Against Global Climate Change*, at 10, COM (2005) 35 final (Feb. 9, 2005) [hereinafter *Winning the Battle Com.*], *available at* http://ec.europa.eu/environment/climat/pdf/comm_en_050209.pdf.

231. ECCP II is the second phase of European Climate Change Programme which was originally set up by the Commission of the European Communities in 2000, as a way for the Commission to present a list of priority actions and policy measures to achieve the E.U.'s Kyoto Target. Marijke Shurmans & Alec Van Vaerenbergh, *The New Proposed EU Legislation on Geological Carbon Capture*

the Working Group on Carbon Capture and Geological Storage (CCS Working Group) was established.[232] In the final report of the CCS Working Group it was recommended that the Commission should present a Communication outlining the major E.U. policies for CCS during 2007.[233] The CCS Working Group, *inter alia,* requested that the Commission address the recognition of CCS in the E.U. Emissions Trading System (EU ETS).[234] In 2007, the Commission released its *Communication on Sustainable Power Generation from Fossil Fuels*. In this communication the Commission indicated that by the year 2015, ten to twelve large-scale CCS demonstration projects should be realised.[235]

At the March 2007, meeting of the European Council, the E.U. endorsed an objective of a 30% reduction in GHG emissions by 2020, provided that other developed countries commit themselves to comparable emission reductions, and economically more advanced developing countries contribute adequately according to their responsibilities and capabilities.[236] Regardless of any other international commitments, the European Council made a commitment to reduce E.U.'s GHG emissions by at least 20% by 2020.[237] The European Council also committed to a 20% increase of renewable energies in energy consumption by 2020.[238] At this meeting the European Council stated that it wanted to make CCS the technology of choice for new power plants,

and Storage (CCS): A First Impression of the Commission's Proposed Framework on CCS, 17 EUR. ENERGY & ENVTL. L. REV. 90, 104 (2008).

232. *See Winning the Battle Com.*, *supra* note 230. The CCS Working Group's primary objectives was to review the potential economics and risks of CCS, identify regulatory needs and barriers and explore the potential of a regulatory framework for the development of environmentally sound CCS and identify other barriers that could impose on the development of environmentally sound CCS.

233. *The Second European Climate Change Programme, Final Report of Working Group 3: Carbon Capture and Geological Storage (CCS)*, 1 (2006), *available at* http://www.climnet.org/EUenergy/CCS/reports/ECCPIIWG3CCSFINALreport.pdf.

234. *Id.*

235. *Sustainable Fossil Fuel Com.*, supra note 227, at 7.

236. Presidency Conclusions at the European Council Brussels §§ 31, 32 (Mar. 8-9, 2007).

237. *Id.*

238. *Id.*

including the setting up of at most twelve demonstration plants by 2015.[239]

In the communication, *20 20 by 2020 Europe's Climate Change Opportunity*, the European Commission stated that the E.U. cannot reduce its CO_2 emissions by 50% by 2050 unless the energy potential of coal is exploited without "ballooning" emissions.[240] CCS is of particular importance in preventing this situation.[241] The Commission also stated that CCS must be included in the EU ETS, and that by 2020 all new coal-fired plants should be equipped with CCS.[242] By this point, plants that are already established will have started to follow the same approach.[243]

The regulatory framework regulating the trade of GHG in the E.U. is known as the ETS Directive.[244] The first period of trading within the EU ETS commenced in January 2005.[245] The first phase was operating until the end of 2007, and was characterized as the 'learning by doing' period.[246] In January 2008, the second trading period, Phase 2 of the system began and

239. *Communication from the Commission to the Council and the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 20 by 2020 Europe's Climate Change Opportunity*, at 9, COM (2008) 30 final (Jan. 23, 2008) [hereinafter *20 by 2020 Com.*], *available at* http://www.energy.eu/directives/com2008_0030en01.pdf.

240. *Id.*

241. *Id.*

242. *Correspondence from the Commission to the European Council and the European Parliament, An Energy Policy for Europe*, at 1, COM (2008) 1 final (Jan. 10, 2007), *available at* http://eurlex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=COMfinal&an_doc=2007&nu_doc=1.

