Department of Primary Industries

Greenhouse Gas Geological Sequestration Regulations 2009

Regulatory Impact Statement

This Regulatory Impact Statement has been prepared in accordance with the requirements of the *Subordinate Legislation Act 1994* and the *Victorian Guide to Regulation* incorporating Guidelines for the Measurement of Changes in Administrative Burden.

September 2009

GREENHOUSE GAS GEOLOGICAL SEQUESTRATION REGULATIONS 2009

REGULATORY IMPACT STATEMENT

This Regulatory Impact Statement (RIS) has been prepared to fulfil the requirements of the *Subordinate Legislation Act 1994* and to facilitate public consultation on the proposed Greenhouse Gas Geological Sequestration Regulations 2009.

In accordance with the *Victorian Guide to Regulation*, the Victorian Government seeks to ensure that proposed regulations are well targeted, effective and appropriate, and impose the lowest possible burden on Victorian business and the community.

The primary function of the RIS process is to allow members of the public to scrutinise proposed statutory rules before they have been finalised and to allow the public to comment on the proposal. Such public input can provide valuable information and perspectives, and thereby improve the overall quality of the regulations.

The proposal establishes the Greenhouse Geological Sequestration Regulations 2009, which will be publicly advertised and circulated to key stakeholders. A copy of the proposed Regulations is attached to this RIS.

Public comments and submissions are now invited on the proposed Regulations. All submissions will be treated as public documents and will be made available to other parties upon request. Written comments and submissions should be forwarded by no later than **5:00pm, Friday 2 October 2009** to:

CCS Regulation Implementation
Energy Sector Development Division
Department of Primary Industries
GPO Box 4440
MELBOURNE VIC 3001

or email:

CCS_Legal@dpi.vic.gov.au

This Regulatory Impact Statement was prepared for the Department of Primary Industries by Regulatory Impact Solutions Pty Ltd.

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ABBREVIATIONS

ABARE – Australian Bureau of Agricultural and Resource Economics

CS – Carbon Storage

CCS – Carbon Capture and Storage

CO_2 – Carbon Dioxide

CPRS – Carbon Pollution Reduction Scheme

COAG – Council of Australian Governments

DOJ – the Department of Justice

DPI – the Department of Primary Industries

DSE – the Department of Sustainability and Environment

DTF – the Department of Treasury and Finance

EO & GR – enhanced oil and gas recovery

EMP – Environment Management Plan

EPA – Environment Protection Authority Victoria

ETS – Emissions Trading Scheme (also see CPRS)

GHG – Greenhouse Gas

IEA – International Energy Agency

IRGC – International Risk Governance Council

IPCC – Intergovernmental Panel on Climate Change

MCMPR – Ministerial Council on Mineral and Petroleum Resources

NCC – National Competition Council

NCP – National Competition Policy

RIS – Regulatory Impact Statement

SCM – Standard Cost Model

SEPP – State Environment Protection Policy (Groundwaters of Victoria) 1997

UNEP – United Nations Environment Programme

UNFCCC – UN Framework Convention on Climate Change

VCAT – Victorian Civil and Administrative Tribunal

VCEC – Victorian Competition and Efficiency Commission

WMO – World Meteorological Organization

DEFINITIONS

For the purposes of this document, the following terms are defined:

Carbon Storage – the injection of carbon dioxide and other prescribed greenhouse gas substances into an underground geological formation for the purpose of permanent storage.

the Act – the *Greenhouse Gas Geological Sequestration Act 2008*

the proposed Regulations – the Greenhouse Gas Geological Sequestration Regulations 2009

EXECUTIVE SUMMARY

Purpose of a Regulatory Impact Statement

Before new regulatory proposals are introduced in Victoria, the *Subordinate Legislation Act 1994* requires that proposals that impose an "appreciable economic or social burden on a sector of the public" be formally assessed in a Regulatory Impact Statement (RIS).[1] This process seeks to ensure that the costs of the proposed regulations are outweighed by the benefits, and that the regulatory proposal is superior to alternative approaches. It has been determined that the burden imposed by the Greenhouse Gas Geological Sequestration Regulations 2009 (the proposed Regulations) warrants assessment in a RIS.

A RIS formally assesses regulatory proposals against the requirements in the *Subordinate Legislation Act 1994*[2] and the *Victorian Guide to Regulation*.[3] The assessment framework of this RIS examines the problem to be addressed, specifies the desired objectives, identifies viable options that will achieve the objectives, and assesses the costs and benefits of the options, as well as identifying the preferred option and describing its effect. This RIS also assesses the proposed Regulations' impact on small business, undertakes a competition assessment and reports on any changes in the administrative burden. Finally, it considers implementation and enforcement issues, details the evaluation strategy, and documents the consultation undertaken.

The Proposed Greenhouse Gas Geological Sequestration Regulations 2009

The proposed Regulations support the implementation and administration of the *Greenhouse Gas Geological Sequestration Act 2008* (the Act), which creates the property rights and access regime necessary to facilitate the exploration for and injection of greenhouse gases into underground storage formations. They also manage competing rights and interests and establish safeguards to provide that the stored greenhouse gas substances are monitored and behave as expected. Further, the proposed Regulations seek to ensure that public health and environmental risks are adequately managed.

The proposed Regulations are limited in their scope. Primarily, they prescribe the content of the various plans required to support CS, the collection and retention of samples and data, reporting requirements, probity matters for public servants, monitoring the expected behaviour of stored greenhouse gas substances and the level of fees payable. There are 41 regulations in total.

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[1] *Subordinate Legislation Act 1994*, s. 7.
[2] ibid., s. 10.
[3] Department of Treasury and Finance, 2007, 2nd ed, *Victorian Guide to Regulation incorporating: Guidelines made under the Subordinate Legislation Act 1994* and *Guidelines for the Measurement of Changes in Administrative Burden*, Melbourne.

The Act and the proposed Regulations are consistent with a nationally agreed approach and with the regulatory regimes being developed by the Queensland and Commonwealth Governments.

Public Consultation

The prime function of the RIS process is to help members of the public and other stakeholders comment on the proposed Regulations before they are finalised. Such input, which draws on practical experience, can provide valuable information and perspectives, thus improving the overall quality of regulations. This is especially the case for the proposed Regulations which, although a new proposal, cover similar matters dealt with by regulations specific to the petroleum and geothermal industries.

The Department of Primary Industries (DPI), which is responsible for administering the Act, welcomes and encourages feedback on the proposed Regulations.

While in no way limiting the matters for comment, stakeholders may wish to comment on the following issues:

- Should a more, or less, prescriptive approach to that provided in the proposed Regulations be adopted?
- What types of information and how much detail is needed to be provided in regulations to guide the preparation of monitoring and verification and risk management plans?
- What is a reasonable time period, from the date on which an application for an injection and monitoring licence is lodged, within which the applicant should be expected to commence commercial scale injection?
- What, if any, information would be required from the holder of a petroleum title to enable the Minister to make a considered public interest decision?
- Are there any practical difficulties associated with the proposed Regulations?
- Are there any unintended consequences associated with the proposed Regulations?
- What matters should be covered by Guidelines, which may be developed in the future?

All submissions will be treated as public documents and will be made available to other parties upon request.

Climate Change and Greenhouse Gas Geological Sequestration

There is an overwhelming amount of scientific evidence to support the conclusion that human activity is resulting in changes to the climate, globally.

The Intergovernmental Panel on Climate Change (IPCC) has warned that warming of the climate system is unequivocal, as is now evident from observations in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.[4] It also notes that most of the observed increase in global average temperatures since the mid-20th century is 'very likely' due to the observed increase in anthropogenic GHG concentrations.[5] The Victorian Government accepts the findings of the IPCC as the most authoritative climate change science available.[6]

Victoria has one of the world's largest reserves of brown coal. At current usage rates, that equates to 500 years' supply of economic brown coal.[7] These coal reserves provide a significant benefit to the Victorian and Australian economies. However, Victorian brown coal has high moisture content, which means that it has a low net energy content relative to black coal and natural gas when combusted in the process of electricity generation.[8] It therefore produces significant GHG emissions. Victorian electricity generators produce an average of 1.3 tonnes of greenhouse gases per megawatt hour (mWh), compared with an Australian average of around 0.9 tonnes of greenhouse gases per mWh).[9]

The Victorian Government recognises that climate change is one of the most serious environmental challenges facing Victoria and recognises that no single policy instrument will meet its GHG and energy objectives. A multi-faceted approach is therefore required.[10] Accordingly, it has developed a suite of initiatives to reduce GHG emissions that include continued investment in renewable energy, energy efficiency and clean coal technologies. The Victorian Government has recognised the importance of carbon capture and storage (CCS) to address the impacts of climate change.[11]

There are three main stages to the CCS process. First, the capture component of CCS involves separating CO_2 from a source. Second, after it has been separated and compressed, CO_2 is transported to long-term storage, generally over considerable distances. The least costly approach is likely to be via gas pipelines. Pipeline transportation of high-pressure CO_2 is a mature technology. Third, geological storage – the subject of the Act and the proposed Regulations – involves the injection of liquid CO_2 or other prescribed GHG into subterranean formations at least 800 metres below the surface.

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[4] IPCC, *Intergovernmental Panel on Climate Change, 2007, Climate Change 2007: Synthesis Report*, adopted at IPCC Plenary XXVII, 12-17 November 2007, p. 30.
[5] ibid., p. 39.
[6] Department of the Environment, Water, Heritage and the Arts, *Carbon Dioxide Capture and Storage*: http://www.environment.gov.au/settlements/industry/ccs/index.html
[7] Department of Primary Industries, 2008, *Strategic Policy Framework for Near Zero Emissions from Victoria's Fossil Fuels*, Position Paper October 2008, p. 5.
[8] ibid.
[9] ibid.
[10] Department of Primary Industries, 2008, *Strategic Policy Framework for Near Zero Emissions from Victoria's Fossil Fuels*, Position Paper October 2008, pp. 1 & 13.
[11] ibid., p. 13.

Geological storage possibilities include depleted oil and gas reservoirs, deep saline aquifers (that is, reservoir rocks saturated with saline water) and deep coal seams unsuited to mining.

Geologists consider the risk of leaks from appropriately assessed storage sites to be low. Appropriate sites have contained materials such as oil, gas and naturally occurring CO_2 for millions of years. The IPCC has estimated that appropriately selected and managed geological reservoirs are 'very likely' to retain more than 99 per cent of injected CO_2 over 100 years. The panel said it was 'likely' that more than 99 per cent could be retained over 1,000 years.[12]

Increasingly there is a view that CCS has the potential to be one of the most environmentally friendly and most acceptable ways to address the issue of increasing CO_2 emissions without adversely impacting on economic development. In support of this, in 2007 the International Energy Agency (IEA) reported that CCS was one of the most promising routes for mitigating emissions in the longer term, and could reconcile continued coal use with the need to cut emissions.[13]

Additionally, in September 2005 the IPCC released a *Special Report on Carbon Dioxide Capture and Storage*, summarising the current status of the technologies related to CCS.[14] The report was written by over 100 international scientists from more than 30 countries, and was reviewed by many experts and governments. The Australian Government was involved in the review process. The report concluded that CCS has the potential to reduce overall GHG mitigation costs and increase flexibility in achieving GHG emission reductions. Importantly, the IPCC report concluded that there is a need for the development of *suitable regulatory frameworks* before large-scale application of CCS can occur.[15]

Rationale for Government Intervention

This RIS identifies two broad levels of market failure. At the level of managing climate change, market failures have arisen with respect to the external costs of carbon emissions not being properly allocated – know as externalities – thereby warranting government intervention.

With CS specifically, government intervention is established on grounds of removing barriers because of which the market may not deliver outcomes consistent with commercial and community expectations. These risks include:

- economic risks (i.e., provision of regulatory certainty, first mover risks, information gaps, long term liability, optimal use of storage formations,);

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[12] Intergovernmental Panel on Climate Change, 2005, *IPCC Special Report on Carbon Dioxide Capture and Storage.* Prepared by Working Group III of the IPCC. Metz, B., O. Davidson, H. C. de Coninck, M. Loos, and L.A. Meyer (eds), Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 14

[13] International Energy Agency, *World Energy Outlook 2007*, p. 12: http://www.iea.org/textbase/npsum/WEO2007SUM.pdf

[14] IPCC, 2005, ibid

[15] ibid., p. 45

- social risks (e.g., ensuring community safety); and
- environmental risks (i.e., storing carbon in a manner that minimises environmental harm and effectively meets climate change response goals).

In addition, it is important that the community has confidence that the operational risks of CCS are managed to an acceptable level.

The risk of non-intervention is that CCS would not proceed in Victoria due to the high level of risk and uncertainty, or would occur without appropriate risk mitigation strategies to protect the community and the environment.

CCS has the potential to be a key contributor to mitigating the impacts of climate change. The IPCC estimates that the economic potential of CCS could be between 10 per cent and 55 per cent of the total carbon mitigation effort until year 2100.[16] Were CCS not to proceed, there is a high likelihood that emissions targets may not be reached (resulting in detrimental effects of climate change) or emissions reductions occur at a much higher cost to the community.

Over the past few years the Victorian Government has released a number of policy and position papers concerning climate change and environmental policy. In these papers, the government has recognised the importance of CCS amongst the suite of strategies to deal with climate change.

To reflect the importance of CCS and to facilitate CS in on-shore Victoria, the *Greenhouse Gas Geological Sequestration Act 2008* was passed in October 2008. The proposed Regulations will support the Act.

Objectives of the proposed Regulations

The proposed Regulations support the administration and implementation of the Act by:

- ensuring that the risks involved in undertaking exploration activities or injection operations are identified and minimised so far as is practicable;

- creating administrative certainty and equitable processes, e.g., the requirement for the holder of authorisations to provide certain information when developing various plans requiring approval prior to activity commencing;

- creating a requirement to provide certain information with respect to Victoria's geological structures, e.g., businesses are required to provide certain geological data to the Minister and certain information will need to be held on a public register;

[16] ibid., p.12

- setting the fees, consistent with the principles of economic efficiency and equity with respect to applying for and altering authorities, paying annual fees, and inspecting publicly held information; and

- providing a mechanism by which rent is to be determined where charged for the ongoing occupation of Crown land.

At a broader level, the overarching objective of the proposed Regulations is to contribute to the mitigation of the impacts of climate change, consistent with and reflecting the objectives of the Act.

Options to Achieve the Objectives

As CCS is not an established industry, there is no reliable and complete data as yet thus choosing a preferred approach requires value judgements that are largely based on qualitative information. Based on this approach, the preferred option for managing the economic, social and environmental risks is the proposed Regulations, as measured against the government's objectives and the likely costs and effectiveness of the proposed Regulations.

Once the Commonwealth Government's carbon pollution reduction scheme (CPRS) is introduced, Victorian industry and the stationary energy generation will have a strong incentive to invest in or seek to access the most efficient form of GHG abatement. This should help to promote efficient GHG abatement outcomes and maintain economically efficient power prices.

This RIS suggests the proposed Regulations will provide benefits to the Victorian community by affording CCS technology the same degree of regulatory certainty as other forms of GHG abatement (e.g. wind farms). This will ensure that investment in GHG abatement in Victoria occurs on the basis of cost efficiency and is not distorted by regulatory uncertainty.

As a consequence, customers would not have to bear inefficient GHG abatement costs. The community will also derive a range of benefits from the improved environment protection outcomes that the proposed Regulations aim to achieve. The potential value that the community places on environment protection can be assessed through a number of value types, which include:

- the value that people place on the actual use of the environment;
- option values which reflect the value people place on the future ability to use the environment; and
- non-use values, which reflect the value people place on preserving or improving resources, such as species conservation and preservation of forest-covered areas.

Externality costs such as these are extremely difficult to quantify, and it has not been possible in this RIS to quantify the benefit that the community derives from the environment and, specifically, the benefit that the proposed Regulations could provide. Nevertheless, there is a risk that poor environmental management of a

CCS project could cause a loss in environmental value. The proposed Regulations help to preserve environmental value in all its forms to the maximum extent practicable.

The legislation will ensure the community has access to information concerning CCS development applications and an authority holder will be required to retain information and samples and keep the community informed of their activities. The development of plans required by the proposed Regulations will help to reassure the community that authority holders will appropriately manage the various risks associated with CS.

Preferred Option

The proposed Regulations offer a net benefit to the community. They assist in facilitating CS activities, which are necessary for addressing the impacts of climate change and effectively manage associated risks to the community and the environment. The proposed Regulations impose relatively minor costs on the community in terms of administrative costs on businesses and costs to government.

Multi-criteria Analysis (MCA) is an assessment tool which allows a comparison of options in cases where costs and benefits are difficult to quantify (this approach is discussed further in section 4). Assessed against the government's objectives, reflected in the MCA criteria, the proposed Regulations offer greater overall benefit than the alternative options identified. This is largely because they are the most effective way to achieve the desired policy outcome, incur low costs to business and government, and will be the most effective in reducing regulatory uncertainty currently acting as a disincentive to CO_2 storage activities. The relative scores are summarised in the table below.

Summary of Multi-criteria Analysis of Regulatory Options

Regulatory Proposal	MCA Assessment
Option 1: Proposed Regulations	+50.5
Option 1A: Performance-based standards	+44.5
Option 2: Use existing legislation/regulations	+13.0
Option 3: Use project-specific regulations	+38.5

The Table below shows that the possible costs over a 10-year period are approximately **$609,000** (PV), or an annualised cost of around $61,000 (PV) per annum. These cost estimates were informed by expert advice from the project manager from the CO2CRC Otway Trial Project and from discussions with geothermal operators.

The total costs are relatively minor because the proposed Regulations build on elements that are contained in the Act. For example, most of the information to be contained in an injection and monitoring plan is contained in the Act. It should also be noted that these costs are calculated on the basis of a single operation, and to the extent that there is more than one operation these costs would vary in that proportion. The time at which these activities occur during the life of the Regulations also affects the total cost. Costs associated with activities such as

Special Access Authorisations, Special Access Well Plans and reporting of serious situations may also not be realised for some operations.

Costs Imposed by the Proposed Regulations on Business, 10-Year Assessment Period

Regulation	Description of Regulation	Cost ($)
5, 6	Injection testing plan	58,794
8, 9	Injection and monitoring plan	47,829
11	Special access authority – special access well plan	25,618
13	Reporting of serious situations	52,717
14	Operation plan to include provision for review	75,102
16, 17	Reporting arrangements - Underground geological storage, information, samples and records	11,090
18–23	Operation Plan must include an Environment Management Plan	177,193
24–25	Operator to provide information about wells made under certain authorities and to provide survey information to Minister	16,869
26	Periodic overview of CS operations	126,521
41	Information from petroleum operators	17,319
Total		**609,052**

At a higher level, the benefits of the proposed Regulations will reflect the benefits of the Act to the extent that they contribute to the effectiveness of the legislation. Whilst it is acknowledged that most benefits from CCS will derive from the legislation, the effective operation of the regulatory regime will assist Victoria in mitigating the negative environmental affects of climate change, and help maintain Victoria's competitiveness when a CPRS is introduced.

The benefits specific to the proposed Regulations are limited to the extent that they contribute to the regulatory controls for managing the risks associated with CS. The benefits also include lowering search costs for applicants and authority holders through specifying requirements) and providing greater certainty and clarity, thus making compliance easier and lowering government enforcement costs. The proposed Regulations will provide a framework to ensure appropriate processes and transparency, which should provide greater public confidence in CCS technologies

Fees

Importantly, fees are not imposed by the proposed Regulations but are imposed by the Act. Fee levels are simply prescribed in the proposed Regulations. However, for illustrative purposes, an operator undertaking exploration and injection activities could be expected to pay fees in the order of $70,000 over a 10-year

period.[17] However, fees are not included as an overall cost to the community, as the fee paid is matched by the service provided (where full cost recovery occurs).

The Victorian Government will incur notional costs associated with administering and processing licences and permits. Given that the proposed Regulations are new, any such notional costs proved difficult to quantify. Moreover, this RIS submits that in practical terms there will be no net cost for government because administrative activities associated with the proposed Regulations will be undertaken largely by existing staff.

The fees in the proposed Regulations were calculated according to the government's *Cost Recovery Guidelines*.[18] Generally, full cost recovery is preferred unless such an approach is inconsistent with other objectives. Assessed against the criteria of efficiency, effectiveness and equity, it was determined that full cost recovery is preferable to partial or no cost recovery.

Proposed Regulations – Fees

Regulation	Description of Fee	Indicative Cost ($)*	Fee Units
Exploration Permits			
31(1)	Fee for application for exploration permit	4,670	400
33	Fee for renewal of exploration permit	2,380	200
35(1)(a)	Annual fee for exploration permit	6,450	550
36(a)	Fee for transfer of exploration permit	4,670	400
32	Fee for late renewal of exploration permit	117/week	10/week
Retention Leases			
31(2)	Fee for application for retention lease	4,670	400
35(1)(b)	Annual fee for retention lease	6,450	550
36(b)	Fee for renewal of retention lease	2,380	200
36(c)	Fee for transfer of retention lease	4,670	400
34	Fee for late renewal of retention lease	117/week	10/week
Injection and Monitoring Licences			
31(3)	Application fee for injection and monitoring licence	11,690	1,000
35(1)(c)	Annual fee for injection and monitoring licence	6,450	550
36(d)	Fee for transfer of injection and monitoring licence	4,670	400

[17] This cost assumes that one exploration permit and one injection and monitoring permit are issued ($16,358), and that five annual exploration permits and five injection and monitoring licence fees are issued, along with a special access licence ($56,050).

[18] Department of Treasury and Finance, 2007, *Cost Recovery Guidelines: Incorporating the information formerly published in the Guidelines for Setting fees and User-Charges Imposed by Departments and Central Government Agencies*, Melbourne.

Proposed Regulations – Fees (Continued)

Regulation	Description of Fee	Indicative Cost ($)*	Fee Units
Special Access Authorisation			
31(4)	Fee for application for special access authorisation	470	40
Greenhouse Gas Sequestration Register			
38	Minister's certificate	58	5
37(a)	Inspection of the Greenhouse Gas sequestration register	23	2
37(b)	Copy of document or entry in register - per A4 page	4	n.a

* Numbers rounded (indicative only). Under the *Monetary Units Act 2004,* the Treasurer has set a fee unit from 1 July 2009 to 30 June 2010 at $11.69.

Royalties – Not an element of the proposed Regulations

State and Federal jurisdictions routinely charge royalties for the extraction of state-owned resources, such as petroleum and gas, coal and various minerals. Typically, the royalties charged for these industries are based on the nature of the industry and the private benefit derived from the resource.

In the case of CS, the Act provides that the Crown owns all potential underground geological storage formations. Section 224 of the Act provides that the holder of an injection and monitoring licence must pay a royalty in respect of the GHG substance injected underground within the licence area. The royalty is to be paid at the rate, and in accordance with the conditions, specified in the licence. The Minister, in consultation with the Treasurer, has the ability to waive a royalty.[19]

Given that a CS industry is yet to fully establish in Victoria, or globally, the real value of storage formations is unlikely to be revealed in the short term. Further, in the process of developing the proposed Regulations, industry stakeholders have strongly expressed the view that imposing a royalty charge at this time would be seen as a significant barrier to the establishment of the industry and would widen the commercial gap for the first-movers in this industry.

For these reasons, a royalty charge will not be established at this time. This position will be reviewed within four years of the commencement of the Act, providing time for the industry to develop and allow the costs and benefits associated with the technology to be more clearly understood, including the 'price' of carbon emissions under the CPRS as well as the private benefit (e.g. avoidance of emission permit costs) derived from the use of potentially scarce geological storage formations.

[19] *Greenhouse Gas Geological Sequestration Act 2008*, s 224(3).

Small Business Impact

The effect of the Act and the proposed Regulations could deliver substantial benefits for small businesses in Victoria. In facilitating increased investment in CS technology, a number of business opportunities may be created for small businesses. For example, there are likely to be opportunities in the construction and set-up of the infrastructure necessary to implement CS, and in ongoing maintenance.

There is also likely to be opportunities for businesses to offer professional services by way of providing environmental and regulatory advice. While the exact magnitude of the potential benefits is unknown, small businesses may find opportunities in providing services to CS projects.

Identification of Restrictions on Competition

The guiding principle in assessing competition impacts is that regulations should not restrict competition unless it can be demonstrated that the benefits of the restriction to the community as a whole outweigh the costs, and that the objectives of the regulations can only be achieved by restricting competition. No restrictions on competition have been identified in connection with the proposed Regulations. The proposed Regulations are considered to satisfy the competition test set out in the *Victorian Guide to Regulation*.[20]

However, it may be observed that, in a very strict sense, the proposed Regulations may impose a restriction on participants entering a market. That is, businesses must satisfy certain requirements before they can obtain an exploration permit for a fee. These requirements are imposed on all businesses and therefore do not discriminate between players *within* the industry.

The proposed Regulations are likely to apply to large-scale, commercial operators therefore these requirements are not assessed as restricting competition given the scale and resources that such businesses are likely to possess. In addition, the level of fees is considered modest in terms of the overall cost of potential CS operations, and the level of fees is not considered a barrier to enter the CCS market.

[20] *Victorian Guide to Regulation*, ch 5.

Conclusion

This Regulatory Impact Statement concludes that:

- the benefits to society of the proposed Regulations exceed the costs;
- the net benefits of the proposed Regulations are greater than those associated with any practicable alternatives; and
- the proposed Regulations do not impose restrictions on competition.

1. WHAT IS THE ISSUE TO BE ADDRESSED?

1.1 Background

1.1.1 Climate Change

There is an overwhelming amount of scientific evidence to support the conclusion that human activity is resulting in climate change.[21]

The Intergovernmental Panel on Climate Change (IPCC) is a scientific intergovernmental body set up by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), to assess the latest worldwide scientific, technical and socio-economic literature to obtain an understanding of the risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation. The Victorian Government accepts the findings of the IPCC as the most authoritative climate change science available.

The IPCC, in its *Climate Change 2007: Synthesis Report*, states that "warming of the climate system is unequivocal, as is now evident from observations in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level."[22] Further, "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations."[23]

This Report also commented on regional impacts, and referring to Australia predicted that:

- by 2020 significant loss of biodiversity is projected to occur in some ecologically rich sites, including the Great Barrier Reef and Queensland Wet Tropics;
- by 2030 water security problems are projected to intensify in southern and eastern Australia;
- by 2030 production from agriculture and forestry is projected to decline over much of southern and eastern Australia, due to increased drought and fire; and
- by 2050 ongoing coastal development and population growth in some areas of Australia are projected to exacerbate risks from sea level rise and increases in the severity and frequency of storms and coastal flooding.[24]
- Table 1 table overleaf prepared by the IPCC summarises the likelihood of future impacts due to climate change on sectors of the economy.[25]

[21] In the twelve years from 1995 to 2006 (inclusive), eleven of these ranked amongst the warmest years since records began. Source: *Intergovernmental Panel on Climate Change, 2007, Climate Change 2007: Synthesis Report*, adopted at IPCC Plenary XXVII, 12-17 November 2007, p. 30.
[22] IPCC, 2007, ibid., p. 30.
[23] IPCC, 2007, ibid., p. 39.
[24] IPCC, 2007, ibid., p. 50.
[25] IPCC, 2007, ibid., p.13.