243. *Id.*

244. *See* Council Directive 2003/87, 2003 O.J. (L 275) 32 (EC) (as amended by Directive 2004/101/EC), *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:275:0032:0046:EN:PDF.

245. *See Green Paper on Greenhouse Gas Emissions Trading within the European Union*, COM (2000) 87 final (Mar. 8, 2000), *available at* http://eurlex.europa.eu/LexUriServ/site/en/com/2000/com2000_0087en01.pdf.

246. FRANK CONVERY, DENNY ELLERMAN & CHRISTIAN DE PERTHUIS, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CENTER FOR ENERGY AND ENVIRONMENTAL POLICY, LESSONS FROM THE FIRST TRADING PERIOD, INTERIM REPORT 12 (Mar. 2008), http://web.mit.edu/ceepr/www/publications/workingpapers/2008-002.pdf.

was set to operate from 2008 to 2012.[247] Although, in its present wording, the ETS Directive does not explicitly refer to CCS as a potential option to curb GHG from European industries, CCS could be used under Article 24. [248] This issue will be discussed in the next section.

The European Community is a Contracting Party of the Kyoto Protocol, and the EU ETS is intended to help the E.U. meet its Kyoto target of an 8% reduction in emissions relative to 1990 levels during the Kyoto Protocol's first commitment period from 2008-2012.[249] Within the E.U. (taking advantage of the Protocol's 'bubble' provision) member states may to contribute to the 8% target at different rates, which means that some member states are allowed to increase their emissions of CO_2.[250] The EU ETS now covers over 10,000 industrial plants across the E.U., including power plants, oil refineries, and steel mills, which accounts for almost half of the E.U.'s CO_2 emissions.[251]

247. Climate Action Network Europe, Emission Trading in the EU, at § 2.1, http://www.climnet.org/EUenergy/ET.html (last visited Sept. 15, 2009).

248. *Commission Staff Working Document, Impact Assessment, Accompanying Document to the Proposal for a Directive of the European Parliament and of the Council Amending Directive 2003/87/EC so as to Improve and Extend the EU Greenhouse Gas Emission Allowance Trading System*, at 49 COM (2008) 52 (Jan. 23, 2008), [hereinafter *GHG Emission Trading Impact Assessment Com.*], *available at* http://ec.europa.eu/environment/climat/emission/pdf/com_2008_16_ia_en.pdf.

249. EU Council Decision 2002/358, art. 2, annx. II, 2002 O.J. (L 130) (EC) (concerning the approval, on behalf of the European Community, of the Kyoto Protocol and defining emission reduction targets for each Member State); Klepper Gernot & Sonja Peterson, *The European Emission Trading Regime and the Future of Kyoto*, *in* GLOBAL WARNING LOOKING BEYOND KYOTO 101 (Ernesto Zedillo ed., 2008).

250. The Burden Sharing Agreement in Annex II of the 2002, E.U. Council Decision 2002/358/EC (*see supra* note 249) concerns the approval, on behalf of the European Community, of the Kyoto Protocol and the defining of emission reduction targets for each Member State. Since Bulgaria and Romania became members of the E.U. in 2007, there are now twenty-seven Member States in the E.U. When the EU Emissions Trading System started in 2005 there were twenty-five Member States in the E.U. and during the development and set-up phase there were fifteen Member States in the EU.

251. *20 by 2020 Com.*, *supra* note 239, at 5; Gernot & Perterson, *supra* note 249, at 102; Europa, Questions and Answers on the Commission's Proposal to Revise the EU Emission Trading System, http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/08/35&format=HTML&ged=0&language=EN&guiLanguage=en (last visited Sept. 15, 2009).

The EU ETS is a cap and trade system and it requires companies to surrender allowances equivalent to their level of CO_2 emissions. Currently the EU ETS scheme is predominantly based on the allocation of free allowances.[252] In the ETS Directive an "allowance" refers to an allowance to emit one ton of CO_2, equivalent during a specific period, which is only valid for meeting the requirements of the Directive, and shall be transferable consistent with the provisions of the Directive.[253]

The E.U. Allowance (EUA) is the single currency used in the EU ETS. For Phases 1 and 2, the allocation of the EUAs has been made by the member states through establishing a National Allocation Plan (NAP), which then has to be accepted by the Commission.[254] Therefore for the first and second phases there has been a decentralized method of determining the cap of the trade without any overall limit.[255] The EU ETS also has a restriction on which emitters of CO_2 are included in the trading system. As set out in to Annex I of the EU ETS Directive, the power sector, specified industrial sectors, and all combustion installations with a thermal input exceeding 20 Megawatts (MW) are included.[256] Under Article 10 the member states shall, during Phase 1, allocate at least 95% of the EUAs free of charge. For Phase 2, 90% of the EUAs should be allocated free of charge.[257] Three months before Phase 1 commenced, each member state had to decide upon the total EUAs it wanted to allocate during that period.[258] For each five-year period after January 1, 2008, each member state has to decide upon the total quantity of EUAs to be allocated during that period and initiate the process of allocation to the operator of each installation. This decision has to be taken at least twelve months before the beginning of the relevant time

252. CONVERY, ELLERMAN & DE PERTHUIS, *supra* note 246, at 12.

253. Council Directive 2003/87, art. 3(a), 2003 O.J. (L 275) 32, 34 (EC).

254. *Id.* at arts. 9.1, 9.2.

255. DENNY ELLERMAN & PAUL L. JOSKOW, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CENTER FOR ENERGY AND ENVIRONMENTAL POLICY RESEARCH, THE EUROPEAN UNION'S EMISSION TRADING SYSTEM IN PERSPECTIVE 10 (May 2008), http://www.pewclimate.org/docUploads/EU-ETS-In-Perspective-Report.pdf.

256. *Id.* at 11.

257. Council Directive 2003/87, art. 10, 2003 O.J. (L 275) 32, 36 (EC).

258. *Id.* at art. 11.1.

period.[259] However, the usage of auctioning has not even been used up to the percentage allowed. In the second phase more allowances are being auctioned, but the quantity is still below the allowed limit. It is believed that the use of auctioning will be much higher after 2012.[260] Under Article 14 of the ETS Directive, the Commission has to develop guidelines for monitoring and reporting emissions.[261] Member states are required to ensure that emissions are monitored in accordance with the guidelines.[262]

According to the Commission, the environmental outcome of the first phase of the EU ETS could have been more significant. The reason it was limited was because there were over-allocations in some member states and sectors, which was mainly caused by reliance on projections and a lack of verified data.[263] For the post-2012 trading period, the Commission has proposed that an E.U. wide cap should be set in the ETS Directive. The reason for this is that the decentralized system does not provide that the target of 20% GHG reductions by 2020, set by the European Council in March 2007, be met.[264] In order to reach those goals, a linear reduction would have to amount to 1.74% per year.[265]

259. *Id.* at art. 11.2.

260. CONVERY, ELLERMAN & DE PERTHUIS, *supra* note 246, at 11.

261. Commission Decision 2004/156, 2004 O.J. (L 59) 1 (EC) (establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and Council), available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:059:0001:0074:EN:PDF.

262. Council Directive 2003/87, art. 14.2, 2003 O.J. (L 275) 32, 36 (EC).

263. *Proposal for a Directive of the European Parliament and of the Council Amending Directive 2003/87EC so as to Improve and Extend the Greenhouse Gas Emission Allowance Trading System of the Community,* at 2, COM (2008) 16 final (Jan. 23, 2008) [hereinafter *GHG Trading Allowance Proposal Com.*], *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0016:FIN:EN:PDF.

264. Presidency Conclusions at the European Council, Brussels, ¶¶ 31, 32 (Mar. 8-9, 2007).

265. *GHG Trading Allowance Proposal Com.*, *supra* note 263, at 7, 21. The following is per an extract relevant to the above discussion.

> The Community-wide quantity of allowances issued each year starting in 2013 shall decrease in a linear manner beginning from the mid-point of the period 2008 to 2012. The quantity shall decrease by a linear factor of 1.74% compared to the average annual total quantity of allowances issued by Member States in accordance with the Commission Decisions on their national allocation plans for period 2008 to 2012.