Table 1: Likelihood of Future Impacts due to Climate Change – Examples of Major Impacts

Phenomenon and direction of trend	Likelihood of future trends	Agriculture, forestry and ecosystems	Water resources	Human health	Industry, settlement and society
Over most land areas, warmer and fewer colder days and nights, warmer and more frequent hot days and nights	***Virtually certain***	Increased yields in colder environments; decreased yields in warmer environments; increased insect outbreaks	Effects on water resources relying on snowmelts; effects on some water supplies	Reduced human mortality from decreased cold exposure	Reducing energy demand for heating; increased demand for cooling; declining air quality in cities; reduced disruption to transport due to snow and ice; effects on winter tourism
Warm spells/heat waves. Frequency increases over most land areas	***Very likely***	Reduced yields in warmer regions due to heat stress; increased danger of wildfire	Increased water demand; water quality problems, e.g., algal blooms	Increased risk of heat-related mortality, especially for the elderly, chronically sick, very young and socially isolated	Reduction in quality of life for people in warm areas without appropriate housing; impacts on elderly, very young and poor
Heavy precipitation events. Frequency increases over most areas	***Very likely***	Damage to crops; soil erosion, inability to cultivate land due to water-logging of soils	Adverse effects on quality of surface and groundwater; contamination of water supply; water scarcity may be relieved	Increased risk of deaths, injuries and infectious, respiratory and skin diseases	Disruption of settlements, commerce, transport and society due to flooding; pressures on urban and rural infrastructures; loss of property
Area affected by land increases	***Likely***	Land degradation; lower yields/crop damage and failure; increased livestock deaths; increased risk of wildfire	More widespread water stress	Increased risk of food and water shortage; increased risk of malnutrition; increased risk of water- and food-borne diseases	Water shortage for settlements, industry and societies; reduced hydropower generation potentials; potential for population migration
Intense tropical cyclone activity increases	***Likely***	Damage to crops; uprooting up trees; damage to coral reefs	Power outages causing disruption of public water supply	Increased risk of deaths, injuries, water- and food-borne diseases; post traumatic stress disorder	Disruption by flood and high winds; withdrawal of risk coverage in vulnerable areas by private insurers; potential for population migrations; loss of property
Increased incidence of extreme high sea levels (excludes tsunamis)	***Likely***	Salinisation of irrigation water, estuaries and fresh water systems	Decreased fresh-water availability due to saltwater intrusion	Increased risk of deaths and injuries by drowning in flood; migration-related health effects	Costs of coastal protection versus costs of land-use relocation; potential for movement of populations and infrastructure; also tropical cyclones

Source: Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report Summary for Policymakers*, approved in detail at IPCC Plenary XXVII (Valencia, Spain, 12-17 November 2007), p.53

Global CO_2 emissions are already higher than the scenarios used by the IPCC in its Fourth Assessment Report and, if allowed to increase in line with projected energy production, are expected to accelerate the atmospheric warming that is already being observed.[26]

The Australian Government's CPRS: *Australia's Low Pollution Future White Paper* (the White Paper) notes that:

> Unmitigated climate change poses a significant threat to Australia's economic security. It challenges our prosperity and risks undermining the viability of many of our coastal, rural and regional communities. It is in our national interest to take strong and decisive action on climate change...Central to Australia's domestic mitigation response is the Carbon Pollution Reduction Scheme, aimed at delivering substantial reductions in emissions while sustaining strong economic growth and securing our future prosperity.[27]

The White Paper notes that the CPRS will play a major role in transforming the energy sector, the source of a significant proportion of Australia's emissions. It also notes that the CPRS will create powerful commercial incentives to adopt low-pollution alternatives. But, it maintains that additional measures will be required, such as support for renewable energy and CCS. The White Paper notes that CCS is the one technology that could allow coal to continue to play a major role in delivering energy supplies in a carbon constrained environment.[28]

1.1.2 Context for Victoria

The *Victorian Climate Change Green Paper* (the Green Paper) developed in the context of progress toward the Commonwealth Government's CPRS outlines the Victorian Government's strategic vision for climate change action.[29] The Green Paper notes the need for action to complement the CPRS to drive emissions abatement in areas of market failure or those sectors not covered by the CPRS. It also needs to position Victoria to take advantage of the opportunities created by the transition to a carbon constrained economy, and to adapt to the impacts of climate change.

The Green Paper identifies priorities for action within this framework,[30] including:

- driving innovation to position Victoria to capitalise on new technologies and new markets, to create new jobs and skills and accelerate the transition to a low carbon economy;
- helping vulnerable regions, businesses and communities adjust to a carbon price, particularly the Latrobe Valley; and

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[26] Australian Government, Environment Protection and Heritage Council, 2009, *Environmental Guidelines for Carbon Dioxide Capture and Geological Storage – 2009*, NEPC Service Corporation, p. 1.
[27] Australian Government, 2008, *Carbon Pollution Reduction Scheme: Australia's Low Pollution Future White Paper*, Volume 1, December 2008, Canberra, p. xv.
[28] ibid., p. xl.
[29] Victorian Government, Department of Premier and Cabinet, 2009, *Victorian Climate Change Green Paper*, Melbourne, June 2009, pp. 1-2.
[30] ibid,. p. 2.

- promoting low emissions energy technologies as the key to Victoria's energy future.

Victoria has one of the world's largest reserves of brown coal. Its reserves are estimated at 430 billion tonnes, of which 33 billion tonnes are considered to hold potential economic worth. At current usage rates, this reserve equates to 500 years' supply of economic brown coal.[31] This figure does not take into account the additional coal that may become economic in the future, nor does it account for a potential increase in usage resulting from new technologies enabling the export of coal and coal-based products.[32]

These coal reserves provide a significant benefit to the Victorian and Australian economies. Brown coal reserves are currently used to generate low-cost base-load electricity. This benefit is shared with other states participating in the national electricity market by contributing to low electricity prices across Australia's eastern seaboard. In 2007, around 95 per cent of Victoria's electricity generation was provided by brown coal fired generation capacity.[33] In addition to securing low-cost energy, brown coal mining and electricity generation have delivered significant economic activity to the Latrobe Valley and across Victoria.[34]

Yet, Victoria's total emissions are higher than some nations, including other industrialised countries with significantly higher populations, such as Austria, Hungary, Portugal, Slovakia, Sweden and Switzerland.[35] Victoria's net GHG emissions were around 122 million tonnes, which was approximately 22 per cent of Australia's overall emissions in 2005.[36]

Victoria's brown coal is low in ash, sulphur and heavy metal contaminants but has high moisture content (i.e. 60 to 70 per cent water). This means that the brown coal has a low net energy content relative to black coal and natural gas and, when combusted in the process of electricity generation, produces significant GHG emissions. Victorian electricity generators produce an average of 1.3 tonnes of GHGes per megawatt hour (mWh), compared with an Australian average of around 0.9 tonnes of GHGes per mWh).[37] Together, Victoria's coal-fired power stations produced 53 per cent of the state's total GHG emissions in 2006.[38]

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[31] DPI, 2008, ibid., p. 5.
[32] ibid.
[33] Victorian Government, *Victorian Climate Change Green Paper*, ibid., p. 33.
[34] DPI, 2008, loc. cit.
[35] Australian Government, Climate Change, http://www.climatechange.vic.gov.au/Greenhouse/
[36] State and Territory Greenhouse Gas Inventories 2006, *Australia's National Greenhouse Accounts, Australian Greenhouse Office*, June 2008.
[37] ibid.
[38] ibid.

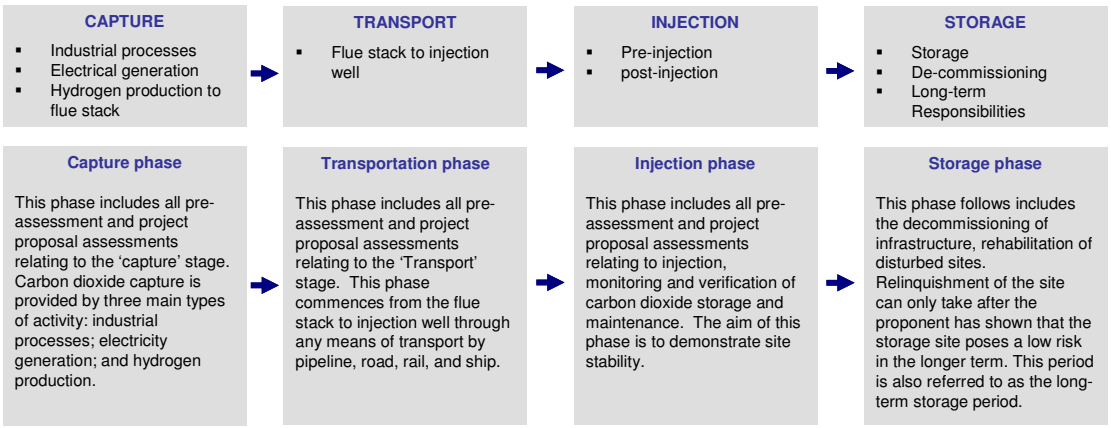
1.1.3 Carbon Capture and Storage

CCS is the process of capturing CO_2 and injecting it for the purpose of permanent storage in geological structures, such as depleted oil and gas reservoirs or deep saline aquifers, in order to reduce CO_2 emissions from electricity generation[39]. There are four phases in the lifecycle of a CCS project: capture, transport, injection and storage (illustrated in Figure 1 below). It is important to note that the proposed Regulations only cover the testing, injection and storage phases.

CCS utilises technology developed from enhanced oil and gas recovery (EO&GR) operations in the oil and gas industries. In EO&GR operations, various gases, including CO_2, are injected into oil and gas reservoirs to boost oil or gas extraction. However, CCS is very different from EO&GR in that it seeks to compress large volumes of CO_2 and inject into underground geological formations for permanent storage, potentially for thousands of years.

Accordingly, the regulation of CCS involves considering unique legal issues not contemplated by the *Petroleum Act 1998* (the Petroleum Act). The Petroleum Act does not explicitly regulate EO&GR operations, but enables these activities to occur as part of a production license.[40]

Figure 1: The life cycle of a CCS project



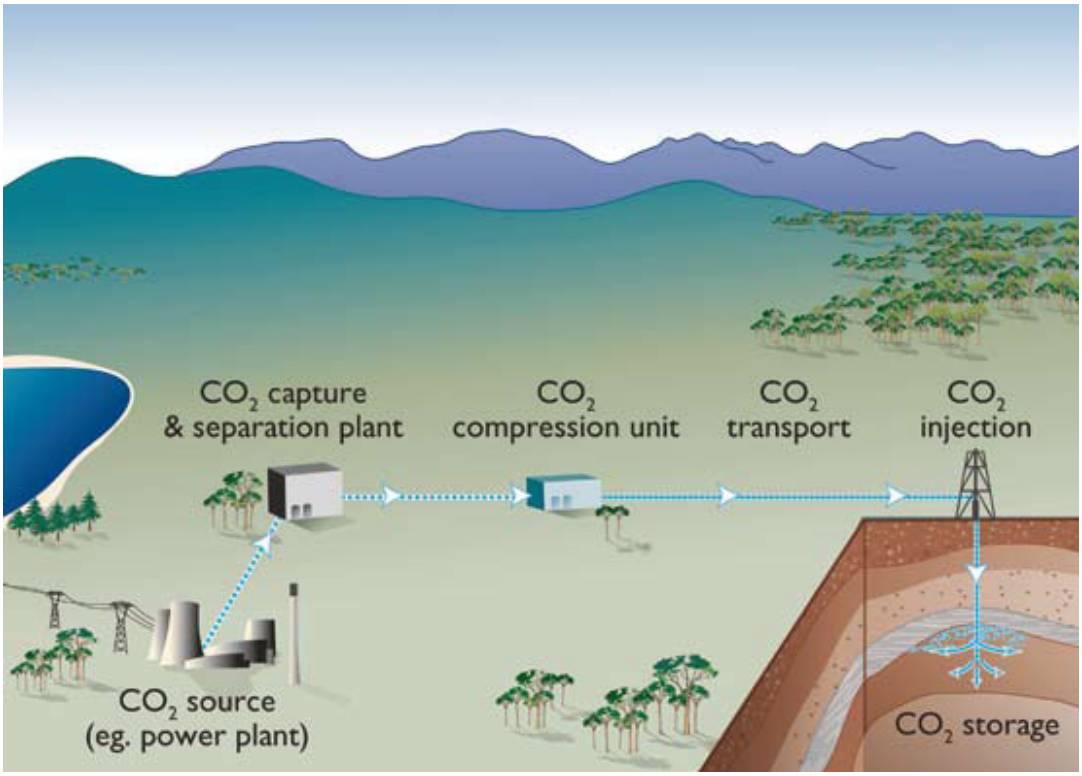
Source: DPI, 2008, Business Impact Assessment, Regulation of Injection and Storage of Carbon Dioxide in Onshore Victoria, p.13

Storage

Geological storage, the subject of the proposed Regulations, involves the injection of liquid CO_2 into subterranean reservoirs, as illustrated in Figure 2 below. Geological storage possibilities include depleted oil and gas reservoirs, deep unused saline aquifers (that is, reservoir rocks saturated with saline water) and deep coal seams unsuited to mining.

[39] Refer to Council of Australian Governments (COAG) Consultation Regulation Impact Statement – Draft Guiding Regulatory Framework for Carbon Dioxide Geosequestration, p. 6.
[40] *Petroleum Act 1998*, s 46(c).

Figure 2: GHG Substance Storage



Source: Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC)

Geologists consider the risk of leaks from appropriately assessed storage sites to be low.[41] Appropriate sites have contained materials such as oil, gas and CO_2 for millions of years. The IPCC has estimated that appropriately selected and managed geological reservoirs are 'very likely' to retain more than 99 per cent of injected CO_2 over 100 years, and it was 'likely' that more than 99 per cent could be retained over 1,000 years.[42]

Additionally, if GHG substances are injected into suitable saline formations or oil or gas fields, at depths below 800 metres, various physical and geochemical trapping mechanisms prevent it from migrating to the surface.[43]

The Report released by the IPCC in September 2005 that summarised the status of the technologies related to CCS at that time. The Report was written by over 100 international scientists from more than 30 countries. It was reviewed by many experts and governments. The Australian Government was involved in the review process. The report concluded that CCS 'has the potential to reduce overall GHG mitigation costs and increase flexibility in achieving GHG emission reductions.'[44]

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[41] ibid., p. 34.
[42] ibid.
[43] IPCC, 2005: *IPCC Special Report on Carbon Dioxide Capture and Storage*. Prepared by Working Group III of the Intergovernmental Panel on Climate Change [Metz, B., O. Davidson, H. C. de Coninck, M. Loos, and L. A. Meyer (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 6.
[44] ibid., p. 3.

The Report discusses the sources of CO_2, the technical specifics of capturing, transporting and storing CO_2 (in geological formations, the ocean, in minerals) and using the CO_2 in industrial processes. The Report also assesses the potential costs and benefits of CCS, environmental impacts, risks and safety, implications for GHG inventories and accounting, public perception and legal issues. IPCC analysis indicates that CCS is an important option available to reduce the impacts of climate change and found that:

- geological storage (geosequestration) remains the priority application compared to other CO_2 storage options;
- health, safety and environment risks for geological storage are low, and the level of risk will decline over time;
- 99 per cent of the CO_2 is likely to be retained over 1,000 years (by contrast the sequestration period of afforestation is around 30 years);
- capture technologies involve the highest costs associated with CCS, however, over the next decade the cost of capture could be reduced by 20–30 per cent; and
- before large-scale application of geological storage can occur, further research is required into site selection criteria, potential risks, and monitoring and verification.

Importantly, the IPCC Report concludes that there is a need for the development of *suitable regulatory frameworks* before large-scale application of geosequestration can occur. The IPCC identified CCS as one of the key mitigation technologies to reduce emissions from energy supplies including gas, biomass and coal-fired electricity, as well as other energy intensive industries.

Increasingly there is a view that geological storage of CO_2 has the potential to be one of the most acceptable ways to address the issue of increasing CO_2 emissions without adversely impacting on economic development.[45] In support of this, in 2007 the International Energy Agency (IEA) reported that CCS was one of the most promising routes for mitigating emissions in the longer term, and could reconcile continued coal use with the need to cut emissions.[46]

Another potential benefit of geological sequestration is that it is auditable. This means that the carbon credits resulting from geological sequestration may have a higher financial value than other carbon credits.

CCS Potential in Victoria

Given the location of Victoria's current energy infrastructure, the capture of CO_2 is most likely to be very closely integrated with production facilities at power stations and other industrial uses of brown coal in the Latrobe Valley. The Gippsland Basin – the majority of which is in the Commonwealth offshore area - appears well suited

[45] Cook, P. J., Rigg, A., and Bradshaw, J., 2000, *Putting it back where it came from: Is Geological Disposal of Carbon Dioxide an Option for Australia?* APPEA Journal, March 2000, p. 5.
[46] International Energy Agency, *World Energy Outlook 2007*, p. 12: http://www.iea.org/textbase/npsum/WEO2007SUM.pdf

for CS. It offers large volumes of high quality storage, including capacity in depleting oil and gas reservoirs.[47]

A review of existing studies estimates the Gippsland Basin's proven storage capacity to be in excess of two billion tonnes which is sufficient for 30 years of storage at current emission rates. It also estimates that more comprehensive studies could confirm storage capacity to be around six billion tonnes.[48]

The future of geological storage in the Gippsland Basin may, however, lie in injection into deep saline aquifers, where there may be potential for over 200 years of storage capacity. Geological storage capacity in the Otway Basin's deep saline aquifers have been estimated to be in the order of four billion tonnes, which offers an additional estimated 30 years of storage.[49]

The Otway Project in Victoria is the only operational CCS project in Australia at this time. The Otway Project is designed to demonstrate the safe production, transport and geological storage of CO_2, and provide a facility to develop monitoring and verification techniques. A detailed case study of this project adapted from EPHC *Environmental Guidelines for Carbon Capture and Geological Storage 2009*[50] and is contained in Attachment B.

Environment Protection (Scheduled Premises and Exemptions) Regulations 2007

Under the *Environment Protection Act 1970*, premises that have the potential for significant environmental impacts are subject to works approvals (for construction or modification of facilities or processes) and licences (for operating conditions, discharge limits, monitoring and reporting requirements).

The Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 (the SP Regulations) prescribe the premises that are subject to works approval and/or licensing by EPA, and provide for exemptions in certain circumstances. When the SP Regulations were re-made in 2007, a number of new categories were adopted, and included a requirement for premises to be used for CCS related activities to obtain a works approval and licence (Schedule 1, Type K02). For example, the SP Regulations would apply to an operation attached to a power plant to capture and compress the CO_2. Air emissions are likely to include the products of combustion from heating and compression of CO_2 gas.

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[47] DPI, 2008, op. cit., p.14

[48] CO2CRC, *Latrobe Valley Storage Assessment Final Report*, November 2005, edited by Barry Hooper, Luke Murray, Catherine Gibson-Poole. Cited in *Strategic Policy Framework for Near Zero Emissions from Victoria's Fossil Fuels*, ibid., p. 35.

[49] DPI, 2008a, ibid., p. 35.

[50] Environment Protection and Heritage Council (EPHC), *Environmental Guidelines for Carbon Dioxide Capture and Geological Storage*, May 2009: http://www.ephc.gov.au/sites/default/files/Climate_GL__Environmental_Guidelines_for_CCS_200905_0.pdf

It is important to note that the SP Regulations do not address all CCS related issues. For example, property rights or long-term responsibilities for monitoring and management of a CO_2 disposal site. Further, the SP Regulations 2007 RIS noted that "it is expected that the treatment of the industry under the *Environment Protection Act* will be reviewed as the statutory framework is established [for carbon CCS] and form only a part of that framework."[51]

The proposed Regulations cover the injection and storage of CO_2 into the storage formation not the industrial processes associated with its capture and compression. The SP Regulations will be amended to exempt premises used for the geological injection and storage of CO_2 and regulated by the Act but will continue to apply to the industrial processes associated with above ground capture and compression of CO_2.

1.2 Rationale for Government Intervention

Public policy advocates the premise that any economic activity should be free of regulation unless it can be shown that it is subject to 'market failure' which, if left unregulated, will not generate socially efficient levels of output. The socially efficient level of output is usually taken to be that which maximises the sum of the net benefits of the activity to producers and consumers and, more broadly, society.

This RIS identifies two broad levels of market failure. At the level of managing climate change, market failures have arisen with respect to the external costs of carbon emissions not being properly allocated that warrants government intervention. The need for government intervention in terms of CS is established on the grounds that the market may not deliver outcomes consistent with commercial and community expectations if barriers are not removed and risks adequately managed. These risks include: economic risks (i.e., provision of regulatory certainty, first-mover risks, information gaps, long term liability); social risks (i.e., ensuring community safety); and environmental risks (i.e., ensuring that the carbon is stored in a manner that minimises environmental harm and effectively meets climate change response goals).

Climate Change Externalities

External costs and benefits, sometimes known as 'externalities', occur when an activity imposes costs on parties not directly involved in the activity that are not compensated for, or generates benefits that are not paid for. Without intervention, the existence of externalities results in too much (where external costs or negative externalities occur); or too little (where external benefits or positive externalities arise) of an activity taking place from society's point of view.

[51] Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 Regulatory Impact Statement, p. 130: http://epanote2.epa.vic.gov.au/EPA/publications.nsf/2f1c2625731746aa4a256ce90001cbb5/e04a7f23c738dcafca2572a300202c14/$FILE/1118.pdf

GHG emissions represent a typical externality. The cost of emissions are being borne by the community as a whole (e.g., through climate change), while emitters are not being charged for the costs they impose on the community. An ETS seeks to price, or internalise, these externalities by creating a market for finite carbon emissions permits.[52] A CPRS will help support the long-term viability of CCS by creating a price for carbon emissions and thereby a market environment in which it becomes commercially attractive to utilise abatement technologies such as CCS.[53] This situation implies that in the absence of a CPRS, or other measures to address this externality, a greater level of CO_2 is being emitted than is socially optimal.

Actions to assist cost-effective GHG abatement, such as through CCS, support the CPRS mechanism in addressing the externality of emissions. However, for the purposes of analysis in this RIS, the proposed Regulations are treated as a stand-alone regulatory proposal, as the Regulations by themselves are not directed towards remedying the externality. That said, it is recognised the adoption of CCS technology is likely to become more attractive once a CPRS is in place. The market failures examined in this RIS therefore relate to market failures that may prevent CCS being used optimally in the suite of measures to achieve emissions reduction targets.

Facilitating Carbon Storage Activities

In the absence of the proposed Regulations there would be sub-optimal under-investment by business in CCS development. Under-investment may occur due to regulatory uncertainty or information asymmetries.

Commercial Certainty

Governments have a long history in creating property rights and compliance mechanisms to ensure commercial certainty. The long-term nature, questions over liability and ownership, and the high cost of capital expenditure associated with CCS operations virtually ensure that such commercial certainty must be provided as a pre-requisite before investors will consider entering this market. Further, rights need to be defined in cases where there are existing resource interests (e.g., managing interaction with the petroleum or geothermal energy resource industries).

In addition, potential investors, as well as capital and insurance providers, require procedural certainty so that possible impediments associated with the regulatory

[52] Any decision to invest in CCS will depend on whether there is sufficient commercial benefit from emissions reduction to justify the additional cost to new or existing generation. To date, no commercial scale plants with CCS have been built in Australia, and the scale of the required permit price to make CCS commercially attractive is uncertain.

[53] In its recent Green Paper on Climate Change (p. 31), the Victorian Government noted that there is a "need for a carbon price, without which carbon capture and storage (CCS) and coal drying will never be economic. When CCS becomes a preferred technology due to higher permit prices under the CPRS, the market will naturally move in this direction. However, the high carbon price required for the uptake of clean coal technologies (especially CCS) means that the Victorian Government, at least in the short to medium term, may need to consider extra measures to ensure the uptake of these technologies".

regime are clear. Section 1.4.2 below discusses the issue of commercial certainty in more detail.

The Australian Bureau of Agricultural and Resource Economics (ABARE) examined the issues of regulatory uncertainty acting as impediments to investment decisions in its report *Mineral Exploration in APEC economies - a framework for investment*.[54] This report found that "as well as prices and geological prospectivity, the decision to invest in mineral exploration is strongly influenced by the regulatory and institutional framework of an economy".[55]

The report noted that transparency of regulation and process provides companies with important information in order to make decisions about investment in minerals exploration. Transparency reduces uncertainty and increases commercial confidence. The ability to access relevant information can make investors more willing to undertake exploration. To that end, an absence of transparency and regulatory certainty was cited as "potentially one of the largest single deterrents to investment …".[56]

Information Asymmetry

Businesses face a lack of information in relation to geophysical data, which may lead to sub-optimal investment outcomes. Businesses require information so they can make informed decisions about the conduct of their operations. The proposed Regulations will require an authority holder to submit certain technical and geological information and maintain information, data and samples so that the government can build a profile of Victoria's GHG storage resources. This information will gradually become publicly available, and should benefit the industry by improving the current 'information gap'.[57] Without addressing this information asymmetry, there is likely to be less investment in CCS than if the information is provided.

Mitigating risks associated with Carbon Storage

While facilitating CS, governments are responsible for ensuring that risks to the community and risks to the environment are appropriately managed. It is important that the community has confidence that the operational risks of CS are managed to an acceptable level.

Like any new technology, there are inherent safety and environment risks associated with CS operations. A key mitigation measure will be to ensure that the area selected for CS has the geological properties to allow for safe, stable long-term

[54] Penney, K., McCallum., R., Schultz, A., 2007, *Mineral Exploration in APEC Economies: A Framework for Investment*, APEC Energy Working Group, Report no. APEC#207-RE-01.10, Published by ABARE as Research Report 07.22, Canberra, December.
[55] ibid., p. iii.
[56] ibid., p. 57.
[57] Several of the proposed Regulations will require authority holders to report to the Minister on, for example, specific geological details (Regulations 16), annual operations report (Regulation 26), and information concerning the geological samples (Regulation 17). This information will be of value to further CCS activities.

storage. Risks are also associated with deep drilling to depths of more than 800 metres and other resources (e.g., aquifers and oil or gas reserves) may be impacted in the course of CS operations. The Act and the proposed Regulations provide the necessary processes and require developed plans and monitoring regimes to manage these risks.

Further, there is the risk that an authority holder may not sufficiently restore the environment to an acceptable level once operations are finished or maintain it while operations are undertaken. However, the Act provides a number of safeguards to ensure rehabilitation. An authority holder is required under the Act to rehabilitate any land that is used in carrying out any operation under the authority.[58] The authority holder must set out in the operation plan what it intends to do to rehabilitate the site[59] and it cannot carry out an activity unless they have paid an acceptable rehabilitation bond.[60]

Risks of Non-intervention

The risk of non-intervention is that CS would not proceed in Victoria due to the high level of risk and uncertainty, or would occur without appropriate risk mitigation strategies to protect the community and the environment.

CCS has the potential to be a key contributor to mitigating the impacts of climate change. The IPCC estimates that the economic potential of CCS could be between 10 per cent and 55 per cent of the total carbon mitigation effort until year 2100.[61]

If CCS did not proceed, there is a high likelihood that emissions reduction targets may not be reached leading to detrimental impacts on the environment from climate change. There is also the risk that emissions reductions would occur at an increased cost to the community.[62]

1.3 Type of Incidence of Cost

The *Victorian Guide to Regulation* identifies three categories of regulatory costs: (1) compliance costs, (2) financial costs and (3) market costs.[63]

Compliance Costs

Compliance costs can be divided into 'substantive compliance costs' and 'administrative costs'.

Substantive compliance costs are those costs that directly lead to the regulated outcomes being sought and are often capital and production costs. These costs are

[58] *Greenhouse Gas Geological Sequestration Act*, s 217.
[59] Ibid., s 209.
[60] Ibid., s 220; see also s 221 for the Minister can request an increased rehabilitation bond; s 222 that allows the Minister to carry out rehabilitation.
[61] IPCC, 2005, ibid., Sec 8.3.3.
[62] Massachusetts Institute of Technology, 2007, *The Future of Coal*: http://web.mit.edu/coal/
[63] DTF, 2007, ibid., p. F-7.

often associated with content-specific regulation and include buying new equipment, maintaining the equipment and undertaking a specified action in order to meet government regulatory requirements, such as undertaking monitoring or testing. In the case of the proposed Regulations substantive compliance costs include specifying time periods before actions should commence (Regulations 7, 10, 39 and 40).

Administrative costs (or 'red tape') are those costs incurred by business to *demonstrate* compliance with the regulation or to allow government to administer the regulation. Administrative costs can be thought of as 'information obligations' to government[64] and includes those costs associated with familiarisation with administrative requirements, submitting applications, record keeping, and periodic reporting. The proposed Regulations principally deal with information obligations imposed upon authority holders; specifically regulations 5, 6, 8, 9, 11 to 14, 16 to 26, and 41 impose administrative costs.

Attachment D contains a regulatory map that sets out the regulations which impose administrative costs. This map illustrates how the proposed Regulations relate to the Act and show the plans and reporting requirements. This attachment also contains a description of the type of regulatory costs imposed by each regulation, along with the groups affected.

Financial costs

Financial costs are the result of a certain and direct obligation to transfer a sum of money to the government or relevant authority. Such costs include administrative charges and taxes. For example, the fees in the Schedule of the proposed Regulations (Regulations 31 to 38) would be a financial cost of regulation.

Market costs

Indirect or market costs are those costs that arise from the impact that a regulation has on market structure or consumption patterns. In the context of this RIS, a CPRS may lead to other changes in the carbon market. For example, a greater demand for more energy efficient appliances, the development of non-carbon energy sources, or the establishment of CCS operations. However, given the narrow and specific nature of the proposed Regulations,[65] it is unlikely that they would impose any indirect or market costs.

Broadly, in the absence of legislation, it is likely that there would be economic, social, and environmental costs and impacts. The externalities associated with climate change suggest that while individual emitters may privately benefit, the collective impact may cause significant long-term damage to the environment and the economy.

[64] Including maintaining records or information that can be audited.
[65] They largely prescribe fees and information obligations.