A. Article 24 and Opt-In of CCS

From 2008 (Phase 2), Article 24 offers the appropriate legal framework for unilateral inclusion of CCS as a whole, including capture, transportation and storage.[266] Under Article 24, member states may, from 2008, apply emission allowance trading in accordance with the ETS Directive to activities, installations and GHG that are not listed in Annex I.[267] The member states are obliged to obtain an approval from the European Commission in order to use this mechanism. All effects on the internal market, potential distortions of competition, the environmental integrity of the scheme and reliability of the planned monitoring and reporting system has to be taken into account. An opt-in under this article requires that the whole chain of CCS (source, capture, transport, injection and storage) is included in the EU ETS as one installation. In order for CCS to be used under Article 24, appropriate monitoring and reporting guidelines have to be established.[268] The United Kingdom has announced that it will use CCS during Phase 2 through opt-in under Article 24.[269]

B. Kyoto CDM Projects and the EU ETS

The Executive Board has not yet approved use of Clean Development Mechanism (CDM) projects on CCS. The CDM is included in the EU ETS by the Linking Directive 2004/101/EC,[270] which amends the ETS Directive so that it "allow[s] operators of installations to utilise credits generated under the [Kyoto] Protocol to meet their commitments under the [ETS] Directive."[271] The inclusion of CCS under the CDM would mean that CCS

Id. at 21.

266. *Id.* at 5, 27.

267. *Id.* at 27, annx. I.

268. *Id.* at 6, 28.

269. *GHG Emission Trading Impact Assessment Com.*, *supra* note 248, at 181.

270. Council Directive 2004/101, 2004 O.J. (L 338) 18 (EC) (amending Directive 2003/87/EC and establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms), *available at* http://www.iklim.cevreorman.gov.tr/abdirektifler/iklim/i03.pdf.

271. Havercroft & Purdy, *supra* note 229, at 11.

performed in a non-E.U. member state could be accredited by the EU ETS.

C. The European Commission's Proposal for Amendments to Directive 2003/87/EC

On January 23, 2008, as part of a legislative package to address climate change, the Commission outlined its proposal dealing with CCS and ensuring that this is properly integrated with other E.U. Directives and the EU ETS. Since CCS is not enabled at the present time under the EU ETS, the positive CO_2 reductions from CCS are not currently rewarded.[272] If included, the CO_2 reduction through CCS would be valued at the carbon price.[273] The Commission proposed that capture, transport and geological storage of GHG should be covered in a harmonised way by the EU ETS from 2013 onwards[274] To enable this, the Commission proposed that the ETS Directive should be amended so that after 2013 installations to capture GHG for the purpose of transport and geological storage, pipelines for transport of GHG for the purpose of geological storage and storage sites for the geological storage of GHG are included in Annex I of the ETS Directive.[275] Even if Article 24 already enabled this, the Commission is of the opinion that it should be included in Annex I. The reasoning for this includes the vast potential for technology as well as the security that an inclusion in Annex I offers to investors.[276]

272. *Commission Staff Working Document, Impact Assessment, Accompanying Document to the Proposal for a Directive of the European Parliament and of the Council on the Geological Storage of Carbon Dioxide,* at 2, COM (2008) 54 (Jan. 23, 2008) [hereinafter *CCS Impact Assessment Com.*], *available at* http://www.ipex.eu/ipex/webdav/site/myjahiasite/groups/CentralSupport/public/2008/SEC_2008_0054/COM_SEC(2008)0054_EN.pdf.

273. *Id.*

274. *GHG Trading Allowance Proposal Com.*, *supra* note 263, at 19.

275. *Id.* at 19, 36. These amendments will be decided on by the European Council and the European Parliament in 2008 and 2009, and the amended EU ETS will start operating in January 2013.

276. *Commission Staff Working Document, Summary Impact Assessment, Accompanying Document to the Proposal for a Directive of the European Parliament and of the Council on the Geological Storage of Carbon Dioxide*, at 4, COM (2008) 55 (Jan. 23, 2008) [hereinafter *CCS Summary Impact Assessment Com.*], *available at* http://ec.europa.eu/environment/climat/ccs/pdf/sec_2008_0055_en.pdf.

There will be no need to surrender allowances for emissions that have been stored.[277] According to the proposed amendments to the ETS Directive, full auctioning of CCS should be the rule from 2013 and forward. Money retrieved from the auctioning (at least 20%) should be used, *inter alia*, for the further development of CCS[278] and there should be no free allocations for CCS.[279] This is because the incentive for CCS arises from allowances not being required to be surrendered with respect to emissions that are stored.[280]

The inclusion of CCS I in the EU ETS is expected to regulate "the liability [of] non-local or global damage."[281] There is always a chance that CO_2 might leak and therefore there is a need to address this in some way. According to the Commission, this will be done by requiring the surrender of allowances for leakage (which is regulated in Article 12.3) in the ETS Directive.[282]

Two issues that were discussed during the stakeholder meetings prior to the proposal of amendments to the ETS Directive were: (1) whether the whole chain of CCS should be regarded as one installation requiring a new type of storage credit to be created; and (2) whether one ton of CO_2 put in storage should equal one ton avoided.[283] There was also support for the view that if storage credits were created, they should also be part of the allocation process, in order to provide the necessary incentives for the upstream CCS chain[284]

277. Shurmans & Van Vaerenbergh, *supra* note 231, at 104.

278. *GHG Trading Allowance Proposal Com.*, *supra* note 263, at 8 (referring to the proposed Article 10.3 (c)).

279. *Id.* at 15 (referring to the proposed Article 10(a)(2)).

280. *Id.* at 15-16.

281. Havercroft & Purdy, *supra* note 229, at 16.

282. *Proposal for a Directive of the European Parliament and of the Council on the geological storage of carbon dioxide and amending Council Directives 86/337/EC, 96/61/EC, Directives 2000/60/EC, 2001/80/EC, 2006/12/EC and Regulation (EC) No 1013/2006*, at 13, COM (2008) 18 final (Jan. 23, 2008) [hereinafter *CCS Proposed Amendments Com.*], *available at* http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0018:FIN:EN:PDF.

283. *GHG Emission Trading Impact Assessment Com.*, *supra* note 248, at 181.

284. *Id.*

D. CCS Should Not be Made Mandatory

Under the Impact Assessment for the proposed Directive on geological storage of CO_2 the Commission considered the effects on enabling CCS in the EU ETS, and came to the conclusion that this alternative would internalise positive climate externalities of CCS deployment.[285] The Commission also took into consideration options of making CCS mandatory[286] or to use subsidies in order to internalise the positive externalities not captured by the market.[287] None of these alternatives, when tried under the testing model[288] used by the Commission in the Impact Assessment, compensated the cost of going beyond the market.[289] Therefore, the Commission decided to recommend that CCS be enabled under EU ETS, but not made mandatory in any way according to the different alternatives in the post-demonstration phase. The Commission also recommended that there would be no subsidies for the technology in the post-demonstration phase. However, the Commission stressed that a subsidy for the demonstration phase itself is a different matter.[290]

285. *CCS Summary Impact Assessment Com.*, *supra* note 276, at 4.

286. These considerations included:

(a) Making CCS mandatory for new coal-fired power [plants] from 2020 onwards.

(b) Making CCS mandatory for new coal- and gas-fired power from 2020 onwards.

(c) Making CCS mandatory for new coal-fired power from 2020 onwards, together with retrofit of existing plants (built between 2015 and 2020) from 2020.

(d) Making CCS mandatory for new coal- and gas-fired power from 2020, together with retrofit of existing plants (built between 2015 and 2020) from 2020.

Id. at 3.

287. *Id.* at 3-5.

288. The testing system is called the PRIMES1 model, which by running through each country's energy market on a five-year basis between 2000 to 2030, "provides detailed results about energy balances, CO_2 emissions, investment, energy technology penetration, prices and costs." *Id.* at 3-4.

289. If mandatory CCS were to be adopted the additional learning resulting from the increased deployment would not compensate for the cost of the policy. Furthermore, the impact on other externalities would not be significant. In the case of giving subsidies to CCS, the impact on positive externalities is not met by the level of subsidies. *Id.* at 5-6.

290. *Id.* at 3-6.