1.4 Nature and Extent of the Problem

THRESHOLD ISSUE:

Without a regulatory framework that establishes property rights and ensures commercial certainty, it is unlikely that large-scale commercial exploration of Victoria's geological formations suitable for storing GHG substances or any CCS would occur. A framework must also ensure regulatory certainty to provide greater certainty and confidence to investors. The community also requires certainty that the risks associated with CS operations are minimised as far as is possible.

1.4.1 Economic Risks: Creating Commercial Certainty

A regulatory framework for the long-term underground geological storage of GHG substances is concerned with ensuring that there is an appropriate system of property rights to enable the injection and long-term storage of CO_2.

Geologically, Victoria has promising potential for CS. However, businesses have generally been unwilling to undertake exploration because of the uncertainties associated with the property rights and ownership of geological tenements for CS.[66] Without defined exclusive rights to an area, there would be little incentive to invest in exploration for suitable geological sites because once a resource was discovered there would be little to prevent a number of parties from taking advantage of it.

CS proponents will require a high degree of certainty regarding access and property rights before committing to any such projects given the likely costs and the time periods involved. In 2005 the Ministerial Council on Mineral and Petroleum Resources (MCMPR) recommended that property rights and access for each stage of a CCS project relating to the surface and subsurface should be clarified. It also recommended that ownership of the CO_2 at each stage of a CCS project should be established, with clearly defined rights and responsibilities.[67]

CO_2 may be recognised at common law as tangible property that is capable of being owned and traded, without the need for specific legislation. In the absence of any contractual rights or statutory restrictions affecting ownership then CO_2 - which is produced as a by-product of combustion fossil fuels - the property of the owner of the emission source and fuel supply. For other purposes, such as emission allocations under a national allocation plan, CO_2 produced as the result of a process of the combustion of a fossil fuel is similarly treated as the responsibility of the owner of that emission source.

[66] This advice was provided by DPI and confirmed in the stakeholder consultations. More generally, the ABARE study cited above demonstrates the unwillingness to undertake exploration activities without regulatory certainty.

[67] Ministerial Council on Mineral and Petroleum Resources, 2005, *Carbon Dioxide Capture and Geological Storage: Australian Regulatory Guiding Principles*, MCMPR, Canberra.

At common law, where CO_2 is injected into the sub-surface of the land and it becomes part of the land, ownership of the injected CO_2 will pass to the owner of the land into which it is injected. In most cases, the Crown will be the owner of the land.[68] The effect of this transfer of ownership is that, if the authority holder undertaking injection is not negligent, then liability for the injected CO_2 will rest with the owner of the land.

However, depending on the geology of the storage site, it may be that the injected CO_2 remains separate from the land, fully capable of extraction at some later time. This may create legal uncertainty about who owns the stored CO_2. It may also therefore create uncertainty in the event of leakage about who is responsible for remediation and claims for damages.[69]

If the legislative regime for CO_2 storage gives a CCS operator statutory title over an area where there is a pre-existing title (e.g. a petroleum tenement), this may give rise to the issues of conflicting resource use and priority of titles. The Act provides the process to resolve potential conflicts in these cases.[70]

Without the creation of property rights and regulatory certainty, it is unlikely that businesses would be willing to engage in exploration activity in Victoria. In addition, without the grant of an exclusive secure title, it is unlikely that capital providers would invest in the CCS sector. A similar approach has been taken to the granting of rights in the mining sector for exploration and development in Victoria for the last 150 years, and more recently in relation to geothermal energy resources.

1.4.2 Economic Risks: Creating Regulatory Certainty

Investment expenditures have two important characteristics. First, they are largely irreversible. Irreversible investment is especially sensitive to risk. The firm cannot disinvest therefore the expenditures are sunk costs. Second, they can be delayed. This requires the firm to wait for new key information about prices, costs, and other market conditions before committing resources.[71] In the case of CCS, proposals may include the legislative (e.g. the CPRS), commercial and regulatory environments.

Further, a detailed report by ABARE found that an absence of transparency and regulatory certainty was cited as potentially one of the largest single deterrents to investment and exploration decisions in APEC countries. After demonstrating deficiencies in a number of APEC economies, it recommended that governments should ensure that the licensing process is clear, efficient and transparent to create regulatory certainty.[72]

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[68] Department of Primary Industries, 2008, *A Regulatory Framework for the Long-Term Underground Geological Storage of Carbon Dioxide in Victoria*, Discussion Paper, p. 24
[69] ibid.
[70] *Greenhouse Gas Geological Sequestration Act*, s 40, 42, 43, 87, 98, 99, 137, 138.
[71] Pindyck, Robert S, 1991, 'Irreversibility, Uncertainty, and Investment', *Journal of Economic Literature*, American Economic Association, vol. 29(3), pages 1110-48, September.
[72] ABARE, loc cit., p. 12.

Given that developing countries do not have well developed regulatory regimes or administrative institutions, evidence may be drawn from these examples of the economic risks associated with regulatory uncertainty. Examples from the mining industry are contained in Box 1 below.

Box 1: Regulatory certainty case studies

Regulatory certainty needed for global oil firms to invest in South Africa – Engineering News 10 June 2009

In order for international oil companies to make investments in new capacity, a reasonable means of achieving a fair return was required, and importantly, regulatory certainty was needed. BP business adviser, Russel Glass, noted that the industry has, for the last four years, had very little certainty on how to achieve this return on investment. "Regulatory certainty speaks directly to investment," he added. Engen business development GM Wayne Hartmann agreed, and added that when operating in Africa, regulatory challenges 'do make life difficult'. He added that companies often found inappropriate legislation, or legislation that was not effectively enforced, or was selectively enforced. He added that energy investments were 'lumpy', and that a 'no regret environment' demanded a predictable and stable regulatory framework. http://www.engineeringnews.co.za/article/regulatory-certainty-needed-for-global-oil-firms-to-invest-in-sa-2009-06-10

Mining boom in Indonesia: so near, yet so far – Reuters UK, 2 November 2007

Mining investment in Indonesia has to cope with regulatory uncertainty, widespread graft, and red tape. The sector grew just 2.2 per cent, while the economy expanded 5.5 per cent last year. "Indonesia is still not the first choice of many international mining companies" due to the uncertainty, says PWC's Winzenried.
http://uk.reuters.com/article/idUKJAK5677520071102?pageNumber=2&sp=true

The *Geothermal Energy Resources Act 2005* is a relevant earth resources sector example of the benefits that regulatory certainty brings is. This legislation provides a framework for the development of large-scale geothermal energy projects, and provides exclusive rights to explore for, and subsequently extract, geothermal energy.

Since the geothermal energy regime came into effect, seven companies have been granted a total of 23 permits that cover approximately 162,000 km^2 (72 per cent) of the state. Expenditure committed in these permits over the next 5 years is estimated to be $376 million.[73]

[73] DPI, Geothermal Acreage Release:

Depending on its use, stored CO_2 can be classified as an industrial product, resource, waste or pollutant. In the absence of specific legislation, this classification would determine the legislative and regulatory regimes with which CCS operators would have to comply. In Victoria, the *Environment Protection Act 1970* and associated Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 regulate the capture, separation, processing and storage of waste CO_2 for the purpose of geological disposal.

While the term "waste carbon dioxide" is not defined, the *Environment Protection Act 1970* defines "waste"' to include 'any matter whether solid, liquid, gaseous or radioactive which is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment …'.[74]

On this basis, CO_2 injected as part of a CS project would be classified a "waste" under existing Victorian legislation. In addition, the Victorian *State Environment Protection Policy (Groundwaters of Victoria) 1997* (the 1997 SEPP) prohibits the direct discharge of wastes into any Victorian geological structure or formation containing, or capable of containing, water where "beneficial uses" are impacted upon.

The Act does not classify the CO_2 injected as part of CCS activities as a "waste" or as a "resource" to avoid unnecessary duplication with existing definitions. If a CO_2 storage project is likely to pose a significant risk of contaminating or sterilising other resources (including water) as a result of injecting CO_2, it is unlikely that current legislation would allow it to proceed. The Act, however, provides a mechanism to allow such projects to proceed.[75]

Under the Act, the authority holder must demonstrate to the Minister's satisfaction that the project is in the public interest.[76] The 'public interest' test is likely to consider that, all things considered, the benefits that arise from the project are likely to exceed the costs.[77] The CCS authority holder is still required to meet all regulatory requirements under the proposed legislation to minimise risks as far as practicable.

Other legislation, such as petroleum, planning and water laws, could apply to CCS in the absence of a framework to regulate CO_2 storage activities. Attachment C highlights the key challenges that were associated in using current regulatory arrangements to enable the CO2CRC Otway Project to proceed as well as the key learnings for the Victorian Government. This attachment also shows that, without a framework to regulate CO_2 storage activities, uncertainty would remain as to the appropriate legislative and regulatory requirements of a CCS authority holder. This would be likely to impose additional costs to CCS operators in terms of gathering

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http://www.dpi.vic.gov.au/DPI/nrenmp.nsf/LinkView/4B1AAC7DEF185ED3CA25714B007C8F22F3E8F7FE27CEB5ABCA2570030000808E

[74] *Environment Protection Act 1970*, s 4.

[75] *Greenhouse Gas Geological Sequestration Act 2008*, s 40, 42, 43, 87, 98, 99, 137, 138.

[76] ibid, s 137(2)(b).

[77] ibid, see s 3 definition of 'public interest'.

more information about the regulatory environment. It may deter potential industry participants and delay investment in CCS technology.

Without regulatory certainty from legislation for investment in CCS, there is the risk that CO_2 storage projects could be delayed and that the potential for CCS to abate GHG emissions could be under utilised. Proprietary rights and access for each stage of a CO_2 storage project relating to the surface and sub-surface need to be clear. The ownership of the GHG stream at each stage of a CO_2 storage project needs to be established with clearly defined rights and responsibilities.

Government regulation of the injection and storage phase of CS is required to:

- provide a clear, certain and consistent framework to facilitate the development of CO_2 storage by providing certainty for investors with respect to their legal rights and obligations;
- address the potential environmental risks of CO_2 storage;
- reassure the community that CCS operators will appropriately manage the potential adverse health, safety and environmental impacts of CO_2 storage;
- increase the options available for meeting the government's long-term targets for GHG reduction;
- protect and enhance the value of Victoria's brown coal resource, by ensuring that it can be used for electricity generation and other valuable uses, whilst still meeting those targets;
- ensure that technologies applicable to Victorian brown coal and CCS sites are developed and available to potential investors; and
- address gaps in existing regulatory frameworks that are insufficient to address the particular characteristics of CO_2 storage.

While technologies for the capture, compression, transport and long-term storage of CO_2 exist to varying scales in Australia, there is no large-scale integration of these technologies. To help overcome the economic and scaling barriers, further research needs to be conducted together with reduced CCS development costs and greater commercial incentives through a settled carbon price.

The national CPRS will enable carbon emissions to be priced by the market. This will provide the commercial incentive to reduce GHG emissions. The Government therefore expects that a market for CCS will only emerge after the introduction of the national CPRS in 2011. As a consequence, the Act does not seek to address current market problems. Instead it seeks to facilitate efficient and stable operation of the CCS market in the future. The proposed Regulations will provide the required regulatory certainty by establishing a detained regulatory framework for the injection and storage of CO_2 and other prescribed GHGes in Victoria.

1.4.3 Public Health and Environmental Risks

Submissions to DPI's *A Regulatory Framework for the Long-Term Underground Geological Storage of Carbon Dioxide in Victoria* Discussion Paper raised the importance of managing environmental and public health risks. Most submissions agreed that it was imperative that the community receive a high level of assurance that the CS authority holders will adopt the best efforts to safely and permanently contain GHG.

CO_2 will generally be captured at the emission source and, like any chemical commodity, will be subject to regulatory controls by way of legislation dealing with storage and transport of hazardous waste, OH&S, and the environment. This includes the *Pipelines Act 2005*, which applies to the licensing and regulation of pipelines carrying CO_2.

As detailed above, the SP Regulations will apply to above-ground CS activities such as the capture, separation and processing of waster CO_2.[78]

Similarly, while the *Pipelines Act 2005* and *Occupational Health and Safety Act 2005* will deal with other aspects of a CS operation, some of the operational risks would not be properly managed, such as those associated with deep drilling and long-term underground storage of GHG.

Drilling Operations

Earth resource operations can involve high risks in comparison to other industries. For this reason, authority holders are privy to higher safety standards. To ensure that the external costs of managing risks are internalised by business, governments have intervened in these areas for many decades. Such intervention can be justified on economic efficiency (i.e., to correct market failures) and equity grounds by making resource operators responsible for any costs they impose on individuals, communities and the environment.

While the occurrence of major incidents is relatively uncommon in earth resource industries in Australia, when such events do occur the results can be significant. For instance, gas explosions, subsidence, and oil spills and these can significantly impact on communities and the environment.

Elements of a CS operation[79], have a similar risk profile to that of the petroleum and geothermal industries. The vast majority of boreholes in the Victorian Groundwater Database that contain some 135,000 borehole records are less than 200 metres depth.[80] The type of boreholes that will be covered by the proposed Regulations will be over 800 metres in depth and in some cases well over 2,000

[78] To overcome this problem, Part 18, Division 2 of the *Greenhouse Gas Geological Sequestration Act 2009* provides that EPA is responsible for the administration of long-term monitoring and verification from four years after the commencement of the legislation.
[79] For instance, drilling deep boreholes.
[80] Groundwater Management System database:
http://www.ourwater.vic.gov.au/monitoring/groundwater/general/groundwater-database

metres. Drilling to these depths requires similar equipment to that used by the petroleum and geothermal industries.

Drilling activities are inherently risky. Drilling risk comprises problems with the drilling process due to unexpected geology or technical problems with the equipment.[81] There are also risks of encountering adverse chemical conditions or impacting on seismic activity. Of all professionals measured by the National Occupational Health and Safety Commission (NOHSC), drilling plant workers operated in the fourth most hazardous occupation (recording a death rate of 72 people per 100,000).[82]

The high safety standards required for drilling in the gas and petroleum and geothermal industries in Australia have seen few incidents. However, in April 2003, a gas fire broke out while drilling at Myall Creek, Queensland. While the fire was contained to the wellhead, three workers were seriously injured and one subsequently died in hospital. Another incident occurred in May 2004, while drilling at well Tarantula 1 located in the Perth basin. Two blow-outs occurred and four workers were injured.[83]

Detailed planning is essential to ensure that risks associated with drilling operations are adequately identified and the means by which they are managed is determined prior to commencing any activity.

The proposed Regulations have been modelled on the Petroleum Regulations 2000 and Geothermal Energy Resources Regulations 2006 in addressing the risks and hazards presented by drilling operations. Similar to these regimes, the proposed Regulations require a detailed operation plan. The *Occupational Health and Safety Act 2005* and the Occupational Health and Safety Regulations 2007 will also apply to provide safety to workers.

Injection and long-term storage

While the risk of CO_2 leakage from appropriately selected and managed geological formations is likely to be low, any leakage could impact on public health and the environment. The magnitude of the impacts would depend on factors such as the location and concentration of the stored GHG substances.

The public health risks associated with CS are generally considered low because:[84]

- CO_2 is a naturally occurring inert non-toxic gas though it can cause harm to humans at elevated levels;

[81] This form of risk is known as 'technical risk'.
[82] Victorian Government, *Better Health Channel*: http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Work_related_fatalities?OpenDocument
[83] DPI, 2005, Geothermal Energy Resources Regulations 2005 Regulatory Impact Statement, p. 15
[84] Council of Australian Governments (COAG), Consultation Regulation Impact Statement – Draft Guiding Regulatory Framework for Carbon Dioxide Geosequestration, p. 8.

- CCS projects will only inject CO_2 into underground geological formations that are identified as geologically suitable; and

- CCS utilises technology developed from enhanced oil and gas recovery operations to transport and inject CO_2 into geologic reservoirs. This technology has been in petroleum operations for many years around the world and has established a consistent track record of safely transporting and injecting CO_2.

Nevertheless, CCS is a relatively new technology that is generally not well understood by the community. An information asymmetry may emerge between CCS operators and the community regarding the public health risks of CCS technology. If left unaddressed there is the risk that this could lead to community resistance to CS projects. From an investment perspective, this would result in higher costs in terms of stakeholder management, public relations and local planning approvals. In turn, this could reduce the attractiveness of CCS technology relative to other GHG abatement measures.

The potential risks of storing GHG substances in a geological formation are primarily related to the potential for it to escape over time. Potential sources of slow CO_2 leakage include transmissive faults or fractures, poorly sealed injection wells and abandoned wells that have not been completely plugged. Such leaks could continue unnoticed if not continuously monitored as they would diffuse into the atmosphere in the same way as carbon dioxide fluxes from natural earth degassing, biological respiration and organic matter decomposition.

However, there is the small possibility that certain topographies or confined structures could act to concentrate CO_2 to dangerous levels. An example was the sudden release of naturally occurring CO_2 from the floor of Lake Nyos in Cameroon in 1987. This resulted in the deaths of more than 1,700 people. While this event is not representative of the risk of leakage from CS, it is indicative of the potential dangers that the sudden release of CO_2 can pose to human health.[85]

In addition to the release of CO_2 to the atmosphere, there is also a risk that CO_2 migrating out of the storage reservoir into one or more surrounding geologic formations could impact upon freshwater aquifers or interfere with oil, gas or coal production. Although injection would be at levels below 800 metres, CO_2 leaking from a storage formation has the potential to dissolve in shallow aquifers and contaminate water for drinking or irrigation purposes.

It is difficult to accurately quantify the likelihood and consequence of unplanned releases of CO_2 at CCS sites due to a lack of detailed research and field trials and the difficulty of assigning generic risks to situations that will vary considerably from site to site. However, together, the Act and the proposed Regulations provide a strong signal that the public health and environmental risks of CCS projects will be rigorously managed. The Act and the proposed Regulations achieve this by requiring rigorous assessment of potential storage formations and the development of detailed work programs and operational plans that ensure the risks at each stage of a CS project are identified and managed adequately. Central to this will be

[85] IPCC, 2005, ibid., p. 211.

monitoring and verification programs to confirm the expected behaviour of injected and stored GHG substances.

The Act and the proposed Regulations also establish regular reporting arrangements designed to confirm the integrity of operations and ensure that any serious situations that arise are reported within a short time period and that the authority holder undertakes the appropriate action.

Importantly, many of the measures to manage public health and environmental risk are prescribed in the Act. The proposed Regulations have the function of ensuring a minimum public health and environmental standard for CS operations. Without regulations to enumerate specific requirements, there is a danger that an authority holder may either 'under' or 'over engineer' these requirements, thereby necessitating increased communication with the regulator on the one hand or incurring higher costs.

2. OBJECTIVES OF GOVERNMENT INTERVENTION

2.1 Government Policy

The Victorian Government recognises that climate change is one of the most serious environmental challenges facing Victoria. It also recognises that no single policy instrument will meet its GHG and energy objectives and that a multi-faceted approach is required. It has therefore developed a suite of initiatives to reduce GHG emissions that include continued investment in renewable energy, energy efficiency and clean coal technologies.

As part of the Victorian Government's *Growing Victoria Together* vision, it is committed to reducing GHG emissions from the production and use of energy. In December 2004, the Government released a Position Paper entitled *The Greenhouse Challenge for Energy: Driving investment, creating jobs and reducing emissions.* This document reaffirmed the Government's commitment to addressing climate change and provided the policy framework for development of a comprehensive package of initiatives to reduce Victoria's GHG emissions from the stationary energy sector while continuing to ensure Victorians have access to a secure, efficient and affordable supply of energy. The Position Paper also sets out the Victorian Government's energy-related greenhouse policy objectives as:

- reducing GHG emissions from the production and use of energy.
- identifying and pursuing policy paths which:
  - assists Victoria's transition to a carbon constrained future;
  - protects Victoria's economic interests by maintaining a secure, reliable and affordable supply of energy;
  - creates an attractive environment for investment in the energy sector and the wider economy; and
  - ensures the Latrobe Valley's long-term future coal industry.[86]

The Greenhouse Challenge for Energy Position Paper describes how these broad objectives can be met through an integrated package of measures, including support for a national CPRS, policies and other initiatives to increase use of renewable energy and to improve energy efficiency, and support for the development, commercialisation and deployment of low emission energy technologies.

Supporting this Report, in April 2005 the Victorian Government released the *Victorian Greenhouse Strategy Action Plan Update.* This document noted that, as brown coal will continue to play an important role in Victoria's energy mix, new low emission technologies (including CCS) would be required.[87]

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[86] Victorian Government, 2004, *The Greenhouse Challenge for Energy: Driving Investment, Creating Jobs and Reducing Emissions*, Position Paper, p. 7.
[87] Department of Sustainability and Environment, 2005, *Victorian Greenhouse Strategy Action Plan Update*, Melbourne, April 2005.

Building on the broader policy framework, the DPI released its *Action Agenda on Climate Change and Greenhouse* in March 2006. In this document, CCS was identified as one of the means by which significant reductions in GHG emissions could be delivered, at the same time as enabling the expansion of Victoria's brown coal industries.[88]

Also in 2006, the Victorian Government set a long-term target to reduce GHG emissions by 60 per cent by 2050, compared to 2000 levels. However, since then the Commonwealth Government has announced that it will introduce emissions trading as part of its CPRS. This means that a binding emissions reduction target set by the Victorian Government would distort the operation of the scheme by mandating that a set level of reductions should take place within the state, regardless of the efficient allocation of national emission reductions that should be achieved through the CPRS market.

In August 2007, DPI released its *Strategic Policy Framework for Near Zero Emissions from Latrobe Valley Brown Coal* Issues Paper.[89] This Paper describes the opportunities and challenges Victoria faces in ensuring all Victorians continue to have a secure, reliable and affordable supply of energy, at the same time as reducing GHG emissions, and sets out issues for stakeholder input, including issues the government should consider in developing a clear and stable policy and legislative framework for CCS. Later, in October 2008, the Position Paper, *Strategic Policy Framework for Near Zero Emissions from Victoria's Fossil Fuels,* was also released confirming the Victorian Government's commitment to advance CCS in Victoria.

Notably, the Act incorporates environmental sustainable development (ESD) principles, including the 'precautionary principle' in relation to government action on climate change. The precautionary principle is adopted under Article 3.3 of the UN Framework Convention on Climate Change (UNFCCC). It states that:

> The Parties should take precautionary measures to anticipate, prevent or minimise the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost effective so as to ensure global benefits at the lowest possible cost.[90]

Most recently, the *Victorian Climate Change Green Paper* notes that the Victorian Government no longer sees any benefit in legislating for a state-based emissions reduction target that is inconsistent with a national target.[91] The Green Paper also highlights the range of measures available to the Government to transform Victoria's energy sector under the CPRS. This includes both regulation and

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[88] Department of Primary Industries, 2006, *Action Agenda on Climate Change and Greenhouse: Growing Sustainable Primary Industries*, March 2006, Melbourne.
[89] DPI, 2007, ibid.
[90] UNFCCC, *United Nations Framework Convention on Climate Change, Handbook*, Produced by Intergovernmental and Legal Affairs, Climate Change Secretariat, p. 74: http://unfccc.int/resource/docs/publications/handbook.pdf
[91] State of Victoria, 2009, *Victorian Climate Change Green Paper*, p. 30: http://www.climatechange.vic.gov.au/

removing regulatory barriers for new technologies such as CCS. In late 2009, the Government will release a White Paper setting out its final position on policies and actions on climate change.

2.2 Regulatory Framework

The *Australian Regulatory Guiding Principles for Carbon Dioxide Capture and Geological Storage* (the MCMPR Regulatory Guiding Principles), were endorsed by the Ministerial Council on Mineral and Petroleum Resources (MCMPR) on 25 November 2005. They provide the broad policy framework for the facilitation of a nationally consistent approach to the regulation of CCS in Australia.[92]

Key to this framework is the identification of six issues below that are fundamental to the development of an Australian CCS regulatory framework:

1. assessment and approvals process;
2. access and property rights;
3. transportation issues;
4. monitoring and verification;
5. liability and post-closure responsibilities; and
6. financial issues.

Both the MCMPR and the Environment Protection and Heritage Ministerial Council have also endorsed the *Environmental Guidelines for Carbon Capture and Storage* ('Environmental Guidelines'), that build on the MCMPR Guiding Principles and seek to provide consistency and certainty as to the environmental regulatory requirements and processes to apply to CS.

The GHG Geological Sequestration Bill (the Bill) was introduced into Parliament in September 2008 and is consistent with the Victorian Government's stated policy objectives outlined above in section 2.1 and the MCMPR Guiding Principles and Environmental Guidelines. In introducing the Bill into Parliament, the Minister for Energy and Resources noted in the Second Reading Speech that:

> In a carbon constrained world, carbon capture and geological storage technologies are required to offset the continued use of Victoria's fossil fuels. Economic incentives, such as a price on carbon dioxide emissions, are likely to be the longer term drivers for investment in carbon capture and storage. The necessary preconditions for that investment are: clear legal rights to explore for underground geological storage formations and to store greenhouse gases; and an efficient, transparent and credible regime for assessment, approval and operation."
>
> The Bill creates a framework to facilitate and regulate the injection and permanent storage of greenhouse gases. This framework is based on an existing model established by the *Petroleum Act 1998* and has been adopted because carbon capture and storage uses many of the same

[92] The MCMPR Regulatory Guiding Principles were supplemented by *Environmental Guidelines for Carbon Dioxide Capture and Geological Storage – 2009* produced by the Environment Protection and Heritage Council (EPHC).

> technologies as the petroleum industry. That said, the Bill addresses a number of unique legal issues, such as the potential migration of the injected GHG substances and the management of long-term liabilities and monitoring and verification requirements associated with the permanent underground geological storage of GHG substances.[93]

The Act received Royal Assent on 5 November 2008 and will come into effect on or by no later than 1 January 2010.

2.3 Objectives

2.3.1 Objectives of the Act

The Act aims to facilitate and regulate the injection of GHG substances into underground geological formations for the purpose of permanent storage of those gases as part of Victoria's commitment to the reduction of atmospheric GHG emissions[94].

The Act describes its objectives, which include promoting GHG sequestration operations for the benefit of all Victorians, by -

- encouraging and facilitating greenhouse gas sequestration operations;
- establishing secure title and an orderly, fair and competitive system for granting authorities to encourage greenhouse gas sequestration operations;
- establishing a legal framework for the regulation of greenhouse gas sequestration operations aimed at ensuring that greenhouse gas sequestration operations are carried out in ways that minimise impacts on public health and the environment, and consultation mechanisms are effective and appropriate access to information regarding greenhouse gas sequestration operations is provided; and land affected by greenhouse gas sequestration operations is rehabilitated; and just compensation is paid for the use of private land; and conditions in licences and approvals are enforced;
- ensuring that greenhouse gas sequestration operations are conducted in accordance with the principles of sustainable development;
- simplifying the planning approval process with respect to greenhouse gas sequestration operations;
- ensuring that economic, public health and environmental impacts are considered in planning for, and the authorisation, operation and decommissioning of, greenhouse gas sequestration operations; and

[93] Victorian Hansard, Greenhouse Gas Geological Sequestration Bill, The Hon Peter Batchelor, Second Reading, 11 September 2008, p. 3672.
[94] *Greenhouse Gas Geological Sequestration Act* 2008, s 1.

- enabling the Crown to assume responsibility for ongoing monitoring and verification of an underground geological storage formation that has been used to permanently store a greenhouse gas substance following the surrender or cancellation of an injection and monitoring licence. [95]

It is worth recounting that the objectives of that Act seek to correct the market failures identified in section 1.2 above, that is, to provide commercial and procedural certainty, minimising social and environment impacts, and clarifying rights and responsibilities.

2.3.2 Primary Objectives of the proposed Regulations

The proposed Regulations support the administration and implementation of the Act by:

- ensuring that the risks involved in undertaking exploration or injection operations are identified and minimised so far as is practicable;

- creating administrative certainty and equitable processes, e.g., the requirement for the holder of authorisations to provide certain information when developing various plans requiring approval prior to activity commencing;

- creating a requirement to provide certain information with respect to Victoria's geological structures, e.g., businesses are required to provide certain geological data to the Minister. The proposed Regulations will also specify that certain information will be held on a public register;

- setting the fees, consistent with the principles of economic efficiency and equity, with respect to applying for and altering authorities, paying annual fees, and inspecting publicly held information; and

- providing a mechanism by which rent is to be determined where charged for the ongoing occupation of Crown land.

At a broader level, the overarching objective of the proposed Regulations is to contribute to the Government's objectives of mitigating the impacts of climate change, consistent with and reflecting the objectives of the Act.