E. The Proposed Directive on Geological Storage

On January 23, 2008, the Commission also presented a framework directive on the geological storage of CO_2 and amendments to certain directives that currently act as obstacles to the full deployment of CCS, as part of the legal package for CCS.[291] As discussed above, the Commission is of the opinion that the best alternative is to enable CCS in the EU ETS and create an independent directive that would ensure that CO_2 capture is an available mitigation option, and that it is done safely and responsibly.[292] This Directive should be in place by 2010.[293] The reason for this development of a new regulation for the geological storage of CO_2 is that the EU ETS is not designed for complete regulation of the risks of CCS,[294] concerning integrated pollution and prevention and control as well as applicable waste directives are not well adapted to the specific requirements of regulating CO_2 storage, and could be made so only by extensive amendments.[295]

There was also a need to address some existing directives that prohibit the use of CCS. There are two main obstacles in current E.U. legislation; the first is Article 11(3)(j) of the Water Framework Directive passed in 2000,[296] which prohibits injection into saline aquifers except in certain cases. In order to remove this barrier, the Commission has proposed that this Article in the Directive should be amended so that injection of CO_2 streams for storage purposes authorised under the proposed Directive on geological storage of CO_2 should be regarded as an exception from

291. *CCS Proposed Amendments Com.*, *supra* note 282, at 5-7.

292. *Id.* at 2.

293. European Technology Platform for Zero Emission Fossil Fuel Power Plants, *The EU Flagship Programme the Key to Making CO2 Capture and Storage (CCS) Commercially Viable by 2020*, 2, (2007), *available at* http://www.zeroemissionplatform.eu/website/docs/ETP%20ZEP/EU%20Flagship%20Programme%20for%20CCS. pdf.

294. *See* Directive 91/61, 1996 O.J. (L 257) (EC) (concerning Integrated Pollution and Prevention and Control).

295. *CCS Summary Impact Assessment Com.*, *supra* note 276, at 2-3.

296. Directive 2000/60, art. 11(3)(j), 2000 O.J. (L 327) 1 (EC) (establishing a framework for the Community action in the field of water policy) (also known as the Water Framework Directive), *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2000:327:0001:0072:EN:PDF.

the prohibition.[297] The second obstacle, Article 5.3 of the 1999 Landfill Directive,[298] prohibits injection of liquid waste and could potentially be regarded as prohibiting CO_2 injections into geological formations.[299]

During the Impact Assessment the three components of CCS, capture, transport and storage have been considered separately. Since capture presents similar risks to those sectors regulated by Directive 91/61/EC concerning Integrated Pollution Prevention and Control, the Commission concluded that this is also the appropriate regulative framework for capture of CO_2.[300] The 1985 EEC Directive on the assessment of the environmental impact of certain projects is used for assessing the environmental impacts of capture, pipeline transport, and storage.[301] Moreover, the 2004 EC Directive on Environmental Liability is used for regulating the liability for local environmental damage from CCS[302]. The ETS Directive is used for regulating the liability for climate change by requiring surrender of allowances for leakage.[303]

The subject matter of the proposed Directive CCS is to create a legal framework for the storage of CO_2 to regulate the environmental risks with this particular activity.[304] The scope of the proposed Directive applies to geological storage of CO_2 in the territory of member states, their exclusive economic zone, and on their continental shelf.[305] In Article 2.4 of the proposed Directive it is stated that the storage of CO_2 in the water column is not

297. *CCS Proposed Amendments Com.*, *supra* note 282, at 30.

298. Council Directive 99/31, art. 5(3), 1999 O.J. (L 182) 1, 5 (EC) (legislating the landfill of waste) (also known as the Landfill Directive), *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1999:182:0001:0019:EN:PDF.

299. *Id.* (No amendments to this Directive were proposed to the *CCS Proposed Amendments Com.*, (*see supra* note 282)).

300. *CCS Summary Impact Assessment Com.*, *supra* note 276, at 2.

301. Council Directive 85/337, 1985 O.J. (L 175) 40 (EEC) (on the assessment of the effects of certain public and private projects on the environment), *available at* http://www.energy-community.org/pls/portal/docs/36294 .PDF.

302. Directive 2004/35, 2004 O.J. (L 143) 56 (CE) (on environmental liability with regard to the prevention and remedying of environmental damage), *available at* http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:143:0056:0075:EN:PDF.

303. *CCS Proposed Amendments Com.*, *supra* note 282, at 3, 13.

304. *Id.* at art. 1.1.

305. *Id.* at art. 2.1.

permitted. The most important feature of the proposed Directive is that it creates a system whereby a permit is required for every storage site.[306] The permit holder will be liable for any 'localised' environmental damage their operations may cause.[307] Harmonization with other multi-national treaties such as the 1996 Protocol to the London Convention of 1972[308] and the OSPAR Convention[309] is necessary to allow storage of CO_2 offshore.

One important issue for the inclusion of CCS in the EU ETS is that there needs to be clear and sufficient monitoring with respect to capture, transport and storage. The proposed Directive on geological storage meets this by establishing the permit system, but also by creating a monitoring scheme. Pursuant to Article 13.1, the operator shall monitor the injection facilities and the storage complex (including the CO_2 plume where possible), and the surrounding environment where appropriate. The monitoring shall be based in a monitoring plan designed by the operator in compliance with certain requirements laid out in Annex II and submitted to and approved by the competent authority.[310]

F. Funding of CCS

In order for CCS to be financed and commercially viable, the funding required would total tens of billions of euros. The Commission has stated that this amount of financing is not possible from the E.U. budget. Therefore the Commission is of the opinion that funding CCS will have to be made through public-private partnerships fed predominantly by national

306. *Id.* at art. 6.1.

307. *Id.* at 13, art. 33 (proposing an amendment to Annex III to Directive 2004/35/EC).

308. 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter, Nov. 7, 1996, S. Treaty Doc. No. 110-5, 36 I.L.M. 1; Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Dec. 29, 1972, 26 U.S.T. 2403, 1046 U.N.T.S. 120. These and other treaty documents are *available at* http://www.imo.org/Conventions/contents.asp?topic_id=258&doc_id=681.

309. Convention for the Protection of the Marine Environment of the North-East Atlantic, Sept. 22, 1992, 32 I.L.M. 1069 (1993) (also known as the OSPAR treaty), *available at* http://www.ospar.org/html_documents/ospar/html/OSPAR_Convention_e_updated_text_2007.pdf

310. *Id.* at 1.2.

budgets and private sector investment. The Commision has made it clear that the later this process begins, "the more policy-makers will be obliged to look at the option of compulsory application of CCS technology as the only way forward."[311] Some have criticised the lack of guaranteed funding and the fact that the Commission has chosen not to make CCS mandatory at this stage.[312] In the Impact Assessment of the proposed amendments to the ETS Directive, the Commission stated that only a few CCS projects will be operational by 2020.[313]

In the revised State Aid guidelines, which were also presented on January 23, 2008, the Commission says it is too early to lay down guidelines for state aid for CCS projects.[314] However, it may very well be possible in the future and the Commission sees these projects as important for reaching the E.U.'s climate goals. Therefore, it appears that the Commission will have a generally positive attitude towards state aid for CCS projects, provided that they are environmentally safe and contribute to environmental protection.[315]

CONCLUDING OBSERVATIONS

The E.U. sees CCS as an important mitigation tool and has taken a lead role in developing a legal framework enabling CCS in the Community. The creation of a special framework on the geological storage of CO_2 is important since the main concern has

311. *Communication from the Commission to European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Supporting Early Demonstration of Sustainable Power Generation from Fossil Fuels*, at 9, COM (2008) 13 final (Jan. 23, 2008), *available at* http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0013:FIN:EN:PDF.

312. *Media Brief: New EU Climate Change Package Fails to Tame King Coal*, E3G, Jan. 22, 2008, http://www.e3g.org/images/uploads/Media_Brief__New_EU_Climate_Change_Package_Fails_to_Tame_King_Coal.pdf (E3G is a non-profit European environmental organisation with the mission to accelerate the transition to sustainable development).

313. According to the modelling based on PRIMES, baselines suggest that by 2020 less than 0.5% of CO_2 from power and steam will be captured. *See CCS Summary Impact Assessment Com.*, *supra* note 276, at 4; *see also GHG Emission Trading Impact Assessment Com.*, *supra* note 248, at 50.