2.4 Authorising Provision

The proposed Regulations are made under section 303 of the Act, which provides the ability to make regulations for any matter or thing required or permitted by the Act to be prescribed or necessary to be prescribed to give effect to the Act.

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[95] *Greenhouse Gas Geological Sequestration Act 2008*, s 7.

3. OPTIONS TO ACHIEVE THE OBJECTIVES

3.1 Regulatory and Non-regulatory Options

The *Subordinate Legislation Act 1994* requires that a RIS must assess the costs and benefits of the proposed Regulations. This Act also requires that a RIS identify practical alternatives to the proposed Regulations and assess the costs and benefits of these alternatives compared to the proposed Regulations. The RIS is not required to identify alternatives that are not practicable or feasible. This section describes the viable non-regulatory and regulatory options for achieving the objectives set out in section 2.

The scope of consideration of regulatory and non-regulatory options is limited because of the existing powers of the Act and the limited focus of the proposed Regulations. Nevertheless, the following were considered: developing existing legislation, project specific regulation, the proposed Regulations, and variations to proposed Regulations.

A common error in the RIS process in identifying options is to assume that the regulations are the only viable option because they 'give effect' or 'operationalise' key elements of the Act. On occasion, these suppositions should be avoided, however, as clause 2.04 of the *Subordinate Legislation Act 1994* Guidelines (the Premier's Guidelines) demonstrates, when the Act requires that a thing or matter be prescribed in regulations, then it must be provided in the Regulations;

> …where the authorising Act dictates the form of subordinate legislation required, for example, where the authorising legislation provides for fees to be prescribed by statutory rule, *there is no discretion* to set those fees by another method.[96] (emphasis added)

The Act often requires further detail to be prescribed in the regulations. For example, section 38(d) of the Act requires a monitoring and verification plan that forms part of an injection testing plan be prepared in accordance with the regulations.[97] Thus, in the absence of proposed Regulations the Act would still allow injection testing plans and injection and monitoring plans to be developed but with less detail as to the required content. The narrow framework of the Act narrows the focus of the proposed Regulations and the range of viable alternatives to making the proposed Regulations and its content.

Broadly, measures should be assessed against the COAG Complementarity Principles when considering options to mitigate climate change to determine whether the measures complement emissions trading.[98] These principles seek to ensure that non-CPRS policy responses do not result in duplication and costly impositions on the community. The measures covered by the proposed Regulations

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[96] *Subordinate Legislation Act 1994* Guidelines, Revised 2007, Section 2.04.

[97] Similarly, section 94 of the *Greenhouse Gas Geological Sequestration Act 2008* contains thirteen subsections, eleven of which prescribe information in the Act and two are prescribed by the regulations.

[98] COAG Principles for Jurisdictions to Review and Streamline their Existing Climate Change Mitigation Measures: http://www.coag.gov.au/coag_meeting_outcomes/2008-11-29/docs/20081129_complementarity_principles.pdf

(and the Act) deal with a sub-set of market failures that are not addressed by the CPRS. The CPRS principally seeks to correct an externality by internalising the costs of pollution into the price of carbon.

At the level of CS, government intervention aims to correct market failures by –

- creating commercial certainty by establishing a framework of property rights and dealing with long term liability;
- addressing first mover risks. The Victorian Government is also addressing this through direct funding, e.g., support of the Otway Trial project; and
- addressing information asymmetries.

The proposed Regulations also help to ensure that the environmental, health and safety hazards and risks are eliminated or minimised, a situation which the market, if left to its own accord, may not deliver.

Although the viability of commercial CS operations may depend on a price being set through a CPRS, to capture the external costs of carbon.[99] it is submitted that the proposed Regulations are consistent with the COAG Complementarity Principles because the costs and benefits of CS are largely independent of a CPRS.

The *Subordinate Legislation Act 1994* also requires that other regulatory options are considered in a RIS.

Self-Regulation

Two advantages of self-regulation are -
a) promoting continuous improvement of the industry; and
b) promoting greater industry stewardship.

Self-regulation allows industry to respond to and address emerging needs in the manner that the industry thinks most appropriate. It provides a flexible regulatory environment that encourages industry participation where industry can continuously evolve and adopt new innovations and technology and strive to meet the highest standards of practice. In addition, the costs to industry of this option are likely to be lower than a regulatory approach.

However, environmental and public heath risks may not be adequately managed under self-regulation. Although environmental and public health risks associated with CS activities are understood to be low, if the process is not administered appropriately and consistently, the consequences and costs imposed on the wider community as a result of an adverse event occurring could be high. Self-regulation may be an inappropriate response in such situations. There may also be reduced community confidence in the efficacy of industry self-regulation to mitigate the potential risks borne by the community. This could result in public opinion forming barriers to CCS investments and operations.

[99] ibid.

If information related to CS activities was not made publicly available as required under the proposed Regulations (via a publicly available register), public access to information may be restricted. This, too, could reduce public confidence and form a barrier to CS operations being pursued.

Finally, self-regulation would be inconsistent with the MCMPR Guiding Principles and the approaches adopted by other Australian jurisdictions. Victorian CCS operators would be regulated differently to their inter-state counterparts leading to a greater risk of inconsistent regulation of CCS operations across Australia. It is for these reasons that a self-regulation approach is considered to be impractical and ineffective and would not satisfactorily meet the Government's objectives.

The section below briefly describes the viable options identified in this RIS. The costs and benefits of these options are analysed in Section 4. Options for fees in the proposed Regulations are discussed in section 4A.

3.1.1 Option 1 – Proposed Regulations

A statutory rule - also known as regulations or subordinate legislation - is a regulatory vehicle used by governments to give effect to primary legislation. Statutory rules can be an effective policy tool and can be used by government to achieve a range of policy objectives including:

- preventing or reducing activity which is harmful to business, the environment or to other people; and
- defining rights, entitlements or obligations.

The *Subordinate Legislation Act 1994* Guidelines (the Premier's Guidelines) provides guidance regarding the matters suitable for inclusion in statutory rules.

These include matters relating to:

- detailed implementation of policy, general principles and standards;
- prescribing fees to be paid for various services and prescribing forms if necessary; and
- prescribing processes for the enforcement of legal rights and obligations.

As mentioned above, the proposed Regulations prescribe the information to be included in planning for CS operations, data gathering and reporting requirements and fees.

Regulations 5, 6, 8, 9, 11, 18 to 23 relate to the information required to be included in various plans (which are required under the Act). The types of information include characteristics of the geological formation into which a liquid or gas is proposed to be injected, mitigation and monitoring strategies. Regulations 7, 10, 39 and 40 specify time periods. Regulations 13, 16, 17, 25, 26 and 41 relate to reporting certain information to the Minister. Regulations 28 to 30 deal with the register of pecuniary interests. Regulations 31 to 38 set fees. (Attachment A of this

RIS contains a detailed description of the proposed Regulations and notes the implications if they were not made.)

3.1.2 Option 1A: Variation of the Proposed Regulations

As discussed above, the narrow scope of the proposed Regulations limit the number of alternatives. They do not alter the scope or extent of the Act. For example, the Regulations prescribe a particular time period of 30 days before an authority holder can make a compensation claim to the Victorian Civil and Administrative Tribunal[100] and the information required for a risk management plan under an injection testing plan.[101] Fee amounts are also prescribed, for when a potential industry participant makes an application and renews or transfers a permit or licence.[102]

The greatest benefit in improving the efficiency and effectiveness of the proposed Regulations may therefore be to vary the type of information and level of detail prescribed, the frequency and time period of reporting, and other details that can be varied. For example, an authority holder could be required to physically provide the government with samples and raw technical data rather than to provide them electronically, require quarterly reports rather than annual reports, or to require a more prescriptive approach rather than general information obligations.

The advantage of requiring more information, more frequently, is that government will receive comprehensive data in a timely fashion. However, with each incremental increase in the requirements imposed on industry, increasing costs will be imposed on industry and the marginal benefit of the additional or timely information may decrease.

The proposed Regulations seek a balance between ensuring that the Victorian Government's objectives are met by the least cost, and the most effective method. Stakeholder input and comment is important to make sure that the proposed Regulations strike this balance.

3.1.3 Option 2 – Develop Current Legislation/Regulations

The Otway Trial project is Australia's first demonstration of the injection and underground geological storage of CO_2. The project is being undertaken by the CO2CRC in south-western Victoria and is being regulated under existing Victorian planning, environment, petroleum and water law.[103] It took over two years to obtain all the regulatory approvals for this project.[104]

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[100] Greenhouse Gas Geological Sequestration Regulations 2009 (draft), r39.
[101] Ibid, r 6.
[102] Ibid, r 31-38.
[103] *Petroleum Act 1998*, *Environment Protection Act 1970*, *Water Act 1970*, *Planning and Environment Act 1987.*
[104] Sharma, S., *et al*, 2008, *The CO2CRC Otway Project: Overcoming Challenges from Planning to Execution of Australia's first CCS project*, The Cooperative Research Centre for Greenhouse Gas Technologies, Canberra, ACT 2601, Australia, no pagination: Energy Procedia 00 (2008) 000–000: www.elsevier.com

However, it is noted that this existing legislation was not designed to address the unique issues raised by CCS activities, such as the potential migration of the injected GHG substances, the management of long-term liabilities and monitoring and verification requirements associated with the permanent underground geological storage of GHG substances. New legislation was therefore considered appropriate.

3.1.5 Option 3 – Project Specific Regulation

An alternative approach to the proposed Regulations could be to adopt project specific regulations. For example, the Act could be relied upon to provide the general regulatory framework for CO_2 storage operations, but the proposed Regulations could be tailored on a case-by-case basis taking into account local conditions or other matters. This approach was used by Western Australia, which passed project specific legislation in 2003 to establish a regulatory framework for all stages of the Gorgon gas processing and infrastructure project being undertaken on Barrow Island, including injection and storage of CO_2.

3.2 Arrangements in other Jurisdictions

The MCMPR Guiding Principles recommend that existing legislation be amended or regulations be added to regulate CCS in Australia.

Consistent with the MCMPR Guiding Principles, the federal, state and territory Governments are developing regulatory frameworks for CS by amending current legislation, where possible, or enacting new stand-alone legislation. South Australia has amended its *Petroleum Act 1998* to accommodate for the transport and storage stages of CCS, while Western Australia has specific legislation for the Barrow Island project. New South Wales and Western Australia are both in the process of developing a comprehensive legislative framework for CS activities. And, in February 2009, the Queensland Government passed its *Greenhouse Gas Storage Act 2009* that is very closely modelled on Victoria's legislation.

The Australian Government also recently passed legislation developing a similar system of CS titles by amending its offshore petroleum legislation. The *Offshore Petroleum and Greenhouse Gas Storage Act 2008* (Cth) was passed in November 2008. This Act applies to offshore waters under Australian Government jurisdiction, (i.e., more than three nautical miles from the coast). On 27 March 2009, the Commonwealth Government released ten offshore areas for the exploration of CS sites. The Commonwealth Government will now develop regulations and guidelines to support the release. Applications will close two months after regulations have been made. Notably, the approach adopted in Victoria's legislation does not differ substantively from the Commonwealth's approach in terms of required monitoring, approvals processes and access rights.

The proposed Regulations have been developed against the nationally endorsed MCMPR Australian Regulatory Guiding Principles for Carbon Dioxide Capture and Geological Storage. Victoria has worked closely with other jurisdictions to ensure consistency with these Guiding Principles. The proposed Regulations have also been drafted to ensure that regulatory burden is minimised. It is considered

that the proposed Regulations are no more onerous than those being developed in other jurisdictions.

At the international level, given that CCS is in its infancy, most operations are currently being conducted by modifying existing regulatory frameworks. The International Risk Governance Council (IRGC) examined the regulatory frameworks associated with CCS and found that they:

> … will probably build upon existing laws and be governed by existing institutions, but existing regulatory systems are not yet suited to addressing some of the special issues that arise in CO_2 storage, such as the need for thorough site characterisation, careful monitoring and long-term stewardship. The current status of CCS regulation varies significantly across the world.[105]

The IRGC further opined that CCS regulation:

> …must evolve as scientific and technical knowledge expands. An evolutionary regulatory process is required because full-scale CCS projects are urgently needed (and must be regulated), but key uncertainties prevent design and implementation of a comprehensive regulatory framework at this time [2008]. The first stage, essentially underway, will consist of several dozen full-scale CCS projects worldwide, operated under existing regulations modified to account for specific features of CCS. The second stage in the evolution of CCS regulation will use data from these early projects to design general CCS regulations to manage widespread commercial deployment.[106]

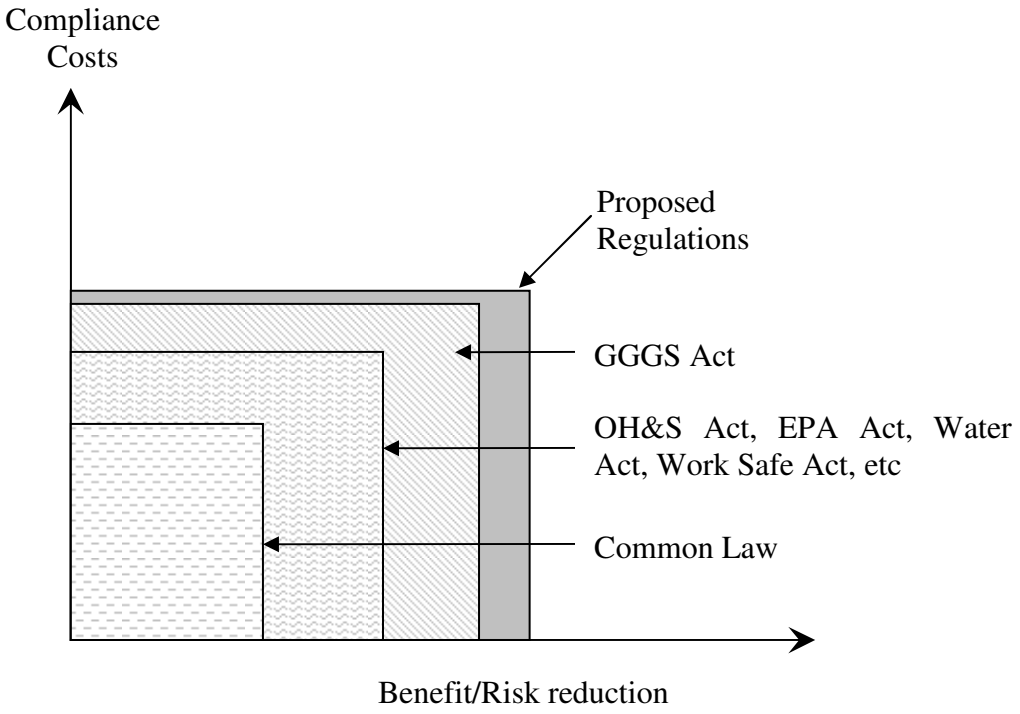
[105] International Risk Governance Council, 2008, *Policy Brief: Regulation of Carbon Capture and Storage*, p. 15: http://www.irgc.org/IMG/pdf/Policy_Brief_CCS.pdf [emphasis added].
[106] ibid.

4. COSTS AND BENEFITS OF THE OPTIONS

4.1 Base Case

The 'base case' describes the current legislative and regulatory position in place in the absence of the proposed Regulations. It is necessary to establish this position in order to make a considered assessment of the incremental costs and benefits of the proposed Regulations. In broad terms, the base case is represented by those laws and regulations currently in place, which may cover activities dealt with by the proposed Regulations. The figure below illustrates the 'base case', and the additional requirements imposed by the proposed Regulations. The 'base case' is represented by the lightly shaded area.

Figure 3: Base Case and Incremental Cost/Benefits



Each component of the regulatory framework seeks to achieve some benefit, although involves certain costs. In total, and incrementally, it is intended that the benefits outweigh the costs. While the proposed Regulations impose compliance and financial costs, they build on the current regulatory framework and seek to deliver benefits by reducing risks and contributing to the government's objectives. (Note the above figure is illustrative only and does not represent any relative scale.)

In the absence of the proposed Regulations, the Act would continue to apply, along with supporting legislation such as the *Environment Protection Act 1970* and the *Water Act 1989*. The base case would therefore be represented by the situation in which licences could be granted for CCS activities but where:

- certain information requirements (i.e., risk management and monitoring and verification plans) would not be prescribed within injection testing plans and injection and monitoring plans (although these plans would still be produced under requirements of the Act);
- time frames for reporting serious incidents would not be prescribed;
- the information to be included in an environment management plan would not be prescribed (although presumably an environment management plan could still be required to be prepared by virtue of section 209 of the Act);
- a consistent mechanism by which rent would be determined would not be prescribed;
- licence holders would not be required to submit an annual operations report; and
- fees under the Act would not be prescribed.

The base case also recognises that the introduction of a national CPRS in Australia will encourage CS activities and that, unless other legislation is introduced, CS would only occur under the Act and other relevant existing legislation.

As discussed below, the extent to which the proposed Regulations add to either compliance costs or benefits are difficult to estimate. For example, while some of the Regulations set out certain information that needs to be included in plans, the plans themselves are already required under the Act and it may have been the case that the information required by the Regulations would have been included in the plans anyway. Indeed, it may be the case that licence proponents would have provided more information than that required in the Regulations, suggesting that the Regulations may in fact reduce costs in preparing these plans by listing the information required.

For the purposes of this RIS, it is assumed that, in the absence of the Regulations, the required information would not have been included whilst acknowledging that this then potentially overstates the impact of the proposed Regulations.

4.2 Methodology

4.2.1 Cost Estimate Issues

The costing of the proposed Regulations posed a number of challenges. Given that the proposal is new, it proved extremely difficult to estimate the take-up rate and timing of stages of various operations. Specifically, the issues associated with the estimated costs include:

1. **New regulatory regime** – The proposed Regulations are new and estimates based on previous experience cannot be made. That said, the plans and reporting activities largely draw upon similar requirements in the petroleum and geothermal energy resources regulations. Special acknowledgement is made to the CO2CRC's CS project in the Otway Basin, which provided guidance on the timing, frequency and number of hours attached to the preparation of plans and associated with other requirements.

2. **Number of authority holders** – There is no way of predicting the number of authorities that will be issued during the life of the proposed Regulations,[107] or the time at which during their life licences will be issued, a complete measure of costs is difficult ex ante.

3. **Timing difficulties –** Given external factors such as delays in the introduction of the CPRS, global economic conditions, and decisions made by power generators, it is extremely difficult to estimate the number and timing of CS activities that may be undertaken relevant to the proposed Regulations. For example, advice provided to DPI suggested that while exploration activities may occur over the next 5 to 10 next years (i.e., the life of the proposed regulations is 10 years), there is no way of predicting whether large-scale, commercial injection operations will occur within this period.

4. **Business as usual case** – the proposed Regulations seek to manage operational and environmental risks and require plans and documentation to demonstrate how the authority holders will manage these risks. Capital providers and in particular insurance providers also place similar requirements on authority holders. In practice, such plans could also serve many of the requirements under the proposed Regulations. In order to provide conservative estimates, no allowance or attributions for this have been made to the calculations.

[107] By comparison, 23 geothermal exploration permits, covering 72 per cent of Victoria (162,000km^2) have been granted since the introduction of the *Geothermal Energy Resources Act 2005*. To date the majority of the work undertaken has been desktop studies and non-invasive petrophysical surveys. The potential for geothermal resources is significantly higher than that for underground carbon storage formations and the costs associated with exploration and commercialisation significantly lower.

5. **Attribution to the Act** – A number of the requirements are established by the Act. The proposed Regulations simply prescribe elements of these obligations. Arguably, a proportion of these costs could be attributed to the Act rather than assuming that they solely derive from the regulations. Again, in order to provide conservative estimates, no allowance or attribution to the Act for this have been made. It is also worth re-iterating that the proposed Regulations have a narrow focus and the vast majority of costs (and benefits) are attributable to the Act and other parts of the regulatory regime. For example, third party consultation costs, where they occur would be attributable to the Act rather than the regulations.

6. **Jurisdiction issues** – there appears to be very promising geological features suitable for CS in the Gippsland basin. However, any such storage that occurs more than three nautical miles from Victoria's coast would be covered by the Commonwealth regulatory regime. Therefore, were injection and storage operations to occur within the next 10 years, it is possible that these activities would be covered by the Commonwealth regulations, and not the proposed Regulations.

Given the uncertainties and variables mentioned above, to ensure a conservative estimate it has been assumed that all stages of carbon storage operations will occur within a 10-year period. Further, no allocation is made to take 'business as usual costs' (i.e., costs companies would have incurred to manage environmental and operation risks regardless of the regulations) into account or attributing some of the specific costs to the Act.

These estimated costs are also not sensitive to prescribed frequency of reporting (as opposed to incident reporting) because only one regulation (Regulation 26) requires periodic reporting and these costs are not large compared with other costs.

4.2.2 Discounted Cash Flow

Every effort has been made to identify and quantify the costs and benefits imposed by the proposed Regulations. As far as possible, likely costs were identified and a Present Value of the costs was calculated. A discount rate of 3.5 per cent was used over a 10-year period (i.e., the life of regulations in Victoria).[108] This allows future costs and benefits to be examined in terms of today's dollar value of costs and benefits. Assumptions underlying these calculations are contained in Attachment F

4.2.3 Standard Cost Model Methodology

By their nature, regulations are designed to modify behaviour in order to achieve certain outcomes. This can impose costs on individuals or businesses known as 'compliance costs'. In simple terms, compliance costs are the costs of complying with regulations. In the context of the Standard Cost Model (SCM), these can be

[108] DTF, 2007, ibid., p. C-9.

divided into 'administrative costs' and 'substantive compliance costs'.[109] It is important to note that only 'administrative costs' are measured by the SCM. [110]

4.2.4 Multi-criteria Analysis

The benefits specific to the proposed Regulations proved difficult to quantify in monetary terms. Multi-criteria Analysis (MCA) is presented in this RIS as an alternative assessment tool to complement the quantitative analysis. The MCA approach is described in parts 5–18 of the *Victorian Guide to Regulation.* This approach is useful where it is not possible to quantify and assign monetary values to the impacts of a proposed measure (e.g., measures that have social impacts). Furthermore, it represents a convenient way of comparing a range of alternative approaches.

This technique requires judgements about how proposals will contribute to a series of criteria that are chosen to reflect the benefits and costs associated with the proposals. A qualitative score is assigned, depending on the impact of the proposal on each of the criterion weightings assigned to each of the criteria, reflecting their relative importance in the policy decision-making process, and an overall score can be derived by multiplying the score assigned to each measure by its weighting and summing the result. If a number of options are being compared, then the option with the highest score would represent the preferred approach.

Four criteria were chosen and weightings selected. The first two criteria were chosen to reflect the objectives set out above. The third and fourth criteria are used to assess the costs and effectiveness of the regulatory approach. The criteria are described in Table 2 below.

[109] DTF, 2007, ibid., p. F-7.
[110] Standard Cost Model Formula: Administrative Cost = (tariff x time) x (population x frequency).

Table 2: Multi-criteria Analysis Criteria

Criterion	Description of criterion	Weighting
Facilitate CCS activities	This criterion reflects the primary objective to reduce economic risks (including addressing information gaps) that may prevent CCS activities.	30
Manage social and environmental risks	This criterion reflects the primary objective to manage the risks to the community and the environment associated with CCS activities. It is given equal weight as the first criterion.	30
Cost minimisation	This criterion relates to ensuring that the costs imposed on licensees of any regulatory measure are kept to a minimum. Given the Victorian Government's objective to reduce the regulatory burden, this criterion is assigned a weighting of 20.	20
Effectiveness	This criterion refers to the likely efficacy and practicality[111] of the regulatory instrument. This criterion also captures cost-effectiveness in relation to Government administration of the instrument. A proposal may have merit, however the delivery mechanism must be efficacious, and hence a weighting of 20 is assigned to this criterion.	20

For the purposes of an MCA assessment, an assigned score of zero (0) represents the 'base case', while a score of plus one hundred (+100) means that the alternative fully achieves the objectives. A score of minus one hundred (–100) means that the proposal does not achieve any of the objectives.

4.3 Costs and Benefits of Options

4.3.1 Option 1 – Proposed Regulation

Each of the proposed Regulations was examined for the likely costs they would impose on parties impacted by the proposal. It is assessed that there are no costs associated with the machinery regulations (Regulations 1 to 4 and 27). Regulations 7, 10, 39 and 40 set time periods for the operation of licences and for appeals to

[111] Section 10(1)(c) of the *Subordinate Legislation Act 1994* states that a RIS must examine 'practicable means of achieving those objectives'. While this legislation and the *Subordinate Legislation Act 1994* Guidelines do not define 'practicable' the Oxford English Dictionary defines it as, "1. Able to be put into practice; able to be effected, accomplished or done; feasible".

tribunals, which notionally may impose some time value of money costs. Given the difficulty in estimating these costs, these are noted rather than calculated.[112]

Regulations 27 to 30 deal with pecuniary interest statements and only affect public servants who administer the Act. The government cost associated with administering this register is likely to be negligible. While these regulations serve an important probity function, there are similar registers in relation to the petroleum and geothermal energy resources legislation and, to date, there have been no pecuniary interest disclosures in relation to these industries.

The remaining regulations deal with information obligations (i.e., preparation of plans, reporting requirements, keeping of records and samples) and imposing administrative costs. While a complete measurement of administrative costs was not undertaken for this RIS (see section 6A), the SCM methodology was used to calculate the indicative administrative costs on business associated with each of the regulations for a single business.[113]

The Table below shows that the possible costs over a 10-year period are approximately **$609,000** (PV), or an annualised cost of around $61,000 (PV). These cost estimates were informed by expert advice from the project manager from the CO2CRC Otway Trial Project and from discussions with geothermal operators. The costs in this RIS may also change depending on the frequency of reporting, for example, if annual reporting changes to quarterly or bi-annual reporting.

These costs are relatively minor because the proposed Regulations build on elements that are contained in the Act. For example, most of the information to be contained in an injection and monitoring plan is contained in the Act. It should also be noted that these costs are calculated on the basis of a single operation, and to the extent that there is more than one operation these costs would vary in that proportion. The time at which these activities occur during the life of the Regulations also affects the total cost. Costs associated with activities such as Special Access Authorisations, Special Access Well Plans and reporting of serious situations may also not be required for some operations. Attachment F contains details of the costings in Table 3 below.

[112] Regulation 39, for example, prescribes the time period of 30 days before a holder of a resource authority can make an application for compensation to VCAT. The notional cost of this regulation would be the 30 day time value of money of compensation, if any is determined.

[113] This RIS uses the Standard Cost Model methodology but has not undertaken the usual five interviews with business to assess the costs, as provided in the *Measurement of Changes in Administrative Burden* in the *Victorian Guide to Regulation*.

Table 3: Costs Imposed by the Proposed Regulations on Business, 10-Year Assessment Period

Regulation	Description of Regulation	Cost ($)
5, 6	Injection testing plan	58,794
8, 9	Injection and monitoring plan	47,829
11	Special access authority – special access well plan	25,618
13	Reporting of serious situations	52,717
14	Operation plan to include provision for review	75,102
16, 17	Reporting arrangements - Underground geological storage, information, samples and records	11,090
18–23	Operation Plan must include an Environment Management Plan	177,193
24–25	Operator to provide information about wells made under certain authorities and to provide survey information to Minister	16,869
26	Periodic overview of CS operations	126,521
41	Information from petroleum operators	17,319
Total		**609,054**

The Act provides that, if rent payable for the ongoing occupancy of Crown land is not specified in an authority, the amount payable will that required by the regulations.

Regulation 15 specifies a methodology for determining rent payable in this situation. While operation of the Regulation may ultimately have a financial impact for the users of the land, it has not been costed in this RIS, for the following reasons:

- The obligation to pay rent is imposed by the Act. Regulation 15 merely identifies a methodology for determining rent, and only in the case where the rent is not otherwise specified in an authority. It is uncertain whether this Regulation will be used over the life of the regulations. The amount of rent charged would vary in each case and is unknown at this time.
- As the specified methodology employs the concept of current market value, any cost of the rent is matched by the benefit of the use of the land. There is therefore no net cost to the community.

Indicative Cost of Fees For An Authority Holder

Fees are discussed in section 4A below and detailed calculations are shown in Attachment E. It is important to realise that fees are not imposed by the proposed Regulations – fee levels are simply prescribed. Fees are imposed by the Act. For illustrative purposes, however, an authority holder undertaking exploration and injection activities could be expected to pay fees in the order of $70,000 over a 10-

year period.[114] However, fees are not included as an overall cost to the community, as the fee paid is matched by the service provided (where full cost recovery occurs).

Government Costs

The Victorian Government will incur notional costs associated with administrating and processing licences and permits; such notional costs proved difficult to quantify given that the proposed Regulations are new. Moreover, this RIS submits that, in practical terms, there will be no net cost for government.

This position is founded on two points. First, the frequency and number of licences and permits to be processed is likely to be low over the first 10 years. Second, to the extent that processing and administrative costs do occur, these are fully recovered by the cost of the fees (i.e., no net cost is imposed on the government). That said, notional costs will be incurred in proportion to the number of licences and permits issued. DPI also advises that based on experience gained from administration of the geothermal energy resources legislation and regulations, one addition staff member at the VPS5 level may be required. While these activities primarily relate to the Act rather than the proposed Regulations, a cost of around $150,000 per annum could be incurred.[115]

Finally, it is noted that the costs associated with pecuniary interests under the proposed Regulations are expected to be negligible, given that no reports have been made under similar regimes for larger segments of the resources sector.

Community Costs – Amenity

In most cases, exploration and other survey activities are generally of a temporary nature and will have a small impact on environmental amenity. However, it is acknowledged that there may be some loss of amenity in localised areas associated with surface works such as drilling rigs, increased heavy traffic or infrastructure associated with injection of GHG. That said, works associated with such activities are not generally extensive, nor are they expected to cause significant noise or other nuisance. Once the infrastructure is in place any such loss of amenity is more likely to be associated with aesthetics.

The Act requires an authority holder not to unduly interfere with the activities of other persons using the land and is required to rehabilitate any land used for the operation when no longer required. The Act requires compensation to be paid to landholders for any loss or damage sustained as a result of CS activities on that land.

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[114] The cost of fees is based on a fee for an application for an exploration permit ($4,667), five annual renewals fees for an exploration permit ($23,333), an application fee for an injection and monitoring licence ($11,691), five annual renewals fees for the injection and monitoring licence ($32,245), and an application for a special access licence ($471). Given the illustrative nature of this example, these costs have not been discounted. See Attachment E for the derivation of the fee levels.

[115] That is, a VPS5 salary of $88,777 (rate at 1 July 2009) multiplied by the VCEC gross-up factor of 1.75, which provides of cost of $149,359.

Benefits of the Proposed Regulations

At a higher level, the benefits of the proposed Regulations will reflect the benefits of the Act to the extent that they contribute to the effectiveness of the legislation. For illustrative purposes only the magnitude of the likely benefits may be gauged by quantifying the external cost of carbon, which captures the economic costs associated with climate change. Estimates of this cost vary considerably, however the *Stern Review: The Economics of Climate Change* suggested that an economic cost of carbon in the order of $US85 would be reasonable.[116]

As a broad measure of these benefits (or avoided costs), a break-even point would suggest that if around 5,850 tonnes of carbon were stored via a CCS operation, this would be the equivalent to the annual costs of the proposed Regulations. To put this figure in perspective, CS in Victoria has potential capacity for billions of tonnes of carbon. It is emphasised once again that the proposed Regulations form only a small dimension of the overall regulatory framework for CCS operations and therefore the benefits attributable to the proposed Regulations is small.

While it is acknowledged that most benefits from CCS will derive from the legislation, the Act's operation should assist Victoria in mitigating the negative environmental effects of climate change, while ensuring that Victoria's competitiveness is not eroded when a CPRS is introduced.

The benefits specific to the proposed Regulations are limited to the extent that they contribute to the regulatory controls for managing the risks associated with CS. These also include lowering search costs for applicants and authority holders (by specifying requirements) and providing greater certainty and clarity, thus making compliance easier and lowering government enforcement costs.

The proposed Regulations will provide a framework to ensure appropriate processes and transparency, to provide greater transparency and public confidence for CS operations. A barrier to the success to these projects is not technology, but it could in fact be society's reaction to this new technology. Community acceptance will mean that CS projects can progress, but community rejection of the projects will mean the technology will not be implemented.[117]

Overall, given the specific focus and nature of the proposed Regulations, the scale of these benefits is likely to be limited. Nonetheless, the direct and indirect use benefits from CS operations (by mitigating the effects of climate change) are likely to be substantial.

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[116] HM Treasury, *The Stern Review: Final Report*, p. xvi: http://www.hm-treasury.gov.uk/

[117] Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC), Community consultation: http://www.co2crc.com.au/otway/community.html

Multi-criteria Analysis (MCA)

Given the difficulty in providing a monetary estimate of the likely benefits, to assist in the assessment of the proposed Regulations and to provide a comparison with other options, an MCA assessment was undertaken. The proposed Regulations seek to achieve the government's objectives by managing the risks associated with CS operations. These risks relate to managing economic risks to facilitate CS activities (e.g., creating commercial and administrative certainty), social risks (e.g., providing the community with confidence that they are safe), and environmental risks.

The proposed Regulations provide certainty of the regulatory environment, and facilitate the transfer of information that can reduce risks for CS activities. However, the Regulations only do this to a limited extent; economic risks still remain, and the information gathered is not as complete as a more onerous regulatory regime might achieve. Therefore, this option is scored 50 on the facilitation criterion.

The proposed Regulations are fairly detailed in requiring licence holders to develop plans that identify and mitigate risks to the community and the environment, and on reporting information on activities and incidents. In combination, they are an important element in reducing these risks, although arguably more prescriptive and onerous regulations would have potential to reduce these risks further. Therefore, this option is scored 75 against the risk mitigation criterion.

The proposed Regulations will impose compliance costs on licence and permit holders. While these groups of course benefit from these activities, the costs imposed by the proposed Regulations are assumed greater than in the base case. Therefore, a score of -10 is assigned to this criterion related to the imposition of costs on stakeholders.

The proposed Regulations place the obligation on licence holders to develop risk mitigation strategies that are then approved by the Minister when granting a licence. This is an effective solution to the problems outlined above and is likely to be more effective than other solutions (e.g., the government setting out the risk mitigation strategies). Therefore, a score of 75 is assigned to the effectiveness criterion. This results in a net score of +50.5.

Table 4: Multi-criteria Analysis Assessment (Option 1)

Criteria	Weighting	Assigned Score	Weighted Score
CCS facilitation	30	50	15.0
Social/environmental risk mitigation	30	75	22.5
Cost minimisation	20	-10	-2.0
Effectiveness	20	75	15.0
Total	**100**		**+50.5**

4.3.2 Options 1A – Variation of the proposed Regulations

In a number of cases, there are no practicable regulatory alternatives other than to alter the scope or extent of the proposed Regulations. It is not intended here to examine the costs and benefits of the large number of possible variations, however this RIS represents another step in the consultation process and DPI welcomes comments or suggestions with respect to the nature, extent, and likely impacts of the proposed Regulations, and any variations that may improve their overall quality.

In terms of any proposed variation, stakeholders may wish to consider whether prescribed details and setting broad standards is preferable. In this regard, regulations may take the form of prescriptive rules, which focus on the inputs, processes and procedures of a particular activity. One of the main advantages of prescriptive regulation is that it provides certainty and clarity. Setting out requirements in detail provides standardised solutions and facilitates straight-forward enforcement.[118] However, because of their inflexibility, prescriptive regulations may be unsuitable in certain situations, e.g., where circumstances are subject to change. Performance-based standards specify desired outcomes or objectives, but not the means by which these outcomes/objectives have to be met.

The main advantages that performance-based standards have over prescriptive regulation is the greater flexibility afforded to regulated parties in achieving the desired outcomes, and their ability to be used in situations where circumstances may change over time. Nevertheless, they do have some disadvantages. For example, the greater flexibility and freedom offered by performance-based regulations is often cited as a problem for those being regulated as it can lead to uncertainty as to whether the actions they undertake are sufficient to satisfy the standards set by the regulations.[119]

Related to this, performance-based standards may generate uncertainty because circumstances giving rise to prosecutions may be determined subjectively. This, in turn, may increase government enforcement costs because the interpretation of such standards may be challenged or determined in the court and tribunal system. For these reasons, this RIS suggests that given the specific nature of plans and reporting requirements, prescribed information provides greater certainty for permit and licence holders and is likely to be more efficiently administered by government than performance-standards.

Again, stakeholders may wish to consider the issues raised in the Executive Summary of this RIS in terms of considering any variations to the proposed Regulations. More broadly, other areas that stakeholders may wish to consider include:

- any way the plans can be streamlined;
- any practical difficulties associated with the proposed Regulations; and
- any unintended consequences associated with the proposed Regulations.

[118] DTF, 2007, ibid., p. 3-8.
[119] ibid., p. 3-9.

A performance-based approach could be considered a less onerous (in terms of specified requirements) option. Where the performance requirements are appropriately specified (to achieve the same expected outcome as Option 1), such an option would score the same as Option 1 on the two primary criteria – CCS facilitation and mitigation of risks. However, such an option would likely involve higher costs to businesses in developing different approaches to the required performance requirements, and potential disputes about whether requirements had been met (costs for business and government). While notionally equal in terms of effectiveness, the effectiveness score must reflect the increased risk of this approach, as outlined above. Therefore, it is scored 50 on this criterion. Overall, this option is scored +44.5.

Table 5: Multi-criteria Analysis Assessment (Option 1A)

Criteria	Weighting	Assigned Score	Weighted Score
CCS facilitation	30	50	15.0
Social/environmental risk mitigation	30	75	22.5
Cost minimisation	20	-15	-3.0
Effectiveness	20	50	10.0
Total	**100**		**+44.5**

4.3.2 Option 2 – Develop Current Legislation

Victoria currently has legislation applicable to certain aspects of CCS. However much of the existing legislation (not including the Act) has not been designed to address the unique issues raised by CCS activities, such as the potential migration of the injected GHG substances, the management of long-term liabilities and monitoring and verification requirements associated with the permanent underground geological storage of GHG substances.

CCS uses many of the technologies developed for and applied by the petroleum industry as part of exploring for oil and gas reserves and enhanced oil and gas recovery, such as resource conservation, groundwater protection, pipeline transportation and drilling activities.

However, CCS is also very different from petroleum operations in both purpose and effect. Petroleum operations are undertaken for the purpose of extracting oil and gas as efficiently as possible, minimising costs and maximising financial returns. In contrast, the purpose of CCS is to compress large volumes of CO_2 which is then injected into geological formations for the purpose of permanent storage, potentially for thousands of years, to mitigate against anthropogenic climate change.

Because of the permanent nature of CS, the regulation of it involves the consideration of unique legal issues not contemplated by petroleum legislation, such as potential migration of the injected CO_2 and long-term liabilities.

In addition, GHG storage formations are a new resource and should be treated as separate and distinct from petroleum and gas resources, which may be present in a potential storage formation.

In this context, stand-alone regulations rather than amendments to existing legislation clearly distinguish the injection and permanent storage of GHG substances from the injection of CO_2 for the purpose of enhanced oil recovery or enhanced gas recovery. The effect of this is to ensure consistency so that petroleum operators do not have a preference over other potential industry stakeholders to undertake injection operations by virtue of being able to undertake enhanced oil recovery as part of petroleum operations.

The complex regulatory arrangements required to enable the CO2CRC Otway Trial Project to inject GHG substances highlights the importance of developing a streamlined regulatory approach for onshore CS operations. To proceed, the project required employing several pieces of legislation in the areas of petroleum, planning, environment and water legislation. This took around two years to negotiate.

The CO2CRC Otway Trial Project highlights that the current legislative framework is inadequate for regulating CS because it requires compliance with a number of Acts which created regulatory uncertainty (particularly in relation to access to land and drilling of injection wells). The current framework also created duplication and confusion in the assessment and approvals process which caused delays and increased project costs. The key learnings from the CO2CRC Project are contained in Attachment C.

Consistent with this analysis, the IRGC noted that "the goal is to guard against becoming locked into a sub-optimal regulatory structure that was appropriate for early demonstration projects but is not conducive to widespread commercial deployment of CCS."[120]

This option is therefore scored only 20 in its ability to facilitate CS activities and mitigate associated risks. Additional costs (for businesses and government) would be required to navigate activities in the regulatory environment. Importantly, this approach would be expected to be much less effective in achieving the objectives than the other options. Given the scores for each criteria as outlined in the table below, this options is scored +13 overall.

Table 6: Multi-criteria Analysis Assessment (Option 2)

Criteria	Weighting	Assigned Score	Weighted Score
CCS facilitation	30	20	6
Social/environmental risk mitigation	30	20	6
Cost minimisation	20	-15	-3
Effectiveness	20	20	4
Total	**100**		**+13**

[120] IRGC, loc cit., p. 21.

4.3.4 Option 3 – Project-specific Regulation

Project-specific regulations could be developed for each tenement or geographical area. For example, the Act could be relied upon to provide the general regulatory framework for CS operations, but regulations could be tailored on a case-by-case basis taking into account local conditions or other matters. This approach was used in Western Australia, where project specific legislation was passed in 2003 to establish a regulatory framework for all aspects of the Gorgon gas processing and infrastructure project being undertaken on Barrow Island, including the injection and storage of CO_2.

A potential advantage of this approach is that regulations could be tailored to take special or local circumstances into account, as well as relevant information at the time. It should be noted, however, that this approach in practice is rarely used. Discussions revealed that the *Barrow Island Act 2003* (WA) was an expediency to fit into the tight timeframes associations with the Gorgon project and, had more time been available, this approach would not have been adopted.

Such an approach therefore could improve the ability to manage social and environmental risks associated with CS activities. While this approach may provide regulatory certainty commensurate with Option 1 for the particular CCS activity, there is substantially greater risk for potential projects in the way that undertaking the operations will rely on case-by-case negotiations with government. These additional risks may delay outcomes and act as a disincentive to CS activities overall.

The main disadvantages of project-specific regulation is that it can add to costs of operators with authorisations across multiple sites (e.g., in Victoria one operator has 12 geothermal exploration permits) possibly diluting national consistency benefits for investors, (e.g., risks are harder to assess and price where regulations differ per site). This approach would also fail to provide the certainty and consistency sought by industry and agreed by the MCMPR.

In addition, one authority holder might be able to negotiate more favourable regulatory conditions, raising possible capture issues and competition issues. This approach would be more costly for government to formulate and administer. Finally, flexibility features can be incorporated into statutory rules or authorities. This may take the form of attaching specific conditions to licences, while relying on the general provisions of a uniform regulatory regime.

The compliance costs of this option would be broadly similar to the proposed Regulations for a single site operator, higher for multiple site operators, and would impose higher costs on government given the complexity of administering multiple regulations. The scores for each of the criteria are outlined in the table below, giving an overall score of +38.5.

Table 7: Multi-criteria Analysis Assessment (Option 3)

Criteria	Weighting	Assigned Score	Weighted Score
CCS facilitation	30	30	9.0
Social/environmental risk mitigation	30	75	22.5
Cost minimisation	20	-15	-3.0
Effectiveness	20	50	10.0
Total	**100**		**+38.5**

4.4 Groups Affected

The proposed Regulations directly affect a narrow group of persons and organisations and indirectly affect the wider community. Authority holders, petroleum tenement holders, and landholders or occupiers of land on which exploration or drilling (and later injection operations) may occur are directly affected.

DPI and EPA[121] will be responsible for administering the regulations, monitoring and verifying activities and processing fees. They also have the responsibility of declaring any conflict of interests.

Indirectly, local communities surrounding operational areas may be affected, and more broadly, the general community should benefit from activities associated with mitigating the effects of climate change, and mitigating the health and environmental risks associated with exploration and operations.

[121] The EPA will assume responsibility for monitoring and verification activities four years after the Act comes into effect.

4A. FEES

4A.1 Principles of Fee Setting

In September 2007 the Victorian Government released its *Cost Recovery Guidelines: Incorporating the information formerly published in the Guidelines for Setting fees and User-Charges Imposed by Departments and Central Government Agencies*[122] (Cost Recovery Guidelines) to clarify its policy principles underpinning cost-recovery arrangements.

These Cost Recovery Guidelines establish a whole-of-government framework thereby ensuring that cost-recovery arrangements in Victoria are transparent, efficient, effective and consistent with legislative requirements and government policy. The Cost Recovery Guidelines are framed by the principle that properly designed cost-recovery arrangements can deliver both equity and efficiency benefits to the community. However, poorly designed arrangements may create inappropriate incentives, and could potentially undermine the achievement of other government objectives.

Cost-recovery may be defined as the recuperation of the costs of government-provided or government-funded products, services or activities that, at least in part, provide private benefits to individuals, entities or groups, or reflect the costs their actions impose. The *Cost Recovery Guidelines* apply to cost-recovery arrangements of government departments and general government agencies and include the recovery of the costs incurred by government in administering regulation (e.g. processing licences and, issuing of permits, etc).

The underlying principle of the *Cost Recovery Guidelines* is that agencies should set charges to recover all the costs of products or services where it is efficient and effective to do so, and where the beneficiaries are an identifiable group who capture the private benefits of the product or service.

If it is determined that full cost-recovery is inconsistent with other Victorian Government policy objectives, then it may not be appropriate to introduce a full cost-recovery regime. This may be based on an authority holder's capacity to pay the fees. Consideration could also be given to a regime of partial cost-recovery (if it can be demonstrated that a lower than full cost-recovery does not jeopardise other objectives), and to rely on other funding sources (e.g. general taxation) to finance the government activity.

4A.2 Discussion of Cost-Recovery Options

The *Subordinate Legislation Act 1994* Guidelines (the Premier's Guidelines) are made under section 26 of the *Subordinate Legislation Act 1994* and provide assistance in interpreting this legislation. Clause 2.04 of the Premier's Guidelines states that where the authorising Act dictates the form of subordinate legislation

[122] DTF, 2007b, ibid.

required, for example, where the authorising legislation provides for fees to be prescribed by statutory rule, *there is no discretion* to set those fees by another method.[123] This is relevant in relation to the assessment of proposed Regulations 34 to 38, which prescribe the fees for licences, permits and other matters. It is clear that the Act does not contemplate alternatives to prescribing fees under the proposed Regulations.

As stated above, the Victorian Government's general policy is that fees should be set on a full cost-recovery basis. The government however may choose to set fees at a partial or zero cost-recovery basis in special circumstances.[124]

The fees included in the Regulations were determined by considering the following three options:

- Option A – full cost-recovery (relevant fee based on 100 per cent of the average costs);
- Option B – partial cost-recovery (fees based on 50 per cent of average costs);
- Option C – zero cost–recovery (this option is similar to the 'base case' because if the proposed fee regulations are not made then no fees would be payable).

A Multi-criteria Analysis (MCA) was used to assess the preferred fee option in relation to CS licence and permit fees. Reflecting the Victorian Government's *Cost Recovery Guidelines*, the criteria used were:

- **Efficiency**. Full cost recovery should be implemented for efficiency reasons (i.e., the allocative efficiency of resources in the economy). This principle suggests that the prices of regulated products should incorporate all of the costs of bringing those products to market, including the administrative costs of regulation. This applies both where the regulation provides benefits to consumers and/or producers, and where it specifically addresses negative spillover effects that may occur (for example, regulation that decreases the risk of pollution). To the extent that cost recovery reduces the call on general taxation revenue, efficiency losses from higher general taxation are avoided.[125]
- **Effective**. Fees are considered effective where they are levied on an identifiable group and readily collected, and support (or do not undermine) the policy objectives. Where fees relate to the granting of licences, the identification of payer and the ability to collect is straightforward. Policy

[123] Subordinate Legislation Act 1994 Guidelines, Revised 2007, Section 2.04 [emphasis added]
[124] For example, it may wish to encourage the 'over consumption' of some goods such as art galleries by charging no fee (e.g. the Ian Potter Centre, National Gallery of Victoria) or it may choose to partially recover other fees (e.g., entry fees to museums or national parks). Partial cost-recovery may also be considered on equity grounds, for example, pensioner discounts or concessions for welfare recipients.
[125] Productivity Commission, 2001, *Cost Recovery by Government Agencies*, Report No 15, AusInfo, Canberra.

objectives may be undermined where the level of fees encourages non-compliance with the regulation (e.g. exploration without a licence) or where the level of fees makes activities uncommercial (not expected in this case).

- **Equitable**. Fees are equitable where they give consideration to the relative ability to pay of each party and whether the sharing of costs matches the sharing of benefits for the received services. Fees should also seek to achieve horizontal equity—agents in similar situations face the same fees.

Each of these criteria is important and need to be balanced in setting fees. For this MCA, the 'efficiency' criterion was assigned a weighting of 40 per cent reflecting its overall importance achieving the Government's policy objectives in relation to fee setting, while the 'equity' and 'effective' criteria were each assigned a weighting of 30 per cent.

4A.2.1 Option A – Full Cost-recovery

Efficiency

The *Cost Recovery Guidelines* state that the general government policy is that regulatory fees and user charges should be set on a full cost–recovery basis. In this case, full costs represent the value of all the resources used or consumed in the provision of licences and permits. A departure from full cost–recovery would result in the Victorian community providing a subsidy to CS operators. Given that full cost–recovery is the most economically efficient option for fee levels and fully achieves the government's objective on efficiency grounds, a maximum score of 100 is assigned to this criterion.

Effectiveness

In terms of 'effectiveness', it is noted that as fees relate to authorities, the group to which the fees will apply are easily identifiable and levied. Further, given the nature of the industry and relative cost of fees, it is unlikely that any businesses would not participate in the industry due to the level of the fees. It is also unlikely that there will be a high rate of non-compliance due to the fee level, although a small degree of non-compliance should be expected. Accordingly, this criterion is scored 90.

Equitable

While the broad objectives of the Act are to benefit the whole community, the fees relate to the granting of authorities specifically conferring benefits on individual authority holders, which have a private value. This value is in terms of their activities to undertake cost-effective GHG abatement and to realise value via the trading of emissions permits. Given the CPRS, fees charged on a less than full cost recovery basis would involve an effective subsidy from the community (i.e., the Victorian taxpayer), which would not be equitable from a community perspective. The industry participants have a high capacity to meet the cost of the fees. All businesses will face the same fee. Accordingly, a score of 80 is given for this criterion. This results in a net score of +91, as shown in Table 8.

Table 8: Multi-criteria Analysis Assessment of Option A

Criteria	Weighting	Assigned Score	Weighted Score
Efficient	40	100	40
Effective	30	90	27
Equitable	30	80	24
Total	**100**		**+91**

4A.2.2 Option B – Partial Cost-recovery

Efficiency

Partial cost recovery seeks to balance the efficiency criterion against the equity criterion where it is considered other parties should bear some of the costs and against the effectiveness criterion where lower fees may provide better support to the policy objectives.

The efficiency criterion is positive because authority holders would pay some contribution to the cost of administering the proposed Regulations. However, this departs from the Government's general policy of full cost–recovery and Victorian taxpayers would partly subsidise authority holders, thus a score of 50 is assigned.

Effectiveness

The effectiveness criterion receive scores of 95 because a lower rate of fees is likely to encourage less non-compliance compared to full cost recovery (noting that in both cases the level of non-compliance is expected to be very low).

Equitable

A common rationale for partial cost recovery is where the benefit of the service provided to an individual benefits the wider community. While such positive externalities are present in relation to the overarching activity of CS, in terms of reducing carbon emissions, the benefit of granting specific authorities has a mostly private value, as cost-effective GHG abatement actions are expected to be rewarded through the national CPRS scheme.

The community will 'pay' for lower carbon emissions by accepting the economic impacts of the introduction of the CPRS and should not further pay for activities to reduce carbon emissions in line with the CPRS targets. In this context, partial cost recovery for licences would involve subsidising authority holders, giving them an undue advantage in the market for GHG abatement. Accordingly, this criterion is scored only 20. This results in an MCA score of +54.5, as shown in Table 9.

Table 9: Multi-criteria Analysis Assessment of Option B

Criteria	Weighting	Assigned Score	Weighted Score
Efficient	40	50	20.0
Effective	30	95	28.5
Equitable	30	20	6.0
Total	**100**		**+54.5**

4A.2.3 Zero Cost Recovery - The 'Base Case'

If no fees were recovered this situation would be similar to the 'base case'. That is, if the regulations were not made then no fees would be prescribed. CCS operators do not fit the typical characteristics of a 'public good', such as a public park or educational facility. The benefits of an authority accrue to the authority holder and are 'excludable' from other members of society. Given that zero-cost recovery approximates the 'base case', scores of zero are assigned against the criteria, resulting in a net score of zero (Table 10).

Table 10: Multi-criteria Analysis Assessment of Option C

Criteria	Weighting	Assigned Score	Weighted Score
Efficient	40	0	0.0
Effective	30	0	0.0
Equitable	30	0	0.0
Total	**100**		**0.0**

4A.3 Assessment of Costs and Benefits

The MCA in Table 11 below shows that Fee Option A (full cost recovery) is the superior option. Principally, this is because it receives a higher score on efficiency and equity against other options (and broadly similar on effectiveness with Option B). CS operations will be conducted on a commercial basis and the financial benefits of holding will accrue to authority holders. Effectiveness in terms of compliance is also likely to be high given the relatively low level of the fees compared to other costs in the exploration and mining sectors. Similarly, equity considerations were not assessed as a significant factor given the relatively affordable levels of the fees.

Table 11: Summary of Multi-criteria Analysis of Fee Options

Regulatory Proposal	MCA Assessment
Option A: Full cost recovery	+91.0
Option B: Partial cost recovery	+54.5
Option C: Zero cost recovery	0.0

4A.4 Calculation of the Proposed Fees

The fees in the proposed Regulations were calculated on a full cost recovery basis in accordance with the *Cost Recovery Guidelines: Incorporating the information formerly published in the Guidelines for Setting fees and User-Charges Imposed by Departments and Central Government Agencies*[126] and informed by the Productivity Commission's *Cost Recovery by Government Agencies* report.[127]

It is noted that, if cost recovery is not linked to the supply of a particular activity and is undertaken merely to raise revenue, then it is likely to have more adverse effects on efficiency than those of funding through general taxation.

The tenure system established under the Act has yet to be used and the costs associated with its administration are unknown. However, the activities required to assess and administer the tenure system for CS are expected to be similar to those for the petroleum and geothermal industries. The activities in processing applications, licences, monitoring and transfers are expected to be very similar for the proposed Regulations, including comparable activities within the department. Therefore, the fees in Table 12 below are based on those provided in the Geothermal Energy Resources Regulations 2006 calculated on a full cost–recovery basis in relation to evaluating and processing authorities under the Act.

These costs are calculated on an activity-based 'bottom up' approach based on labour costs (including labour on-costs). Detailed cost calculations, including the number and time taken by VPS staff to process a licence, are contained in Attachment E. It is important to note that these costs do not include general costs of enforcement (i.e., inspecting well sites, conducting audits, etc) as these requirements are imposed by the Act rather than the proposed Regulations.

[126] Department of Treasury and Finance, 2007, Cost Recovery Guidelines: Incorporating the information formerly published in the Guidelines for Setting fees and User-Charges Imposed by Departments and Central Government Agencies, Melbourne.
[127] Productivity Commission, loc cit.

Table 12: Proposed Regulations – Fees

Regulation	Description of Fee	Indicative Cost ($)*	Fee Units
Exploration Permits			
31(1)	Fee for application for exploration permit	4,670	400
33	Fee for renewal of exploration permit	2,380	200
35(1)(a)	Annual fee for exploration permit	6,450	550
36(a)	Fee for transfer of exploration permit	4,670	400
32	Fee for late renewal of exploration permit	117/week	10/week
Retention Leases			
31(2)	Fee for application for retention lease	4,670	400
35(1)(b)	Annual fee for retention lease	6,450	550
36(b)	Fee for renewal of retention lease	2,380	200
36(c)	Fee for transfer of retention lease	4,670	400
34	Fee for late renewal of retention lease	117/week	10/week
Injection and Monitoring Licences			
31(3)	Application fee for injection and monitoring licence	11,690	1,000
35(1)(c)	Annual fee for injection and monitoring licence	6,450	550
36(d)	Fee for transfer of injection and monitoring licence	4,670	400
Special Access Authorisation			
31(4)	Fee for application for special access authorisation	470	40
Greenhouse Gas Sequestration Register			
38	Minister's certificate	58	5
37(a)	Inspection of the GHG Sequestration register	23	2
37(b)	Copy of document or entry in register - per A4 page	4	n.a

4B. IMPACT ON SMALL BUSINESS

The *Victorian Guide to Regulation* provides a definitive guide to developing regulation in Victoria within the context of the Victorian Government's vision of well-targeted, effective and appropriate regulation. While not a requirement for a RIS, it is recommended as good practice to examine the impact of proposed regulations on small business[128] because the compliance burden of regulation often falls disproportionately on that sector of the economy.[129]

4B.1 Direct impacts

Businesses expected to invest in CCS technology are likely to be current coal-fired electricity generators, new coal-fired electricity generators, CCS operators, petroleum and gas producers and joint venture arrangements. As the set-up costs of developing a CS project will be very high, small business is not expected to be directly involved in the industry and, as such, unlikely to be directly affected by the proposed regulations.