314. COMMUNITY GUIDELINES ON STATE AID FOR ENVIRONMENTAL PROTECTION 19 (2008), http://ec.europa.eu/competition/state_aid/reform/environmental_guidelines_en.pdf.

315. *Id.*

to be that CCS is deployed in an environmentally sound way, and that liability issues are resolved. However, the reluctance of funding and the fact that the Commission does not propose to make CCS mandatory has been criticised. In the policy statements made before the presentation of the proposed Directive on geological storage of CO_2 and the amendments to the ETS Directive, the Commission stated that before 2015, twelve to fifteen demonstration projects on CCS should be realised. Without clear funding and a mandatory requirement this might be hard to achieve. The proposed amendments will not enter into force until 2013, so until then the unilateral opt-in under Article 24 in the ETS Directive is the only incentive for CCS.

Another issue that is not thoroughly discussed in the proposed amendments to the ETS Directive is how leakage of CO_2 shall be regulated. In the Impact Assessment for the proposed Directive on geological storage of CO_2, the Commission stated that the ETS Directive is used for regulating the liability for climate change by requiring the surrender of allowances for leakage, but exactly how this will be accomplished has not been discussed.

It is too early to know precisely what impact CCS will have in Australia, although, given the monies already committed by the government to fast track the technology and thoroughly test this technology in the context of developing large scale commercial prototype projects, it is fair to expect that whether as part of the CPRS legislation proposed by the government, or as a way of ensuring that the Australian coal industry continues to survive long into the future, it will play an increasing important role in any future reduction scheme. There is little doubt that the psychology surrounding renewable forms of energy production has, after years of ambivalence, finally penetrated much deeper into the conscience of the average citizen who would like to see Australia become a world leader in the development and marketing of solar power, for example, provided that the associated costs of converting to less polluting methods of energy production are managed appropriately. The solution will likely lie in the adoption of a broader mix of alternatives than the current

government appears to be relying on in its rush to ensure that Australia's CPRS is both enacted and operational by 2011.[316]

Endeavoring to keep its commitment to enact the CPRS into law prior to the meetings in Copenhagen in December 2009, the CPRS Bill was introduced to Parliament on May 14, 2009, and was passed by the House of Representatives on June 4th. It was defeated, however, in the Australian Senate on August 13, 2009, by a 42 to 30 vote where the Opposition, the Greens, and two independent Senators hold the balance of power. The Government has vowed to re-introduce the same legislation in three months time. If the legislation is rejected a second time, the Government will have what is known under the Australian Constitution as a "trigger" for a double dissolution (i.e. a trigger to dissolve both houses of Parliament) and call an early election.

This turn of events has created a political crisis for both the Government and the Coalition. Trailing badly in the polls, Coalition Opposition leader, Malcolm Turnbull does not relish the prospect of an early election in which, if the polls held, he is almost certain to lose. On, the other hand, Australian voters have punished and defeated governments who have chosen to go to an early election, the most recent example being that of the West Australian Labor government that in August 2008, called an early election and lost to the Liberal opposition.[317]

What appears relatively certain is that the Government will be forced to seriously consider further substantive amendments to the CPRS to be tabled by the Opposition by October 19th of this year if it harbors any hope of getting the legislation through Parliament prior to arriving in Copenhagen in December.

316. Although the Government had originally planned for the CPRS to commence in 2010 it bowed to pressure from both the opposition and industry to delay its implementation until the following year. On May 4, 2008, some key policy changes were announced including the delay to the start of the scheme until July 1, 2011. For a summary of these policy changes *see* Parlimentary Library, Party Policies, Australian Labor Party, http://www.aph.gov.au/library/pubs/ClimateChange/governance/domestic/national/party.htm (last visited Sept. 24, 2009).

317. For an analysis of the implications of the Senate rejecting the CPRS *see* Adeline Dontenville, *Australian Senate Rejects CPRS*, CLIMATICO, Aug. 15, 2009, http://www.climaticoanalysis.org/post/australian-senate-rejects-cprs/.