In Victoria, there are 11 operators that run 17 power generation facilities. Of the 17 power generation facilities, six are brown coal dependent and produce about 77 per cent of all energy in Victoria. These power generators are most likely to benefit from increased investment in CCS technology.

The likelihood of such an event adversely impacting on small businesses is low. Geological formations suitable for permanent storage of CO_2 are likely to exist where petroleum and gas activities currently occur. Holders of tenements relating to petroleum or gas on such land are most likely large organisations.

4B.2 Indirect impacts

The Act and the proposed Regulations could deliver substantial benefits for small businesses in the Victorian economy. In facilitating increased investment in CCS technology, a number of business opportunities could be created for small businesses. For example, there are likely to be opportunities in the construction and set-up of the infrastructure necessary to implement CCS, and in ongoing maintenance.

There is also likely to be opportunities for businesses to offer professional services by way of providing environmental and regulatory advice. While the exact magnitude of the potential benefits is unknown, small businesses may find opportunities in providing services to CS projects.

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[128] The ABS defines a small business as a business employing less than 20 people. ABS Cat. 1321.0 - Small Business in Australia.

[129] Victorian Government, 2007, *Small Business Regulatory Impact Assessment Manual*, Melbourne, April 2007.

5. ASSESSMENT OF COMPETITION IMPACTS

5.1 Broader Competition Impacts

The *Victorian Guide to Regulation* establishes the fundamental principles that any new legislation in Victoria cannot restrict competition unless it can be demonstrated that the:

- benefits of the restriction, as a whole, outweigh the costs; and
- objectives of the legislation can only be achieved by restricting competition.

In addressing this test, the Regulations do not place any competitive restrictions on businesses. They will apply equally to proponents of CS in Victoria.

In the absence of the proposed Regulations, proponents of CS are less likely to invest in this relatively new technology, which would be characterised by uncertain regulatory requirements, costs and responsibilities. This could disadvantage CS against other potential abatement technologies and result in a lower level of investment than desired to assist Victoria in meeting GHG emissions reduction objectives. Further, the proposed Regulations do not serve to provide an advantage to CS over other potential abatement technologies.

5.2 The Competition Test

The guiding principle in assessing competition impacts is that the Regulations should not restrict competition unless it can be demonstrated that the benefits of the restriction to the community as a whole outweigh the costs, and that the objectives of the Regulations can only be achieved by restricting competition.

The RIS concludes that there is nothing in the proposed Regulations that:

- allows only one participant to supply a product or service;
- requires producers to sell to a single participant;
- limits the number of producers of goods and services to less than four;
- limits the output of an industry or individual producers;
- discourages entry by new persons into an occupation or prompts exit by existing providers;
- imposes restrictions on companies entering or exiting a market;
- introduces controls that reduce the number of participants in a market;
- affects the ability of businesses to innovate, adopt new technology, or respond to the changing demands of consumers;
- imposes higher costs on a particular class or type of products or services;

- locks consumers into particular service providers, or makes it more difficult for them to move between service providers; and/or
- imposes restrictions that reduce range or price or service quality options that are available in the marketplace.

No restrictions on competition have been identified in connection with the proposed Regulations. The proposed Regulations are considered to satisfy the competition test set out in the *Victorian Guide to Regulation*.

However, it may be observed that in a very strict sense, the proposed Regulations may impose a restriction on participants entering a market. That is, businesses must satisfy certain operational, environmental and OH&S requirements before they can obtain an exploration permit for a fee. These additional requirements are imposed on all businesses and therefore do not discriminate between players *within the industry*.

Since the proposed Regulations are aimed at large-scale, commercial operators, these requirements are not assessed as restricting competition given the scale and resources that such businesses are likely to possess. In addition, the level of fees is considered relatively modest in terms of the overall cost of potential CS operations. Hence the level of fees is not considered to be a barrier to enter the CS market.

6. THE PREFERRED OPTION

The proposed Regulations offer net benefit to the community. They assist in facilitating CS activities (necessary for addressing the impacts of climate change) and provide for management of associated risks to the community and the environment. In doing so, the proposed Regulations impose relatively minor costs on the community in terms of administrative costs on businesses and costs to government.

Assessed against the government's objectives, reflected in the MCA criteria, the proposed Regulations also offer greater overall benefit than the alternative options identified. This is largely because they are the most effective in achieving the desired policy outcome, have lower costs to business and government, and would be the most effective and efficient in reducing regulatory uncertainty, which would act as a disincentive to CS activities. The relative scores are summarised in the table below.

Table 13: Summary of Multi-criteria Analysis of Regulatory Options

Regulatory Proposal	MCA Assessment
Option 1: Proposed Regulations	+50.5
Option 1A: Performance-based standards	+44.5
Option 2: Use existing legislation/regulations	+13.0
Option 3: Use project-specific regulations	+38.5

The fees in the proposed Regulations were calculated according to the guidelines of the government's *Cost Recovery Guidelines*. Generally, full cost recovery is preferred unless such an approach is inconsistent with other objectives. Assessed against the criteria of efficiency, effectiveness and equity, it was determined that full cost recovery is preferable to partial or no cost recovery. This is shown in Table 14 below.

Table 14: Summary of Multi-criteria Analysis of Fee Options

Regulatory Proposal	MCA Assessment
Option A: Full cost recovery	+91.0
Option B: Partial cost recovery	+54.5
Option C: Zero cost recovery	0.0

Fee Option A (full cost recovery) is the superior option, principally because it received a higher score on efficiency and equity against other options (and broadly similar on effectiveness with Option B). CS operations will be conducted on a commercial basis and the financial benefits of holding will accrue to the authority holder. Effectiveness in terms of compliance is also likely to be high given the relatively low level of the fees compared to other costs in the sector. Similarly, equity considerations were not assessed as a significant factor given the relatively affordable levels of the fees to be imposed.

It has not been possible to directly quantify the benefits associated with the proposed Regulations. However, this RIS identifies (qualitative) direct benefits related to the proposed Regulations and (qualitative) indirect benefits associated with mitigating climate change impacts (to the extent that regulations assist in the achieving the objectives of the Act). Table 15 below summaries these costs and benefits.

Table 15: Qualitative summary of the overall benefits and costs of each option

Option	Costs	Benefits
Base case	• Inconsistent with MCMPR Guiding Principles and the decision by other Australian jurisdictions to develop a legal framework for CCS activities • Industry faces uncertain regulatory environment for CCS activities • Does not address long-term environmental and public health risks unique to CCS activities • Uncertainty in relation to ownership of land and underground reservoir • Inconsistency in reporting requirements • May not deal with all aspects of CCS, especially long-term storage	• No increase in compliance costs for industry
Proposed Regulation	• Increased compliance costs • Costs to government of implementing and enforcing the legislation • Possibly some costs to the community in the form of reduced access to public land	• Increased industry certainty • Increased clarity for industry of community expectations • Increased consistency and transparency • Increased industry assurance about how post-closure costs will be managed • Benefit from controlled GHG emissions and secure energy supply • Increased confidence that CCS poses low risk to the environment, human health and safety

The alternatives identified in the RIS of developing existing legislation or enacting project specific regulation would deliver similar benefits to the proposed Regulations (if well-framed). However, the disadvantage with the alternatives is that they would impose greater costs (e.g., less certainty, lack streamlined approval process, possibly greater dealing with government), thus the benefit to cost ratio would be lower.

The fees in the proposed Regulations were therefore calculated on a full cost recovery basis in accordance with the *Cost Recovery Guidelines* and informed by the Productivity Commission's *Cost Recovery by Government Agencies* report.[130] Fees were calculated on an activity-based 'bottom up' approach.

The activities required to assess and administer the tenure system for CS are expected to be similar to those for the petroleum and geothermal industries. The activities in processing applications, assessments, monitoring of activities and transfers are expected to be very similar for the proposed Regulations. The fees are thus based on those provided in the Geothermal Energy Resources Regulations 2006 (which were calculated on a full cost–recovery basis).

[130] Productivity Commission, 2001, loc cit.

Table 16: Proposed Regulations – Fees

Regulation	Description of Fee	Indicative Cost ($)*	Fee Units
Exploration Permits			
31(1)	Fee for application for exploration permit	4,670	400
33	Fee for renewal of exploration permit	2,380	200
35(1)(a)	Annual fee for exploration permit	6,450	550
36(a)	Fee for transfer of exploration permit	4,670	400
32	Fee for late renewal of exploration permit	117/week	10/week
Retention Leases			
31(2)	Fee for application for retention lease	4,670	400
35(1)(b)	Annual fee for retention lease	6,450	550
36(b)	Fee for renewal of retention lease	2,380	200
36(c)	Fee for transfer of retention lease	4,670	400
34	Fee for late renewal of retention lease	117/week	10/week
Injection and Monitoring Licences			
31(3)	Application fee for injection and monitoring licence	11,690	1,000
35(1)(c)	Annual fee for injection and monitoring licence	6,450	550
36(d)	Fee for transfer of injection and monitoring licence	4,670	400
Special Access Authorisation			
31(4)	Fee for application for special access authorisation	470	40
Greenhouse Gas Sequestration Register			
38	Minister's certificate	58	5
37(a)	Inspection of the GHG register	23	2
37(b)	Copy of document or entry in register - per A4 page	4	n.a

* Numbers rounded (indicative only). Under the *Monetary Units Act 2004,* the Treasurer has set a fee unit from 1 July 2009 to 30 June 2010 at $11.69.

6A. CHANGE IN THE ADMINISTRATIVE BURDEN

The *Reducing the Regulatory Burden* initiative commits the Victorian Government to reducing the administrative burden (or 'administrative costs') of regulation.

Specifically, the Victorian Government is committed to cutting the existing administrative burden of regulation by 25 per cent by 30 June 2011. It also seeks to ensure that the administrative burden of any new regulation is met by an 'offsetting simplification' in the same or related area.

A meaningful calculation of the total administrative burden from the proposed Regulations is impossible due to uncertainties as it is an emerging industry. The Regulations will apply for 10 years until they sunset under the *Subordinate Legislation Act*. In the first 10 years, there are likely to be only a few CS full-scale operations. The number of companies affected is therefore unknown. The timing and the nature of the activities that may be undertaken is also unknown.

Notably, a formal *ex post* Standard Cost Model Assessment will be undertaken to determine the additional administrative burden imposed by the proposed Regulations. This will allow the amount based on an informed assessment to be entered onto DPI's portfolio account under the *Reducing the Regulatory Burden* initiative and to allow it to deliver 'offsetting simplification' measures.

To minimise the regulatory burden on potential CS operators, authority holders are not required to obtain duplicative approvals for injection and sub-surface storage activities under the *Environment Protection Act 1970* and the *Water Act 1989* if they have an approved injection testing plan or injection and monitoring plan under the Act.

7. IMPLEMENTATION AND ENFORCEMENT ISSUES

Implementation

The proposed Regulations are to commence on 1 December 2009. Given that the proposed Regulations establish a new framework, there are no requirements as such for transitional measures.

DPI officers will liaise with potential authority holders and provide information to assist in preparing applications or complying with the regulations.

Based on experience obtained from the introduction of the Geothermal Energy Resources Regulations 2005, it is not expected that any significant transitional or implementation issues will arise.

Enforcement

DPI in its capacity as the CCS industry regulator will respond to breaches of the Act and the proposed Regulations with a range of enforcement actions. These actions range from advice by the DPI and the EPA regarding compliance with the Act and Regulations, through to issuing of penalties, prosecutions or cancelling an authority. DPI employs trained and experienced inspectors who are to be authorised under the Act to enter premises, search or seize documents and monitor compliance.

The specific environmental regulations will be enforced by DPI. This will involve assessing the adequacy of safety management systems, emergency plans, environmental management plans, as well as field officers assessing the actual CCS operations on an annual basis. The EPA will assume responsibility for monitoring and verification activities four years after the Act commences (see Division 2 of Part 18 of the Act).

The proposed Regulations contain two penalties. Regulation 26 requires an operator to submit an annual report of the CS operations. Failure to submit this report within 3 months after the end of each period of 12 months after the relevant authority was granted to the operator may result in a penalty of up to 10 penalty units (i.e., currently equivalent to $1,168).[131] The appropriateness of this penalty and its amount was confirmed with the Department of Justice. A penalty (also of 10 penalty units) in Regulation 28 applies to an officer of the Department acting in relation to up pecuniary interest without the Minister's authority.

[131] Under the *Monetary Units Act 2004* the value of a penalty unit is $116.82, Victorian Government Gazette, No. S 132 Friday 15 May 2009.

8. EVALUATION

It is good practice to periodically review regulations to assess whether they are operating effectively and efficiently. Consequently, the *Victorian Guide to Regulation* recommends that government departments put in place some form of mechanism to evaluate regulations. DPI will work with its stakeholders to develop an appropriately tailored evaluation regime, which is expected to include the following elements:

- The baseline data and information that will be collected to judge the effectiveness of the proposed regulations;
- The key performance indicators (KPIs) that will be used to measure the success of the proposed regulations; and
- The timelines for undertaking the evaluation. At this stage, DPI does not expect to evaluate the effectiveness of the proposed Regulations until after at least two injection and monitoring proposals have been authorised and become operational.

Such an approach will enable DPI to observe the operation of the proposed Regulations in practice. It is important to recognise that the evaluation regime will be consistent with the objectives of the MCA used to determine the preferred option.

DPI will continue to monitor progress with the development of the regulatory frameworks in other jurisdictions and consider the need for a formal review of the legislation in light of developments. This allows the Victorian Government to consider the relevance and applicability of the proposed regulatory framework in light of new data and new information that becomes available as the industry matures.

In addition, pursuant to section 8 of the *Financial Management Act 1994*, and regulation 16 of the Financial Management Regulations 2004, under Direction 3.4 the Chief Financial Officer will annually review the level of fees.

9. CONSULTATION

The *Subordinate Legislation Act 2004* and the *Victorian Guide to Regulation* require that during development of regulations consultation take place between business and relevant sectors of the community. Such input, which draws on practical experience, can provide valuable information and perspectives, and thus improve the overall quality of regulations. There has been considerable consultation with respect to the development of the proposed Regulations.

This RIS represents another step in the consultation process to establish a regulatory framework for CS in Victoria. This process formally began in January 2008 when DPI released the consultation paper, *A Regulatory Framework for the Long-Term Underground Storage of Carbon Dioxide in Victoria*. This paper sought views and raised issues, which informed the development of the Act.

The proposed Regulations have been framed against the MCMPR *Australian Regulatory Guiding Principles for Carbon Dioxide Capture and Geological Storage* and were largely based on Victoria's recent Geothermal Energy Resources Regulations 2006 and the Petroleum Regulations 2000.

Drafting and development of the proposed Regulations was assisted with advice and input from the following government agencies in Victoria: DPI, DSE, DPCD, EPA, DOJ, DPC and DTF (Better Regulation Unit). Advice and assistance was also provided by industry and local councils.

In addition, the Project Manager of the Otway Trial Project and operational staff provided valuable advice to assist in defining the nature and extent of certain practical issues encountered from experience with the Project, Further, three industry participants provided detailed advice concerning possible costs associated with the proposed Regulations.

On 5 April 2009, DPI released a discussion paper, the *Greenhouse Gas Geological Sequestration Regulations Discussion Paper*, to inform stakeholders of the proposed Regulations and to seek their input to improve the efficiency and effectiveness of the proposal. This paper was sent to industry, local councils, key environmental groups and non-government organisations. By May 2009 DPI had received 6 formal written submissions, which assisted in framing the proposed Regulations.

On 5 May 2009, as part of the consultation process for the proposed Regulations, two stakeholder meetings were held with industry (six industry representatives) and local government (three representatives). Key issues and comments raised in these meetings included:

- clarification on the interaction and relationships between the different agencies and legislation that may apply to CCS operations;

- a query as to whether DPI should establish guidelines to assist in implementing and understanding compliance. Stakeholders suggested that

such guidelines could include procedures for communication with landowners, the community, and also guidance on how the CCS legislation interacts with other legislation and guidance on the public interest test;

- queries were raised in relation to what was a reasonable time period between date at which an application is lodged to the date at which commercial injection could commence;

- discussion over the EMP and advocation that it should not be onerous and should be specific to the CCS industry;

- the need to clarify rights and responsibilities when geological formations are discovered.

While some points raised during the consultation relate to the legislation rather than the regulations, a common theme centred on *how* the regime would work in practice given that the legislation and regulations will be new. To provide greater clarity and guidance around these matters, DPI will develop appropriate guidance material.

The cost calculations in this RIS were informed by input provided by three industry operators from the geothermal energy sector. Given the similarities between the proposed Regulations and those related to geothermal operations, this was considered appropriate. The key operational officers in the CO2CRC Otway CCS trial project were also consulted. It should be stressed that the costs and frequencies represent 'best estimates' and to that extent should be considered indicative. Stakeholders commented that they will only know the actual costs when incurred.

This RIS represents another step in the consultation process and DPI welcomes comments or suggestions with respect to the nature, extent, and likely impacts of the proposed Regulations, and any variations that may improve the overall quality of the proposed Regulations.

The *Subordinate Legislation Act 1994* requires that the public be given at least 28 days to provide comments or submissions regarding the proposed Regulations. Written comments are required by no later than **5.00pm, Friday 2 October 2009**.

10. CONCLUSION

This Regulatory Impact Statement concludes that:

- the benefits to society of the proposed Regulations exceed the costs;
- the net benefits of the proposed Regulations are greater than those associated with any practicable alternatives; and
- the proposed Regulations do not impose restrictions on competition.

BIBLIOGRAPHY

Cook, P. J., Rigg, A., and Bradshaw, J., 2000, *Putting it back where it came from: Is geological disposal of Carbon Dioxide an option for Australia?* APPEA Journal, March 2000

Commonwealth Government, c.2008, Regulatory Impact Statement, *Amendment to Offshore Petroleum Legislation to Provide for Greenhouse Gas Transport, Injection, and Storage in Commonwealth Waters*, Canberra

Commonwealth of Australia, 2008, Submission to the United Nations Subsidiary Body for Scientific and Technological Advice: Views on issues relevant to the consideration of CCS and CDM project activities

Commonwealth of Australia, 2008, *Carbon Pollution Reduction Scheme: Australia's Low Pollution Future White Paper*, Volume 1, December 2008, Canberra

Commonwealth of Australia, Environment Protection and Heritage Council, 2009, *Environmental Guidelines for Carbon Dioxide Capture and Geological Storage – 2009*, NEPC Service Corporation

Department for Environment, Food and Rural Affairs (UK), 2007, *The Social Cost of Carbon and the Shadow Price of Carbon: What they are, and how to use them in economic appraisal in the UK*, DEFRA, London

Department of Primary Industries, 2006, *Action Agenda on Climate Change and Greenhouse: Growing Sustainable Primary Industries*, March 2006, Melbourne

Department of Primary Industries, 2008, *Strategic Policy Framework for Near Zero Emissions from Victoria's Fossil Fuels*, Position Paper October 2008

Department of Primary Industries, 2008, *A Regulatory Framework for the Long-Term Underground Geological Storage of Carbon Dioxide in Victoria*, Discussion Paper January 2008

Department of Sustainability and Environment, 2005, *Victorian Greenhouse Strategy Action Plan Update*, Melbourne, April 2005

Department of Treasury and Finance, 2007, 2nd ed, *Victorian Guide to Regulation incorporating: Guidelines made under the Subordinate Legislation Act 1994 and Guidelines for the measurement of changes in administrative burden*, Melbourne

Department of Treasury and Finance, 2007, *Cost Recovery Guidelines: Incorporating the information formerly published in the Guidelines for Setting fees and User-Charges Imposed by Departments and Central Government Agencies*, Melbourne

Garnaut, R., 2008, *The Garnaut climate change review*, Cambridge University Press, Melbourne

Intergovernmental Panel on Climate Change, 2005: IPCC Special Report on Carbon Dioxide Capture and Storage. Prepared by Working Group III of the Intergovernmental Panel on Climate Change [Metz, B., O. Davidson, H. C. de Coninck, M. Loos, and L. A. Meyer (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

Intergovernmental Panel on Climate Change, 2007, *Climate Change 2007: Synthesis Report*, adopted at IPCC Plenary XXVII, 12-17 November 2007

Ministerial Council on Mineral and Petroleum Resources, 2005, *Carbon Dioxide Capture and Geological Storage: Australian Regulatory Guiding Principles*, MCMPR, Canberra

Ministerial Council on Mineral and Petroleum Resources, 2008, *Environmental Guidelines for Carbon Dioxide Capture and Geological Storage* (Draft)

Sharma, S., *et al*, 2008, *The CO2CRC Otway Project: Overcoming Challenges from Planning to Execution of Australia's first CCS project*, The Cooperative Research Centre for Greenhouse Gas Technologies, Canberra, ACT 2601, Australia, no pagination: Energy Procedia 00 (2008) 000–000: www.elsevier.com

Productivity Commission, 2001, *Cost Recovery by Government agencies*, Report No. 15, AusInfo, Canberra

Victorian Government, 2004, *The Greenhouse Challenge for Energy: Driving investment, creating jobs and reducing emissions*, Position Paper

Victorian Government, 2006, *Reducing the Regulatory Burden: The Victorian Government's Plan to Reduce Red Tape*

Victorian Government, 2007, *Small Business Regulatory Impact Assessment Manual*, Melbourne, April 2007

Victorian Government, 2008, *Delivering for Victoria: Annual Statement of Government Intentions*, Melbourne, February 2008

Wilson, E. J., and Gerard, D., 2007, *Carbon Capture and Sequestration: integrating technology, monitoring and regulation*, Blackwell Publishing

Internet

COAG Principles for Jurisdictions to Review and Streamline their Existing Climate Change Mitigation Measures: http://www.coag.gov.au/

Department of the Environment and Heritage, Australian Greenhouse Office, Carbon Dioxide Capture and Storage: http://www.environment.gov.au

Department of Mines and Energy (Queensland), 2007, *Discussion Paper: Carbon Dioxide geosequestration tenure administration*: http://www.dme.qld.gov.au/zone_files/Mines/ccs_discussion_paper.pdf

Department of Primary Industries, 2004, *Geosequestration: Putting the carbon back – A paper to discuss current issues and opportunities to reduce Greenhouse Gas emissions through geosequestration*:
http://www.dpi.vic.gov.au/dpi/nrenmp.nsf/LinkView/122C01CF7F9C0609CA2575AE0007F0468B3DA072DA032386CA2573DF001C56C6/$file/Geosequestration.pdf

Hays Mining & Resources 2008 Salary Survey:http://www.hays.com.au

State of Victoria, 2009, *Victorian Climate Change Green Paper*:
http://www.climatechange.vic.gov.au

Legislation

Greenhouse Gas Geological Sequestration Act 2008

Subordinate Legislation Act 1994

Environment Protection Authority Act 1970

Petroleum Act 1982

Geothermal Energy Resources Act 2005

Valuation of Land Act 1960

Victorian Government Gazette, No. S 132 Friday 15 May 2009: Fee and penalty units set under the *Monetary Units Act 2004*

The Environment Protection (Scheduled Premises and Exemptions) Regulations 2007

Geothermal Energy Resources Regulations 2006

ATTACHMENTS

Attachment A

DESCRIPTION OF THE PROPOSED STATUTORY RULES – GREENHOUSE GAS GEOLOGICAL SEQUESTRATION REGULATIONS 2009

Part 1 – Preliminary (Regulations 1 to 4)

Regulations 1 to 4 are machinery regulations.

Regulation 1 states the objectives of the Regulations.

Regulation 2 provides that the regulations are made under section 303 of the *GHG Geological Sequestration Act 2008.*

Regulation 3 provides that the regulations will come into operation on 1 December 2009.

Regulation 4 defines words and terms used in the regulations. It defines 'business day', 'stored greenhouse gas substance', and 'the Act'.

Part 2 – Provisions Applying to Authorities (Regulations 5 to 17)

Regulation 5 enumerates the information that must be included in an injection testing plan (monitoring and verification plan). This plan must include details of the characteristics of the geological formation into which a liquid or gas is proposed to be injected, and must include any geological or other conditions that may influence containment of injected liquid or gas; it must also provide a description of the existing environment above and on the surface of the ground; and any resource above, on and below the surface of the ground that a person is entitled to extract or use under a resource authority.

It must also include details of the equipment proposed to be used to monitor the behaviour of any injected liquid or gas and where it is to be located. It must also set out details of the techniques that the holder of an exploration permit proposes to use to monitor the behaviour of any stored greenhouse gas substance, and the length of time for which each such technique is to be used and how often each monitoring technique is to be carried out.

It must also include details of the methods to be used for differentiating injected liquids or gases from naturally occurring liquids or gases; and details of how the actual behaviour of injected liquids or gases is to be verified against the expected behaviour of injected liquids or gases and how often the actual behaviour of injected liquids or gases is to be verified against the expected behaviour of injected liquids or gases. It must also include details of how the affect of injected liquids or gases on naturally occurring liquids or gases is to be verified against the affect that the holder of the exploration permit expected and how often the affect of injected liquids or gases on naturally occurring liquids or gases is to be verified against the

affect that the holder of the exploration permit expected. This plan must include the format of reports to be provided in accordance with section 55 of the Act.

In the absence of this regulation, a monitoring plan is still required to be prepared under s 38(d) of the Act, detailing how the behaviour of the greenhouse gas substances will be monitored.

Regulation 6 requires that certain details must include details of the potential risks and damage to, and impacts on, public health and the environment that may result from injection testing operations, whether or not in emergency conditions. Performance objectives and standards against which performance by the holder of the exploration permit in avoiding those risks, damage and impacts is to be measured. Finally, a strategy for the management of those risks, damages and impacts. In the absence of this regulation, a risk management plan is still required to be prepared under s 38(e) of the Act, although there would be no enumerated requirements.

Regulation 7 prescribes that the maximum time period is 5 years beginning on the date on which the application for the injection and monitoring licence is made. In the absence of this regulation, there would be no time limit on the commencement of injections (ss. 73(2) and 75(2)).

Regulation 8 prescribes the information that must be included in an injection and monitoring plan (monitoring and verification plan). This plan must include details of the characteristics of the geological formation into which a liquid or gas is proposed to be injected, and must include any geological or other conditions that may influence containment of stored greenhouse gas substance; it must also provide a description of the existing environment above and on the surface of the ground; and any resource above, on and below the surface of the ground that a person is entitled to extract or use under a resource authority.

It must also include details of the equipment proposed to be used to monitor the behaviour of any stored greenhouse gas substances, and where it is to be located. It must also set out details of the techniques that the holder of the injection and monitoring licence proposes to use to monitor the behaviour of any stored greenhouse gas substance or its affect on the environment, and the length of time for which each such technique is to be used and how often each monitoring technique is to be carried out.

It must also include details of the methods to be used for differentiating injected liquids or gases from naturally occurring liquids or gases; and details of how the actual behaviour of injected liquids or gases is to be verified against the expected behaviour of injected liquids or gases and how often the actual behaviour of injected liquids or gases is to be verified against the expected behaviour of injected liquids or gases.

It must also include details of how the affect of injected liquids or gases on naturally occurring liquids or gases is to be verified against the affect that the holder of the exploration permit expected and how often the affect of injected liquids or gases on naturally occurring liquids or gases is to be verified against the

affect that the holder of the exploration permit expected. Finally, this plan must include the format of reports to be provided in accordance with section 111 of the Act. In the absence of this regulation, a monitoring plan is still required to be prepared under s 94(j) of the Act, detailing how the behaviour of the greenhouse gas substances will be monitored.

Regulation 9 provides that a risk management plan within an injection and monitoring plan must set out details of potential risks and damage to, and impacts on, public health and the environment that may result from injection operations, whether or not in emergency conditions, and must include performance objectives and standards against which performance by the holder of the injection and monitoring licence in avoiding those risks, damage and impacts is to be measured; and have a strategy for the management of risks, damages and impacts. In the absence of this regulation, a risk management plan is still required to be prepared under s 94(k) of the Act, although there would be no enumerated requirements.

Regulation 10 prescribes that the period for which a special access authorisation continues in force (unless sooner cancelled or surrendered) is the period ending 12 months after the special access authorisation is granted or, if that period is extended under section 132 of the Act, at the end of that period as so extended. In the absence of this regulation, the special access authorisation would continue unless cancelled or surrendered.

Regulation 11 prescribes the details that must be included in a special access well plan. A special access well plan must include a description of the location and purpose of the well and the proposed down hole activity, and the period during which it is expected that the well will be used, a description of the characteristics of the geological formation where the well is situated, and the existing environment above and on the surface of the ground and any resource that a person is entitled to extract or use under a resource authority, above, on and below the surface of the ground, and details of potential risks or damage to, and impacts on, public health and the environment that may result from down hole activity, whether or not in emergency conditions, performance objectives and standards against which performance by the special access authority holder in avoiding those risks, damages and impacts is to be measured, and a strategy for the management of those risks, damages and impacts.

It must also include details of the measures to be taken for the decommissioning of the well. In the absence of this regulation, a special access well plan would still be required under s 133 of the Act, but there would be no enumerated requirements for the plan.

Regulation 12 provides that a work program must be in an electronic form or a form approved by the Minister. In the absence of this regulation, authority holders would not be clear as to what form should be used (s 148).

Regulation 13 prescribes the period within which a serious situation must be reported, as well as the form and details to be included in a report. In the case of a serious situation that has occurred, this period is 2 hours after the occurrence, and in the case of a serious situation that may occur (an event referred to in section 6 of

the Act), the period is 3 business days after the authority holder becomes aware of the event.

An authority holder who is required to make a report with respect to a 'serious situation' must make a preliminary report, 2 hours after the holder becomes aware that the serious situation may occur; and by a further report, 3 business days after the holder becomes aware that the serious situation may occur.

An authority holder must include in the report under this regulation the authority holder's name, telephone number, name of the informant, location of the serious situation and sufficient details to identify the serious situation. A further report must be given in writing to the Department and must include the holder's name, address, telephone number and email address; details of the serious situation and where it has occurred or may occur; as the case requires, details of the leak or anticipated leak or the unpredicted behaviour or anticipated unpredicted behaviour or significant impact or anticipated significant impact or the unsuitable, or anticipated unsuitable underground geological storage formation, as the case requires, details or any harm or damage suffered to any person or the environment, details of action taken or to be taken to control or minimise injury or damage, or any other information relevant to the serious situation that has occurred, or may occur, that is requested by the Minister.

In the absence of this regulation, there would be no requirement for reporting of serious situations (s. 181).

Regulation 14 requires that an operation plan include provision for review. Specifically, a review by the operator must occur whenever there is a significant change in the risks of the operation, and a review by the operator of the plan at least once every 5 years. Following these reviews, an authority holder must submit the findings of the report to the Minister. In the absence of this regulation, a review of the operation plan would not be required when there had been a significant change in the risks of the operation, or at least, a review of the plan in 5 years after being drafted (s 209).

Regulation 15 specifies that, unless otherwise specified in an authority, the amount of rent payable for CCS operations on Crown land is the current market value for occupying the land, having regard to the use of the land permitted by the authority, as determined by a valuer nominated by the valuer-general within the meaning of the *Valuation of Land Act 1960*. The holder of the authority is liable for the costs incurred in obtaining the valuation. In the absence of this regulation, the rent would need to be specified in each authority when granted.

Regulation 16 specifies the information that must be provided to the Minister in relation to a discovery of an underground geological storage formation. This information includes the location of the formation and its extent, the geoscientific properties of the formation and the surrounding area, particulars of properties of fluids found in the formation and the surrounding area, particulars of pressures in the formation and the surrounding area, an analysis of the suitability of the formation for the storage of greenhouse gas substances, and any other information requested by the Minister given under a section 230 direction. This information

must be given in writing. This regulation sets up a type of 'standing requirements' for requests of information under this section. In the absence of this regulation, the Minister may still require the same information in each direction under section 230.

Regulation 17 specifies information, samples and records for the purpose of monitoring compliance with the Act. This information includes geoscientific data, engineering and safety data, injection data, and monitoring data. In relation to samples, rock cores, cuttings, side wall cores, drilling muds, fluids, gases and other related substances must be collected and kept in accordance with industry standards and the data must be in a readily accessible format. An authority holder must provide information, samples and records to the Minister in accordance with any request made by the Minister. In the absence of this regulation, the authority holder would not be required to collect the information and samples to provide to the Minister (s. 231).

Part 3 – Environment Management Plans (Regulations 18 to 23)

Regulation 18 provides that an operation plan under section 209(d) of the Act must include an environment management plan, and the environment management plan must include the matters set out in Regulations 19 to 23.

In the absence of regulations 18-23, there would be no specific requirement for a separate environmental management plan, but the authority holder would still be required to include in its operation plan the risks of injury or damage that the operation may pose to the environment, to any community, person, land user, land or property in the vicinity of the operation; specify what the authority holder will do to eliminate or minimise those risks; and specify what the authority holder will do to rehabilitate the land that will be affected by the operation.

Regulation 19 requires that an environment management plan must describe the existing environment that may be affected by the greenhouse gas sequestration operation, as well as any relevant cultural, historical, aesthetic, social, recreational, ecological, biological, landscape and economic aspects of the environment that may be affected. It must also identify the particular relevant values and sensitivities (if any) of that environment.

Regulation 20 prescribes details to be included in an environment management plan. Such a plan must include an assessment of the environmental effects and risks of the greenhouse gas sequestration operation that identifies and evaluates the environmental effects and risks that may arise directly or indirectly from the normal activities of the operation (including construction where applicable). It also must include an assessment of the risks of the potential effects on the environment resulting from reasonably possible activities in relation to the operation, or incidents or events (whether accidental or otherwise) that are not normal activities, incidents or events in relation to the operation.

Regulation 21 requires an environment management plan to define environmental performance objectives, and set environmental performance standards, against which performance by the authority holder in protecting the environment from the greenhouse gas sequestration operation is to be measured, as well as include

measurement methods for determining whether the objectives and standards have been met.

Regulation 22 requires an environment management plan to contain an implementation strategy for the greenhouse gas sequestration operation. The implementation strategy must include measures to ensure that the environmental performance objectives and standards in the environment management plan are met. The implementation strategy must also identify the specific systems, practices and procedures to be used to ensure that any potential adverse environmental effects of, and any risks to the environment arising from the operation are eliminated, or if that is not reasonably practicable, are minimised so far as is reasonably practicable. It must outline how the environmental performance objectives and standards in the environment management plan will be met.

The implementation strategy must establish a clear chain of command, setting out the roles and responsibilities of personnel in relation to the implementation, management and review of the environment management plan. It must also include measures to ensure that each employee or contractor working on, or in connection with, the greenhouse gas sequestration operation is aware of his or her responsibilities in relation to the environment and has the appropriate skills and training to be able to fulfil those responsibilities provides for the monitoring, audit and review of the environmental performance and implementation strategy of the holder of the authority.

Finally, the implementation strategy must provide for the maintenance of a quantitative record of emissions and discharges (whether occurring during normal operations or otherwise) to the air, land surface, or below the land surface environment that is accurate and that can be monitored and audited against the environmental performance standards.

Regulation 23 prescribes other information that must be included in an environment management plan. This includes a statement of the authority holder's corporate environmental policy, a report on any consultations between the authority holder and relevant authorities, interested people and organisations in the course of developing the environment management plan, a list of all environmental legislation of the Commonwealth or the State that may apply to the greenhouse gas sequestration operation, and a description of any arrangements for ongoing consultation between the authority holder and relevant authorities, interested people and organisations during the life of the operation.

Part 4 – Specific Information to be submitted to the Minister (Regulations 24 to 26)

Regulation 24 requires that if an authority holder makes a well under an exploration permit or an injection and monitoring licence, the authority holder must submit certain information to the Minister including a description of the location and purpose of the well and the proposed down hole activity, the period during which it is expected that the well will be used, and a description of the characteristics of the geological formation where the well is situated and the existing environment above and on the surface of the ground, and any resource that

a person is entitled to extract or use under a resource authority, above, on and below the surface of the ground.

Further, if a well made by an authority holder under an exploration permit or an injection and monitoring licence ceases to be required or used, the authority holder must decommission the well and provide a report to the Minister on the measures taken for the decommissioning. The information is to be provided within 3 months after the well is made or within the period approved by the Minister.

In the absence of this regulation, this information would not be required to be provided.

Regulation 25 provides that if an authority holder conducts a seismic or any other survey in the course of carrying out a greenhouse gas sequestration operation under an exploration permit, retention lease or injection and monitoring licence, the authority holder must submit to the Minister the following information: the location and purpose of the survey; the date and duration of the survey; and details of the geoscientific and other data generated by the survey. The information is to be provided within 3 months after the survey has been conducted or within the period approved by the Minister.

In the absence of this regulation, this information would not be required to be provided.

Regulation 26 provides for an authority holder to submit an annual overview report of greenhouse gas sequestration operations. Specifically, an authority holder must submit to the Minister during each 12 month period after the date on which the authority was granted, a report in electronic form, or in a form approved by the Minister, and, must be consistent with the industry standard for reports of the same class and must contain the following an overview of the operations, together with a complete record of all geoscientific and other data obtained from the operations; details of all technical investigations and surveys carried out in that period; a complete record of all drill holes, together with logs and maps showing the locations of the holes both at surface and sub-surface level; the names of all greenhouse gases injected during the period; details of any material tested, along with test results; any interpretations formed as a result of surveys or activities undertaken; and details of how the maps and sections provided in the report are related to the Map Grid of Australia (GDA94 coordinates) and the National Topographic Map Series.

In addition, the report must include a statement of expenditure in respect of the period on operations carried out, showing separately expenditure on drilling operations; seismic operations; technical evaluation and analysis; geological studies; surveys; construction or modification of facilities; and administration. The operations report must be dated and signed by the operator and each other person who prepared any part of the report. The Minister may on request from an authority holder, or former authority holder, extend the period within which a report is to be submitted.

If this is not done, a penalty of 10 penalty units may apply.

In the absence of this regulation, this information would not be required to be provided.

Part 5 – Pecuniary interest statements (Regulations 27 to 30)

Regulation 27 provides definition for this part and defines 'domestic partner', 'family', 'interest register', 'officer' and 'reportable interest'.

Regulation 28 prescribes the disclosure requirements under section 293 of the Act. This regulation requires that an officer must disclose all reportable interests to the Minister within 30 days of becoming an officer. The officer must also disclose any change in a reportable interest to the Minister within 30 days of becoming aware of the change. In addition, an officer must not perform or exercise any function or power under the Act in relation to a matter to which a reportable interest relates unless the Minister authorises her or him to do so. In the absence of this regulation, there would be no requirement to disclose relevant interests.

Regulation 29 establishes a disclosure of interest register, which is maintained containing the information included in disclosures submitted to the Minister under regulation 28.

Regulation 30 provides that the interest register must be kept at a place nominated by the Minister and must be open to inspection by any person.

Part 6 – Fees (Regulations 31 to 38)

Regulation 31 provides the application fees payable for authorities, including for an exploration permit (400 fee units), a retention licence (400 fee units), an injection and monitoring licence (1000 fee units) and a special access authorisation (40 fee units).

Regulation 32 provides that the late fee under section 32(3) for the renewal of exploration permit is 10 fee units for each week or part of a week after the due day for payment of the fee.

Regulation 33 provides that the fee payable for renewal of an exploration permit is 200 fee units.

Regulation 34 provides that the late fee under section 60(3) is 10 fee units for each week or part of a week after the due day for payment of the fee.

Regulation 35 provides that the annual fee payable by the holder of an authority is 550 fee units for an exploration permit; 550 fee units for a retention lease and 550 fee units for an injection and monitoring licence. In terms of payment times, the annual fee payable by the holder of an authority in respect of the first year after the grant of an authority must be paid no later than 7 days after the authority is granted. Following that, the annual fee payable in respect of the second or subsequent year after the grant of an authority must be paid before the first anniversary of the grant of the authority.

Regulation 36 provide the fees payable for transfer, or part transfer, of an exploration permit (400 fee units); for renewal of a retention lease (200 fee units); for transfer or a retention lease (400 fee units) and for transfer, or part transfer, of an injection and monitoring licence (400 fee units).

Regulation 37 provides, for the purposes of section 287 of the Act, the fees for inspection of the greenhouse gas sequestration register is 2 fee units; and for each page of a copy of a document or entry in the greenhouse gas sequestration register is $4.

Regulation 38 provides that the fee payable for a Minister's certificate under section 287 of the Act is 5 fee units. This relates to obtaining certified information from the proposed greenhouse gas sequestration register.

Part 7 – General (Regulation 39 to 41)

Regulation 39 specifies that, for the purposes of section 48(2), 104(2) and 118(2) of the Act, the time period for a compensation agreement after which an application may be made to VCAT or Court is 30 days after the claim is first made. In the absence of this regulation, it would not be unclear when a party may make a compensation agreement.

Regulation 40 specifies that, for the purposes of section 206(2), there is a 30 day time period before a person may make an application to VCAT in respect of a claim or refer a claim to the Supreme Court. In the absence of this regulation, it would not be unclear when a party may take a disputed claim to VCAT.

Regulation 41 provides that the Minister may require certain information from petroleum operators. For the purposes of section 234 of the Act, the Minister may request information about the characteristics of the geological formation in the area to which the authority applies in which petroleum operations are being carried out, any petroleum operations being carried out or that are proposed to be carried out in those geological formations, and any infrastructure, whether above, on or below the surface of the ground, associated with those petroleum operations. In addition, information regarding any impact that the holder believes any greenhouse gas sequestration operations may have on petroleum operations in that area may be requested. The Minister may only request information under s 234 in accordance with regulations.

Attachment B

CCS PROJECTS

Operational International projects

Weyburn (Canada)

The Weyburn CO2-enhanced oil recovery (CO2-EOR) project is located in the Williston Basin, a geological structure extending from south-central Canada into north-central United States. The project aims to permanently store almost all of the injected CO2 by eliminating the CO2 that would normally be released during the end of the field life.

The source of the CO2 for the Weyburn CO2-EOR Project is the Dakota Gasification Company facility, located approximately 325 km south of Weyburn, in North Dakota, USA and where coal is gasified to make synthetic gas (methane), with a relatively pure stream of CO2 as a by-product. Over the life of the CO2-EOR project (20-25 years), it is expected that some 20 MtCO2 will be stored in the field. Since CO2 injection began in late 2000, the EOR project has performed largely as predicted. Currently, some 1,000 Mt CO2 per day is reinjected; this will increase as the project matures. Monitoring involves high-resolution seismic surveys and surface monitoring to determine any potential leakage. Surface monitoring includes sampling and analysis of potable groundwater, as well as soil gas sampling and analysis. To date, there has been no indication of CO2 leakage to the surface and near-surface environment.

In Salah Gas (Algeria)

The In Salah Gas Project, a joint venture among Sonatrach, BP and Statoil located in the central Saharan region of Algeria, is the world's first large-scale CO2 storage project in a depleted gas reservoir. The Krechba Field at In Salah produces natural gas containing up to 10 per cent CO2 from several geological reservoirs. The project involves reinjecting the CO2 into a sandstone reservoir at a depth of 1,800 m and storing up to 1.2 Mt CO2 per year. CO2 injection started in April 2004 and, over the life of the project, it is estimated that 17 Mt CO2 will be geologically stored. Processes that could result in CO2 migration from the injection interval have been quantified and a monitoring program is planned involving a range of technologies, including noble gas tracers, pressure surveys, tomography, gravity baseline studies, microbiological studies, four-dimensional seismic and geomechanical monitoring.

Sleipner (Norway)

The Sleipner Project, operated by Statoil in the North Sea about 250 km off the coast of Norway, is the first commercial scale project dedicated to geological CO2 storage in a saline formation. The CO2 is produced in the gas stream at the Sleipner West Gas Field and is separated and injected into a deep saline formation 800 m below the seabed of the North Sea. Approximately 1 Mt CO2 is removed from the produced natural gas and injected underground annually in the field. The CO2

injection operation started in October 1996, and over the lifetime of the project a total of 20 Mt CO2 is expected to be stored. The saline formation into which the CO2 is injected is a brine-saturated unconsolidated sandstone about 800-1,000 m below the sea floor. The fate and transport of the CO2 plume in the storage formation has been monitored successfully by seismic time-lapse surveys. The surveys also show that the caprock is an effective seal that prevents CO2 migration out of the storage formation. Today, the footprint of the plume at Sleipner extends over an area of approximately 5 km^2. Reservoir studies and simulations covering hundreds to thousands of years have shown that CO2 will eventually dissolve in the pore water, which will become heavier and sink, thus, minimising the potential for long-term leakage.

Snohvit (Norway)

The Snohvit Project is Europe's first Liquefied Natural Gas plant and is the first offshore gas field found in the Barents Sea. Snøhvit will be the first major development on the Norwegian continental shelf without a fixed or floating unit. Instead, a subsea production system on the seabed will feed a land-based plant on the north-western coast of Melkøya via a 160 km gas pipeline. The natural gas from the Snøhvit field contains five to eight per cent CO2. The CO2 is removed at the land based facility and piped back to the field rather than being released into the atmosphere. A total of 0.7 Mt CO2 produced with the gas on the Snøhvit field is to be stored 2,600 m beneath the seabed at the edge of the reservoir. CO2 will be reinjected into the Tubåsen sandstone formation, which is between 45 and 75 m thick and lies somewhat deeper than the gas formations. A sealing formation which lies above the sandstone will ensure that the CO2 does not leak out. CO2 storage on the Snøhvit field is the second large storage project initiated by Statoil.

Australian Projects

Operational

CO2CRC Otway Project, Victoria

This is Australia's first storage project which commenced injection of 100,000 t CO2 from a nearby gas well, in April 2008, initially into a depleted gas field at a depth of 2 km. A major program of monitoring and verification has been implemented. The $40 million Project, which is supported by 15 companies and 7 governments, involves researchers from Australia, New Zealand, Canada, Korea and the USA. CO2CRC Pilot Project Ltd, the operating company, has its members AngloCoal, BHP Billiton, BP, Chevron, Schlumberger, Shell, RioTinto Solid Energy, Woodside and Xstrata.

Proposed

Callide Oxyfuels Project, Queensland

This demonstration project launched in November 2008 involves conversion of an existing 30 MW unit at Callide A (currently underway), and capture of CO2. The second stage of the project will involve the injection and storage of up to 50,000 t

CO2 captured in saline aquifers or depleted oil/gas fields, and will continue for up to five years, commencing in 2010. This project is expected to cost $200 million. Participants in the project include CS Energy (who own the power station), IHI – a major Japanese boiler maker - J-Power – a Japanese power generator - Mitsui & Co, Xstrata Coal, Schlumberger, ACA and CO2CRC.

Coolimba Power Project, Western Australia

Aviva Corporation Ltd released its Public Environmental Review on 28 May 2009, closing 23 June 2009. Located 270km north of Perth, Coolimba consists of 2x200 MW oxyfuel coal fired power station, a 360MW gas fired power station and 2.9 million tonne per annum CCS when feasible. Construction is anticipated 2010 – 2014.

Gorgon Project, Western Australia

Chevron (operator) - Shell - Exxon are planning a major sequestration project linked to the Gorgon LNG Project. The separated CO2 will be injected under Barrow Island to a depth of about 2.5 km, with injection of 3-4 Mt CO2 per year, and a total of 125 Mt CO2 injected over the life of the project, which is planned to commence around 2012-2013. A data well has been drilled and a major study of the subsurface is underway.

Hazelwood and Loy Yang PCC Projects, Victoria

These projects involve drying of brown coal and retrofitting of post combustion capture of CO2. International Power is developing a large-scale facility at Hazelwood that will capture and chemically sequester CO2 at a rate of 10,000-20,000 t CO2 per annum.

Partners include Alstrom, RWE, Process Group and CO2CRC. A CSIRO mobile pilot PCC facility commenced trails at the Loy Yang power station in July 2008 capturing around 5000 tCO2 per annum. The $5.6million Latrobe Valley PCC Capture Project is a collaboration between Loy Yang Power, International Power Hazlewood, the Victorian Government, CO2CRC and CSIRO. Storage is not involved.

PCC Demonstration Project, Latrobe Valley, Victoria

The definition of a demonstration project aimed at integrated capture and storage of at least 50,000 tonne per annum of CO2 from a PCC retrofit of an existing generator in the Latrobe Valley is on hold pending the outcome of a Victorian Government Request for Proposal under its Energy Technology Innovation Scheme anticipated in December 2009.

HRL IDGCC Project, Victoria

A proposed 400 MW power generation plant in Victoria will involve integrated drying gasification combined-cycle (IDGCC) using brown coal. CO2 emissions will be captured at a pilot scale initially. The total project is estimated to cost over $750 million. Partners include HRL Technology, Harbin and CO2CRC.

Monash CTL Project, Victoria

This proposed project, on hold as of December 2008, will involve drying and gasification of brown coal, for conversion to synthetic diesel, followed by the separation of the produced CO2 (up to 10 Mt a year), and its transport and injection into a suitable storage site. This project, which has an indicative start date of 2015, is estimated to cost $6-7 billion. Capture and offshore storage is expected to commence in 2015. Partners involved in this project include Monash Energy, Anglo American and Shell.

Moomba Carbon Storage Project, South Australia

This project, on hold as of April 2009, will involve establishing a regional carbon storage hub in the Cooper Basin. The first (demonstration) phase, will involve the capture of CO2 from existing gas processing facilities and injecting 1 MtCO2 commencing in 2010, to re-pressure oil reservoirs for enhanced oil recovery. Partners in this project include Santos and Origin.

Munmorah PCC Project, New South Wales

This research scale pilot project is investigating the post carbon capture (PCC) ammonia absorption process, and the ability to adapt it to suit Australian conditions. Capture of up to 3,000 tonnes CO2 for the pilot phase, using the CSIRO technology developed in the Victorian pilot trials commenced in 2009. Delta Electricity has developed a business case for the next stage demonstration of integrated capture and storage of at least 50,000 tonne per annum and is proceeding to pre feasibility. The definition of the project is dependent on the results of storage availability currently under investigation.

Perdaman Urea Project, Collie, WA

In March 2009 Perdamin Chemicals and Feriliser released details of a plan to construct a urea manufacturing plant in Collie. The plant will have a 2 million tonne per annum capacity. A 214MW IGCC power station is proposed as part of an integrated facility. The project will be carbon capture ready.

Tarong PCC Project, Queensland

Commencing September 2008 CSIRO and Tarong Energy is conducting a $5 million PCC pilot capture only program at Tarong Power station, south of Kingaroy. The pilot plant is designed to capture at 1,500 tonne per annum in a program building on the work at Loy Yang in Victoria and Munmorah in NSW. The capture process will be mine based and will operate from July 2009 until 2011.

Wandowan IGCC Project, Queensland

The Queensland Gasification Power Consortium (GE Energy and Stanwell Corporation) are proposing to construct a 700-750 MW commercial scale IGCC with CCS power station to be located at Wandoan in Queensland's Surat Basin. The Consortium has formed an alliance with Xstrata coal and Santos. Xstrata Coal is expected to provide coal for the life of the project from their proposed new mine at Wandoan. Storage is under investigation at sites in Queensland and South Australia.

ZeroGen Project, Queensland

This Queensland Government project seeks to deploy commercial scale IGCC with CCS by 2015-2017. ZeroGen, in partnership with a Japanese consortium lead by Mitsubishi Heavy Industries, proposes a 550MW IGCC with CCS power plant capturing 65 – 90 per cent of CO2 emissions for injection and safe storage of 2 million tonne per annum in deep underground reservoirs in the Northern Denison Trough. The project is proceeding to pre-feasibility with a Final Investment Decision anticipated mid-2011. The Queensland Government and the Australian Coal Association have committed $300 million to an IGCC project. At estimated cost of $4 billion, any IGCC project will require substantial Australian Government funding.

Information drawn from publications of the International Energy Agency (IEA) and the Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC). This extract was adapted from Appendix 3 from the Commonwealth Government, Environment Protection and Heritage Council, 2009, Environmental Guidelines for Carbon Dioxide Capture and Geological Storage – 2009, NEPC Service Corporation, pp. 15-18

Attachment **C**

KEY CHALLENGES AND LEARNINGS OF USING CURRENT REGULATORY ARRANGEMENTS ON THE CO2CRC OTWAY PROJECT[132]

Activity	Key legislation	Process	Issues and learnings
The injection and storage of GHGs for the purpose of long-term storage	No provision under existing legislation which applies specifically to what the proposed legislation terms a GHG Sequestration Operation[133]		**Issues:** No specific regulatory framework exists to enable the injection and storage of greenhouse gases for the purpose of long-term storage as part of Victoria's commitment to the reduction of atmospheric GHG emissions. The *Petroleum Act 1998* currently regulates EOR/EGR operations. However, it is inadequate for the unique issues presented by CCS[134]. Learnings: There are some unique challenges associated with GHG capture, transport and storage which warrant the development of standalone legislation dedicated to regulating this sector.

[132] Earth Resources Policy Unit, Energy and Earth Resources Policy Division, the Department, Government of Victoria, Key Issues and Options for a Regulatory Framework for the long term Underground Geological Storage of Co2 in Victoria: a Background Paper, 31 October 2007

[133] The drafting instructions use this term to describe any activity conducted as part of either "GHG sequestration formation exploration" or "GHG stream injection and monitoring".

[134] As previously noted - section 46(c) of the Petroleum Act confers the right on production licence holders to do any thing in the licence area that is necessary for, or incidental to, petroleum production. However, because of the way in which the Petroleum Act defines petroleum so as to exclude Co2 except where it forms part of a naturally occurring mixture of hydrocarbons, the Act does not enable the specific regulation of a gas stream which is primarily Co2.

Activity	Key legislation	Process	Issues and learnings
Exploration for suitable underground geological formations	No provision under existing legislation which applies specifically to this activity		**Issues:** The *Petroleum Act 1998* (sections 19-34) provides for the grant of a exploration permit to carry out activities for the purpose of finding petroleum or reservoirs in which it is likely to be found, but does not provide for activities needed to assess the feasibility of injecting and storing greenhouse gases in the long term. **Learnings:** There needs to be legislation to regulate the activity of exploring for suitable GHG storage sites.
Assessment and approval process	*Petroleum Act 1998* *Environment Protection Act 1970* *Water Act 1989* *Planning and Environment Act 1987*	It took a year and a half to: • Transfer all right, title and interest under the current petroleum production licence (PPL 11) from Origin Energy Resources Limited and Beach Petroleum Limited to the CO2CRC Pilot Project Limited under the *Petroleum Act*; • Apply for a new petroleum licence under the *Petroleum Act*; • Apply for a research, development and demonstration approval (RDD)[135] under the *EP Act*; and • Gain approval to dispose of matter underground by means of a bore and to operate works for that purpose, under the *Water Act*.	**Issues:** Under the Moyne Shire planning scheme, the areas under which the petroleum production licences were issued (PPL11 and PPL13) had been rezoned as farming. This could have prohibited the project from being undertaken in that zone. **Learnings:** The project proponents suggested that there be a single assessment and approval process with referrals to other agencies, coordinated by a single agency to achieve a consistent whole of government position on the regulation of CCS. It was also noted that CCS needed to be clearly defined in planning schemes as a new category of activity that is allowed in rural or farming zones.

[135] s 19E of the EP Act.

Activity	Key legislation	Process	Issues and learnings
Access to land	*Petroleum Act 1998* *Planning and Environment Act 1987* *Land Acquisition and Compensation Act 1986*	• Land required for the project had to be declared special land under the *Planning and Environment Act 1987* for the purpose of compulsory acquisition under the *Land Acquisition and Compensation Act 1986* as a compensation agreement could not be reached with one of three landholders. • The project had to be declared a development of State significance under the Victorian *Planning and Environment Act 1987* for it to proceed.	**Issues:** Petroleum production licences issued (PPL10, PPL11 and PPL13) were on land possessed by three private landholders. Consent of the owner or agreement on compensation was required under the *Petroleum Act* before any operations could commence. A compensation agreement with the third landholder could not be reached. Usual process would have been for the proponent to apply to VCAT for resolution of the compensation dispute. The *Petroleum Act* does not empower the Minister to intervene and determine the compensation dispute. Following consultation with the proponent, the Department determined that because of the likely impact of delays on project milestones, the project should be declared a development of State significance under the *Planning and Environment Act 1987*. Alternatively, a pipelines licence under the *Pipelines Act 1998* could have been obtained to gain access to the third landholder's land for the purpose of establishing the pipeline. **Learnings:** A mechanism is needed to resolve a situation where the project operator and landholder and/or occupier can't reach an agreement in relation to GHG capture, transport and storage activities on the landholder's and/or occupier's property. A mechanism through which access could be gained for the purpose of 'offsite' monitoring activities associated with GHG storage was also needed..

Activity	Key legislation	Process	Issues and learnings
Storage of gas – monitoring & verification	*Environment Protection Act 1970* *Water Act 1989* *State Environment Protection Policy (Groundwater)*	The RDD approval issued under the *Environment Protection Act 1970* provides that an Environment Improvement Plan must be submitted to the EPA which includes a monitoring program, a timetable for reporting monitoring results and interpretation, a protocol for reporting any result to the EPA that is outside the range expected and an incident reporting procedure for any spills, leaks or non-routine discharges to the environment.	**Issues:** The monitoring requirements under the *EP Act*, *Water Act* and SEPP may not take into account the permanent nature of the storage of CO2. The permanent storage of CO2 could require a monitoring and verification regime that extends 30-40 years after the injection phase of the project is completed to minimise potential environmental and public heath risks. **Learnings:** There is a need to include a long-term monitoring and verification requirement for CCS projects that is capable of adapting to the specific phase of the operation.
Project closure: decommission & rehabilitation bonds	*Petroleum Act 1998* *Environment Protection Act 1970*	Under s 111 of the *Petroleum Act 1998* PPL11 and 13 cannot be surrendered until the proponent has complied with all relevant obligations under the Act, including compliance with any conditions that apply in relation to the petroleum production licences, removal of all infrastructures from the site, sealing the wells and rehabilitation of the surface. A rehabilitation bond is also required from proponents. Under the terms of the RDD approval, the Environment Improvement Plan to be submitted to the EPA must include procedures for decommission the works at the end of the injection phase and proponents must meet their obligations.	**Issues:** The *Petroleum Act* and *Environment Protection Act* requires for a rehabilitation bond and a decommission plan, however these are not specific to CCS activities. **Learnings:** Similar requirements are required to regulate CCS activities so as to minimise any environmental and public heath risks as well as any related costs that could be borne by the wider community.

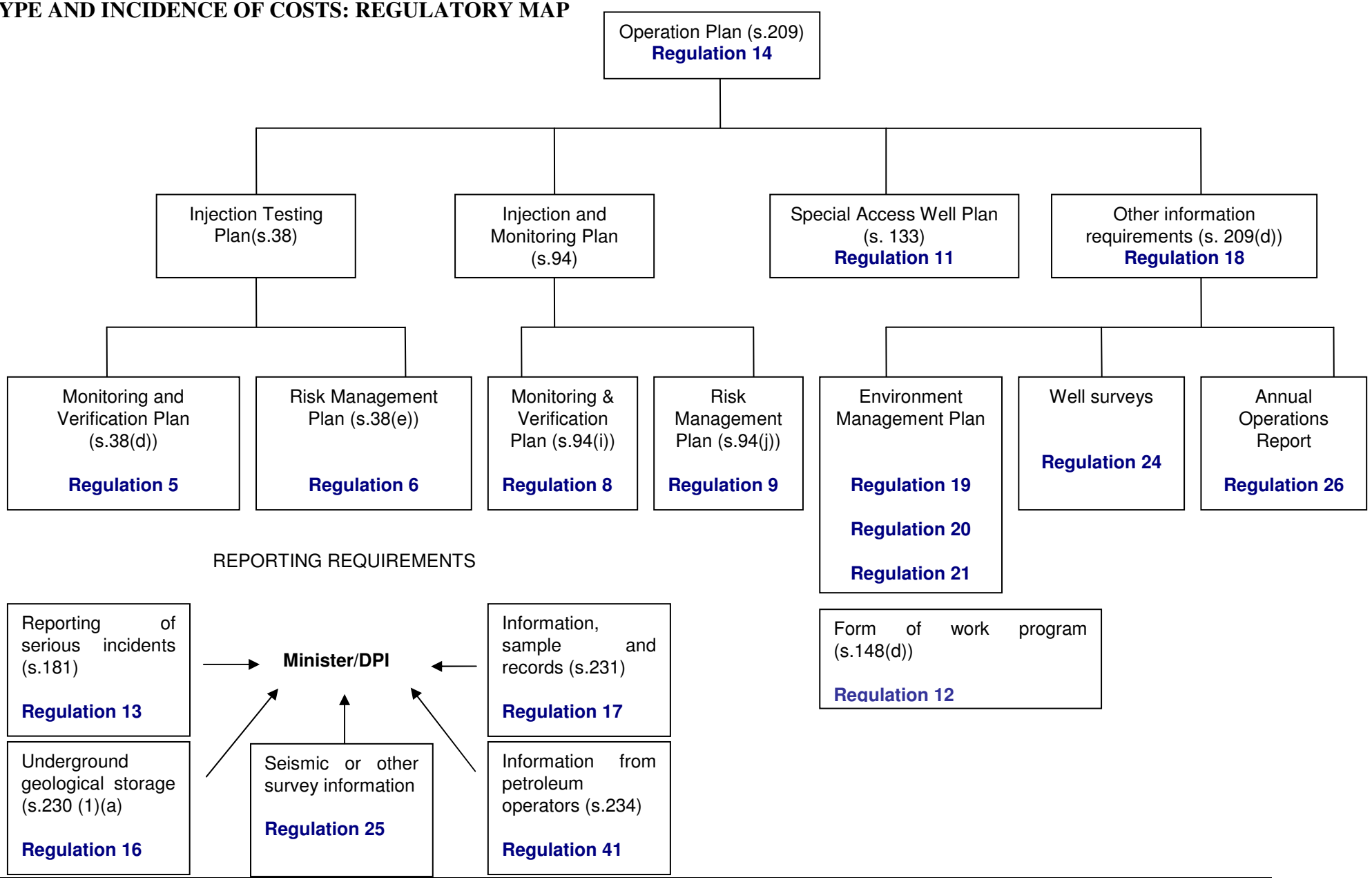
Summary:

The CO2CRC Project highlighted that the legislative framework under which it was authorised was inadequate for regulating commercial-scale CCS due to the following:

- It required compliance with a number of Acts, which created regulatory uncertainty. (The GHG Geological Sequestration Act 2008 (the GGGSA)creates a comprehensive framework for the underground storage of CO2 and other prescribed GHGes)..
- The assessment and approvals process was complex. (The GGGSA and proposed Regulations will streamline assessment and approvals and lead to lower project costs and time taken to obtain approvals)
- It did not provide certainty in a number of areas including access to land and drilling of the injection well. (The GGGSA establishes processes that enable resolution of potential land and resource conflicts.

Attachment D

TYPE AND INCIDENCE OF COSTS: REGULATORY MAP



TYPE AND INCIDENCE OF COSTS

Regulation	Type of Cost	Affected Parties
Regulation 5 – Injection testing plan—monitoring and verification plan	Administrative	Permit and/or licence holder
Regulation 6 – Injection testing plan—risk management plan	Administrative	Permit and/or licence holder
Regulation 7 – Applications—Time period for commencement	Substantive compliance	Permit and/or licence holder
Regulation 8 – Injection and monitoring plan— monitoring and verification plan	Administrative	Permit and/or licence holder
Regulation 9 – Injection and monitoring plan—risk management plan	Administrative	Permit and/or licence holder
Regulation 10 – Special access authorisation—duration of authority	Substantive compliance	Permit and/or licence holder
Regulation 11 – Special access authorisation —special access well plan	Administrative	Permit and/or licence holder
Regulation 12 – Form of work program	Administrative	Permit and/or licence holder
Regulation 13 – Reporting of serious situations	Administrative	Permit and/or licence holder
Regulation 14 Requirement for review of operation plan	Administrative/ substantive compliance	Permit and/or licence holder
Regulation 15 Rent payable for occupancy of Crown land	Financial	Permit and/or licence holder
Regulation 16 – Discovery of underground geological storage information	Administrative	Permit and/or licence holder
Regulation 17 – Information, samples and records	Administrative	Permit and/or licence holder
Regulation 18 – Operation plan must include an environment management plan	Administrative	Permit and/or licence holder
Regulation 19 – Description of the environment	Administrative	Permit and/or licence holder
Regulation 20 – Description of environmental effects and risks	Administrative	Permit and/or licence holder
Regulation 21 – Environmental performance objectives and standards	Administrative	Permit and/or licence holder

Regulation	Type of Cost	Affected Parties
Regulation 22 – Implementation strategy for the environmental plan	Administrative	Permit and/or licence holder
Regulation 23 – Other information in the environment management plan	Administrative	Permit and/or licence holder
Regulation 24 – Authority holder to provide information about wells made under certain authorities	Administrative	Permit and/or licence holder
Regulation 25 Authority holder to provide survey information to the Minister	Administrative	Permit and/or licence holder
Regulation 26 – Periodic overview report on greenhouse gas sequestration operations	Administrative	Permit and/or licence holder
Regulation 28 – Duty of disclosure of pecuniary interests	Government	DPI – persons employed in the administration of the Act
Regulation 29 – Disclosure of interest register	Government	DPI
Regulation 30 – Inspection of register	Government	DPI
Regulation 31 – Application Fees	Financial	Exploration permit, retention lease, and injection and monitoring licence holders
Regulation 32 – Late fee for renewal of exploration permit	Financial	Exploration permit holders
Regulation 33 – Fee for renewal of exploration permit	Financial	Exploration permit holders
Regulation 34 – Late fee for retention lease	Financial	Retention lease holders

Regulation	Type of Cost	Affected Parties
Regulation 35 – Annual fees for exploration permit, retention lease or injection and monitoring licence	Financial	Exploration permit, retention lease, and injection and monitoring licence holders
Regulation 36 – Fees for transfer or renewal of an exploration permit, retention lease or injection and monitoring licence	Financial	Exploration permit, retention lease, and injection and monitoring licence holders
Regulation 37 Fees for inspection of, or copy of document in, greenhouse gas sequestration register	Financial	Any person
Regulation 38 Fee for Minister's certificate under s 287	Financial	Any person
Regulation 39 – Time period before a disputed claim can go to Tribunal or Court	Substantive compliance	Occupier of land and licence holder
Regulation 40 – Compensation agreement	Substantive compliance	Occupier of land and licence holder
Regulation 41 – Minister may require information from petroleum operators	Administrative	Petroleum licence holders

Note: Regulations 1-4 and 27 are machinery regulations and as such do not impose compliance costs.

Attachment E

FEES IMPOSED BY THE PROPOSED REGULATIONS

Proposed Greenhouse Gas Geological Sequestration Regulations 2009 – Fee Schedule							
Regulation	**Description of Fee**	**Staff time (hours) VPS5**	**Salary rate (hourly) VPS5**	**Staff time (hours) VPS6**	**Salary rate (hourly) VPS6**	**Indicative Cost ($)**	**Fee Units**
	Exploration Permits						
31(1)	Fee for application for exploration permit	58	52.63	25	64.56	4,667	**400**
33	Fee for renewal of exploration permit	28	52.63	14	64.56	2,378	**200**
35(1)(a)	Annual fee for exploration permit	98	52.63	20	64.56	6,449	**550**
36(a)	Fee for transfer of exploration permit	58	52.63	25	64.56	4,667	**400**
	Retention Leases						
31(2)	Fee for application for retention lease	58	52.63	25	64.56	4,667	**400**
35(1)(b)	Annual fee for retention lease	98	52.63	20	64.56	6,449	**550**
36(b)	Fee for renewal of retention lease	28	52.63	14	64.56	2,378	**200**
36(c)	Fee for transfer of retention lease	58	52.63	25	64.56	4,667	**400**
	Injection and Monitoring Licences						
31(3)	Application fee for injection and monitoring licence	124	52.63	80	64.56	11,691	**1000**
35(1)(c	Annual fee for injection and monitoring licence	98	52.63	20	64.56	6,449	**550**
36(d)	Fee for transfer of injection and monitoring licence	58	52.63	25	64.56	4,667	**400**
	Special Access Licence						
31(4)	Fee for application for special access licence	6.5	52.63	2	64.56	471	**40**
	Greenhouse Gas Sequestration Register						
38	Minister's certificate					58.45	**5**
37(a)	Inspection of the greenhouse gas sequestration register					23.38	**2**
37(b)	Copy of document or entry in register - per A4 page					See note 3	**$4**

Notes:

1. Salary rates are from the Victorian Public Service Agreement 2006 effective from 1 October 2008. The hourly rates for a VPS5 and VPS6 officer are $45.18 and $55.42 respectively. These rates have been grossed-up by the VCEC rate of 16.5 per cent to allow for salary on-costs. This provides an hourly rate of $52.63 (VPS5) and $64.56 (VPS6). Also see Assumption 3 in Attachment F.
2. Under the *Monetary Units Act 2004* , a fee unit from 1 July 2009 to 30 June 2010 has been set by the Treasurer at $11.69.
3. For consistency, fee items 13, 14 and 15 have been set at the same rate applying to these items in the Geothermal Energy Resources Regulations 2005.

Attachment F

COSTS IMPOSED BY THE PROPOSED REGULATIONS OVER 10-YEAR PERIOD

Summary of Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009 – 10 Year Assessment Period		
Costs imposed on licence and permit holders		
Regulation	***Description***	**Cost ($)**
Regulations 5 and 6	Injection testing plan	58,794
Regulations 8 and 9	Injection and monitoring plan	47,829
Regulation 11	Special access authority – special access well plan	25,618
Regulation 13	Reporting of serious situations	52,717
Regulations 14	Operation plan to include provision for review	75,102
Regulation 16 and 17	Reporting arrangements - Underground geological storage, information, samples and records	11,090
Regulations 19 to 23	Operation Plan must include an Environment Management Plan	177,193
Regulations 24 and 25	Operator to provide information about wells and surveys made under certain authorities	16,869
Regulation 26	Periodic overview of greenhouse gas sequestration operations	126,521
Regulation 41	Information from petroleum operators	17,319
Total		**609,054**

1. Costs have been discounted.

Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009					
Price		**Quantity**			**Administrative Cost**
Regulations 5 and 6 - Injection testing plan					
	Tariff[1]	*Time (hours)*[2]	*Population*[3]	*Frequency*[4]	
Regulation 5 - Monitoring and verification plan	126.78	240	1	1	30,426
Regulation 6 - Risk management plan	126.78	240	1	1	30,426
				Total	**$60,852**

Discounted (10-Years)					
Year	**Administrative Cost ($)**				**Discounted Administrative Cost ($)**[5]
1	$60,852				$58,794
2	$0				$0
3	$0				$0
4	$0				$0
5	$0				$0
6	$0				$0
7	$0				$0
8	$0				$0
9	$0				$0
10	$0				$0
				Total	**$58,794**

Notes:

1. The tariff is based on the mid-point range of the annual salary of an exploration manager (geology) in Victoria (see Hays Mining & Resources 2008 Salary Survey, p. 118) of $127,500, which was grossed up by a factor of 1.75 to take into account labour and non-labour on-costs (see Victorian Guide to Regulation, Section C.2.1, p. C-4) providing a salary $223,125 per annum. Assuming that that are 220 total working days per annum and 8 hours is worked per day, this provides an hourly rate of $126.78 per hour
2. Estimated from stakeholder advice.
3. Costing analysis is based on a single tenement.
4. Injecting test plans are produced once.
5. The discount rate used in this RIS is 3.5 per cent. In doing so, the RIS adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)
6. Figures may not add due to rounding.

Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009					
Price		**Quantity**			**Administrative Cost**
Regulations 8 and 9 - Injection and monitoring plan					
	Tariff[1]	*Time (hours)*[2]	*Population*[3]	*Frequency*[4]	
Regulation 8 – Monitoring and verification plan	126.78	240	1	1	30,426
Regulation 9 – Risk management plan	126.78	240	1	1	30,426
				Total	**$60,852**

Discounted (10-Years)					
Year	**Administrative Cost ($)**				**Discounted Administrative Cost ($)**[5]
1	$0				$0
2	$0				$0
3	$0				$0
4	$0				$0
5	$0				$0
6	$0				$0
7	$60,852				$47,829
8	$0				$0
9	$0				$0
10	$0				$0
				Total	**$47,829**

Notes:

1. The tariff is based on the mid-point range of the annual salary of an exploration manager (geology) in Victoria (see Hays Mining & Resources 2008 Salary Survey, p. 118) of $127,500, which was grossed up by a factor of 1.75 to take into account labour and non-labour on-costs (see Victorian Guide to Regulation, Section C.2.1, p. C-4) providing a salary $223,125 per annum. Assuming that that are 220 total working days per annum and 8 hours is worked per day, this provides an hourly rate of $126.78 per hour
2. Estimated from stakeholder advice.
3. Costing analysis is based on a single tenement.
4. Injecting and monitoring plans are produced once.
5. The discount rate used in this RIS is 3.5 per cent. In doing so, the RIS adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)
6. Figures may not add due to rounding.

Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009					
Price		**Quantity**			**Administrative Cost**
Regulation 11 - Special access authority – special access well plan					
	Tariff[1]	*Time (hours)*[2]	*Population*[3]	*Frequency*[4]	
Special access well plan	126.78	240	1	1	30,426
				Total	**$30,426**

Discounted (10-Years)					
Year	**Administrative Cost ($)**				**Discounted Administrative Cost ($)**[5]
1	$0				$0
2	$0				$0
3	$0				$0
4	$0				$0
5	$30,426				$25,618
6	$0				$0
7	$0				$0
8	$0				$0
9	$0				$0
10	$0				$0
				Total	**$25,618**

Notes:
1. The tariff is based on the mid-point range of the annual salary of an exploration manager (geology) in Victoria (see Hays Mining & Resources 2008 Salary Survey, p. 118) of $127,500, which was grossed up by a factor of 1.75 to take into account labour and non-labour on-costs (see Victorian Guide to Regulation, Section C.2.1, p. C-4) providing a salary $223,125 per annum. Assuming that that are 220 total working days per annum and 8 hours is worked per day, this provides an hourly rate of $126.78 per hour
2. Estimated from stakeholder advice.
3. Costing analysis is based on a single tenement.
4. Special access well plans are produced once. It is likely that such plans would be required, if at all, following commencement of operations, therefore it is assumed that this take place in year 5.
5. The discount rate used in this RIS is 3.5 per cent. In doing so, the RIS adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)
6. Figures may not add due to rounding.

Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009					
Price		**Quantity**			**Administrative Cost**
Regulation 13 - Reporting of serious situations					
	Tariff[1]	*Time (hours)*[2]	*Population*[3]	*Frequency*[4]	
Reporting of serious situations	126.78	50.0	1	1	6,339
				Total	**$6,339**

Discounted (10-Years)					
Year	**Administrative Cost ($)**				**Discounted Administrative Cost ($)**[5]
1	$6,339				$6,124
2	$6,339				$5,917
3	$6,339				$5,717
4	$6,339				$5,524
5	$6,339				$5,337
6	$6,339				$5,157
7	$6,339				$4,982
8	$6,339				$4,814
9	$6,339				$4,651
10	$6,339				$4,494
				Total	**$52,717**

Notes:

1. The tariff is based on the mid-point range of the annual salary of an exploration manager (geology) in Victoria (see Hays Mining & Resources 2008 Salary Survey, p. 118) of $127,500, which was grossed up by a factor of 1.75 to take into account labour Regulation, Section C.2.1, p. C-4) providing a salary $223,125 per annum. Assuming that that are 220 total working days per annum and 8 hours is worked per day, this provides an hourly rate of $126.78 per hour
2. This estimate inlcudes the cost of telephoning DPI and preparing a subsequent note in writing.
3. Costing analysis is based on a single tenement.
4. The frequency of such events is difficult to estimate. In the absense of any data an estimate of one event per year is assumed.
5. The discount rate used in this RIS is 3.5 per cent. In doing so, the RIS adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)
6. Figures may not add due to rounding.

Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009					
Price		**Quantity**			**Administrative Cost**
Regulation 14 - Operation plan to include provision for review					
	Tariff[1]	*Time (hours)*[2]	*Population*[3]	*Frequency*[4]	
Operations plan - 5 yearly review	126.78	240.0	1	1	30,426
				Total	**$30,426**

Discounted (10-Years)					
Year	**Administrative Cost ($)**				**Discounted Administrative Cost ($)**[5]
1					$0
2					$0
3					$0
4					$0
5					$0
6	$30,426				$30,426
7					$0
8	$30,426				$23,106
9					$0
10	$30,426				$21,570
				Total	**$75,102**

Notes:

1. The tariff is based on the mid-point range of the annual salary of an exploration manager (geology) in Victoria (see Hays Mining & Resources 2008 Salary Survey, p. 118) of $127,500, which was grossed up by a factor of 1.75 to take into account labour and non-labour on-costs (see Victorian Guide to Regulation, Section C.2.1, p. C-4) providing a salary $223,125 per annum. Assuming that that are 220 total working days per annum and 8 hours is worked per day, this provides an hourly rate of $126.78 per hour
2. This estimate assumes that a report will take about 2 working days to prepare. This is considered a conservative estimate given that such a report would be based on data prepared by the firm in any case.
3. Costing analysis is based on a single tenement.
4. The frequency of such events is difficult to estimate. In the absence of an data an estimate of one event per year is assumed.
5. The discount rate used in this RIS is 3.5 per cent. In doing so, the RIS adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)
6. Figures may not add due to rounding.

Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009					
Price		**Quantity**			**Administrative Cost**
Regulations 16 and 17 - Reporting Arrangements					
	Tariff[1]	*Time (hours)*[2]	*Population*[3]	*Frequency*[4]	
Regulation 16 – Underground geological storage	126.78	16	1	1	2,028
Regulation 17 – Information, samples and records	126.78	16	1	1	2,028
				Total	**4,057**

Discounted (10-Years)					
Year	**Administrative Cost ($)**				**Discounted Administrative Cost ($)**[5]
1	$0				$0
2	$4,057				$4,057
3	$0				$0
4	$0				$0
5	$0				$0
6	$0				
7	$0				$0
8	$4,057				$4,057
9	$4,057				$2,977
10	$0				$0
				Total	**$11,090**

Notes:

1. The tariff is based on the mid-point range of the annual salary of an exploration manager (geology) in Victoria (see Hays Mining & Resources 2008 Salary Survey, p. 118) of $127,500, which was grossed up by a factor of 1.75 to take into account labour and non-labour on-costs (see Victorian Guide to Regulation, Section C.2.1, p. C-4) providing a salary $223,125 per annum. Assuming that that are 220 total working days per annum and 8 hours is worked per day, this provides an hourly rate of $126.78 per hour
2. The time relates to preparing the reports/samples for the Minister. It is assumed that an operator as part of normal business practice would collect such data, information and samples in the absence of the regulations.
3. Costing analysis is based on a single tenement.
4. It is assumed that the Minister will request this information three times over a ten year period. This is a conservative estimate.
5. The discount rate used in this RIS is 3.5 per cent. In doing so, the RIS adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)
6. Figures may not add due to rounding.

Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009					
Price		**Quantity**			**Administrative Cost**
Regulations 19 to 23 - Operation Plan must include an environment management plan					
Discounted (10-Years)					
Year	**Administrative Cost ($)**				**Discounted Administrative Cost ($)**[2]
1	$15,000				$14,493
2	$0				$0
3	$0				$0
4	$0				$0
5	$0				$0
6	$200,000				$162,700
7	$0				$0
8	$0				$0
9	$0				$0
10	$0				$0
				Total	**$177,193**

Notes:
1. These costs were informed to stakeholder input. The cost in Year 1 relates to an operation plan for the exploration stage, while the cost in Year 6 is for a plan at the operation stage.
2. The discount rate used in this RIS is 3.5 per cent. In doing so, the RIS adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)
3. Figures may not add due to rounding.

Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009					
Price		**Quantity**			**Administrative Cost**
Operator to provide information about wells and surveys made under certain authorities					
	Tariff [1]	*Time (hours)* [2]	*Population* [3]	*Frequency* [4]	
Regulation 24 - Well details	126.78	16	1	1	2,028
Regulation 25 - Survey details	126.78	8	1	1	1,014
				Total	**2,028**

Discounted (10-Years)					
Year	**Administrative Cost ($)**				**Discounted Administrative Cost ($)** [5]
1	$2,028				$1,960
2	$2,028				$1,894
3	$2,028				$1,830
4	$2,028				$1,768
5	$2,028				$1,708
6	$2,028				$1,650
7	$2,028				$1,594
8	$2,028				$1,540
9	$2,028				$1,488
10	$2,028				$1,438
				Total	**$16,869**

Notes:

1. The tariff is based on the mid-point range of the annual salary of an exploration manager (geology) in Victoria (see Hays Mining & Resources 2008 Salary Survey, p. 118) of $127,500, which was grossed up by a factor of 1.75 to take into account labour and non-labour on-costs (see Victorian Guide to Regulation, Section C.2.1, p. C-4) providing a salary $223,125 per annum. Assuming that that are 220 total working days per annum and 8 hours is worked per day, this provides an hourly rate of $126.78 per hour
2. Estimated from stakeholder advice.
3. Costing analysis is based on a single tenement.
4. Assumes one well per annum is drilled.
5. The discount rate used in this RIS is 3.5 per cent. In doing so, the RIS adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)
6. Figures may not add due to rounding.

Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009					
Price		**Quantity**			**Administrative Cost**
Regulation 26 - Periodic overview of greenhouse gas sequestration operations					
	Tariff[1]	*Time (hours)*[2]	*Population*[3]	*Frequency*[4]	
Annual operations report	126.78	120	1	1	15,213
				Total	**$15,213**

Discounted (10-Years)					
Year	**Administrative Cost ($)**				**Discounted Administrative Cost ($)**[5]
1	$15,213				$14,699
2	$15,213				$14,202
3	$15,213				$13,721
4	$15,213				$13,257
5	$15,213				$12,809
6	$15,213				$12,376
7	$15,213				$11,957
8	$15,213				$11,553
9	$15,213				$11,162
10	$15,213				$10,785
				Total	**$126,521**

Notes:

1. The tariff is based on the mid-point range of the annual salary of an exploration manager (geology) in Victoria (see Hays Mining & Resources 2008 Salary Survey, p. 118) of $127,500, which was grossed up by a factor of 1.75 to take into account labour and non-labour on-costs (see Victorian Guide to Regulation, Section C.2.1, p. C-4) providing a salary $223,125 per annum. Assuming that that are 220 total working days per annum and 8 hours is worked per day, this provides an hourly rate of $126.78 per hour
2. Estimated from stakeholder advice.
3. Costing analysis is based on a single tenement.
4. Reports are required annually.
5. The discount rate used in this RIS is 3.5 per cent. In doing so, the RIS adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)
6. Figures may not add due to rounding.

Costs of Proposed Greenhouse Gas Geological Sequestration Regulations 2009					
Price		**Quantity**			**Administrative Cost**
Regulation 27 - Information from petroleum operators					
	Tariff[1]	*Time (hours)*[2]	*Population*[3]	*Frequency*[4]	
Information from petroleum operators	126.78	40	1	1	5,071
				Total	**$5,071**

Discounted (10-Years)					
Year	**Administrative Cost ($)**				**Discounted Administrative Cost ($)**[5]
1	$5,071				$4,900
2	$0				$0
3	$5,071				$4,574
4	$0				$0
5	$0				$0
6	$5,071				$4,125
7	$0				$0
8	$0				$0
9	$5,071				$3,721
10	$0				$0
				Total	**$17,319**

Notes:

1. The tariff is based on the mid-point range of the annual salary of an exploration manager (geology) in Victoria (see Hays Mining & Resources 2008 Salary Survey, p. 118) of $127,500, which was grossed up by a factor of 1.75 to take into account labour and non-labour on-costs (see Victorian Guide to Regulation, Section C.2.1, p. C-4) providing a salary $223,125 per annum. Assuming that that are 220 total working days per annum and 8 hours is worked per day, this provides an hourly rate of $126.78 per hour
2. Estimated from stakeholder advice.
3. Costing analysis is based on a single tenement.
4. The frequency assumes that the Minister requests this information from operators three times over a ten year period.
5. The discount rate used in this RIS is 3.5 per cent. In doing so, the RIS adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)
6. Figures may not add due to rounding.

Attachment G

ASSUMPTIONS

1. The real discount rate used in this RIS is 3.5 per cent. The RIS therefore adopts the rate published in the *Victorian Guide to Regulation* (Section C.3, p. C-9)

2. The cost (tariff) use for the purposes of the calculation in this RIS is $126.78 per hour. This is based on the mid-point range of the annual salary of an exploration manager (geology) in Victoria (see Hays Mining & Resources 2008 Salary Survey, p. 118) of $127,500, which was grossed up by a factor of 1.75 to take into account labour and non-labour on-costs (see Victorian Guide to Regulation, Section C.2.1, p. C-4) providing a salary $223,125 per annum. Assuming that there are 220 total working days per annum and 8 hours is worked per day, this provides an hourly rate of $126.78 per hour. This is approximately 2.3 times greater than the default hourly rate of $54.55 used to calculate administrative costs, which is the 'average' hourly rate contained in the *Victorian Guide to Regulation* in relation to valuing staff time (Section C.2.1, p. C-5).

3. The calculation of fees is set on a full cost-recovery basis, however, costs for corporate overheads have not been included. This is because these activities will form only a small proportion of time from officers of the Energy & Earth Resources Policy Division and GeoScience Victoria, DPI, and such overhead costs would have been incurred in any case. This approach is supported by the Productivity Commission (Productivity Commission, 2001, *Cost Recovery by Government Agencies*, Report No. 15, AusInfo, Canberra, p. 160).