DEPARTMENT OF
PRIMARY INDUSTRIES

Discussion Paper April 2009



Greenhouse Gas Geological Sequestration Regulations

State Government Victoria
Department of Primary Industries

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Foreword

Carbon capture and storage is one of many new technologies the Victorian Government is investigating to tackle climate change. It offers the potential to transition coal, our largest source of electricity, to a cleaner future – an important step in achieving Victoria's target to cut emissions by 60 per cent of 2000 levels by 2050.

Geosequestration, or permanently storing carbon dioxide deep underground, is a key part of carbon capture and storage which has required legislative attention from the Victorian Government.

Last year, working alongside industry, the Victorian Government developed the *Greenhouse Gas Geological Sequestration Act 2008* to provide the clarity and certainty needed by industry to support investment in carbon storage.

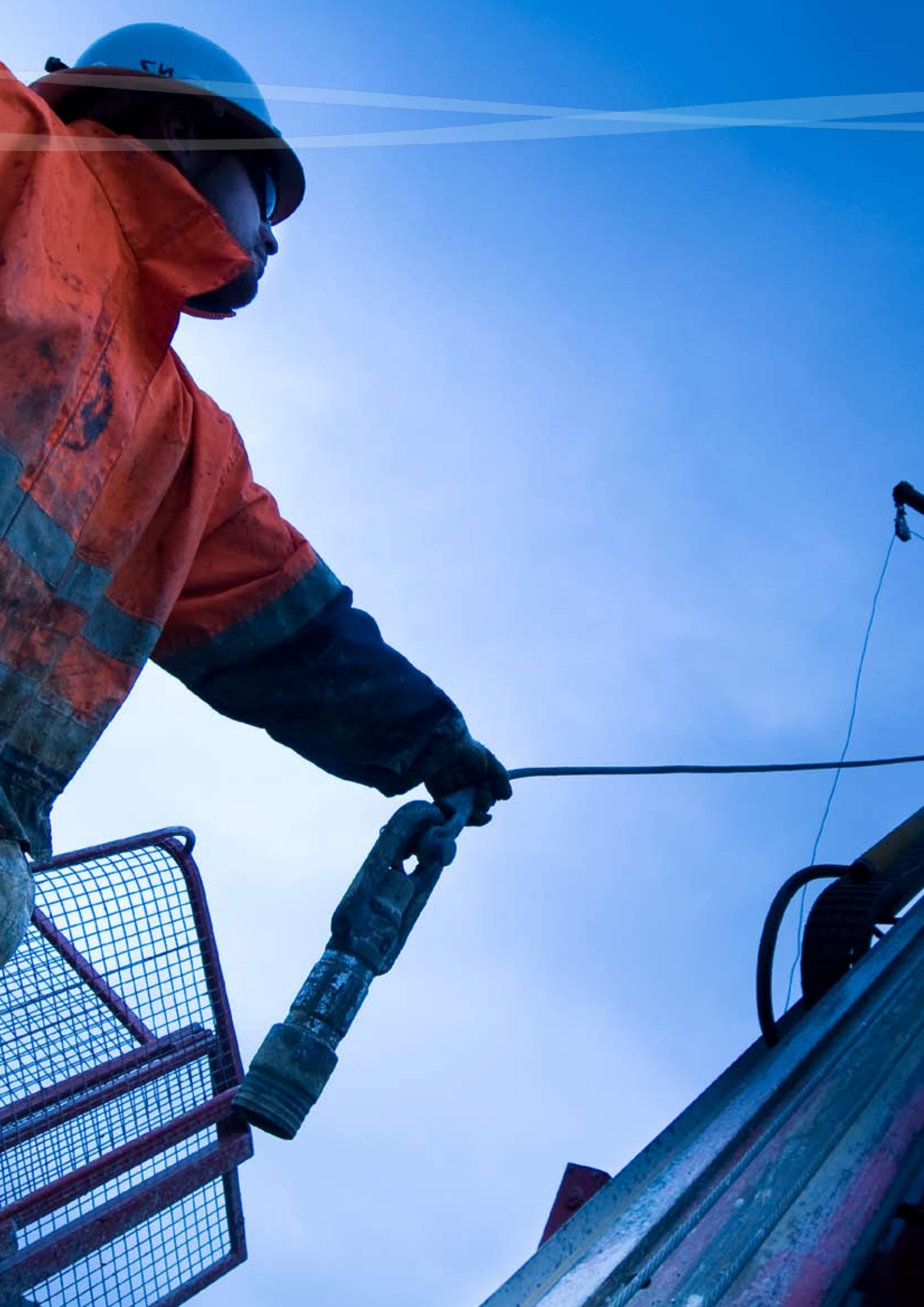
Assuring safety for communities and for the environment, the legislation will come into effect no later than 1 January 2010. It applies to Victoria's onshore area, spanning geological exploration injection and monitoring as well as the permanent storage of carbon emissions deep underground.

As we now begin work on the regulations and guidelines accompanying this Act, we invite you to contribute your views and ideas.

This Discussion Paper raises questions to begin a dialogue about the operational issues associated with geosequestration in Victoria.

I encourage you to submit a response and look forward to your contribution.

Richard Aldous
Deputy Secretary



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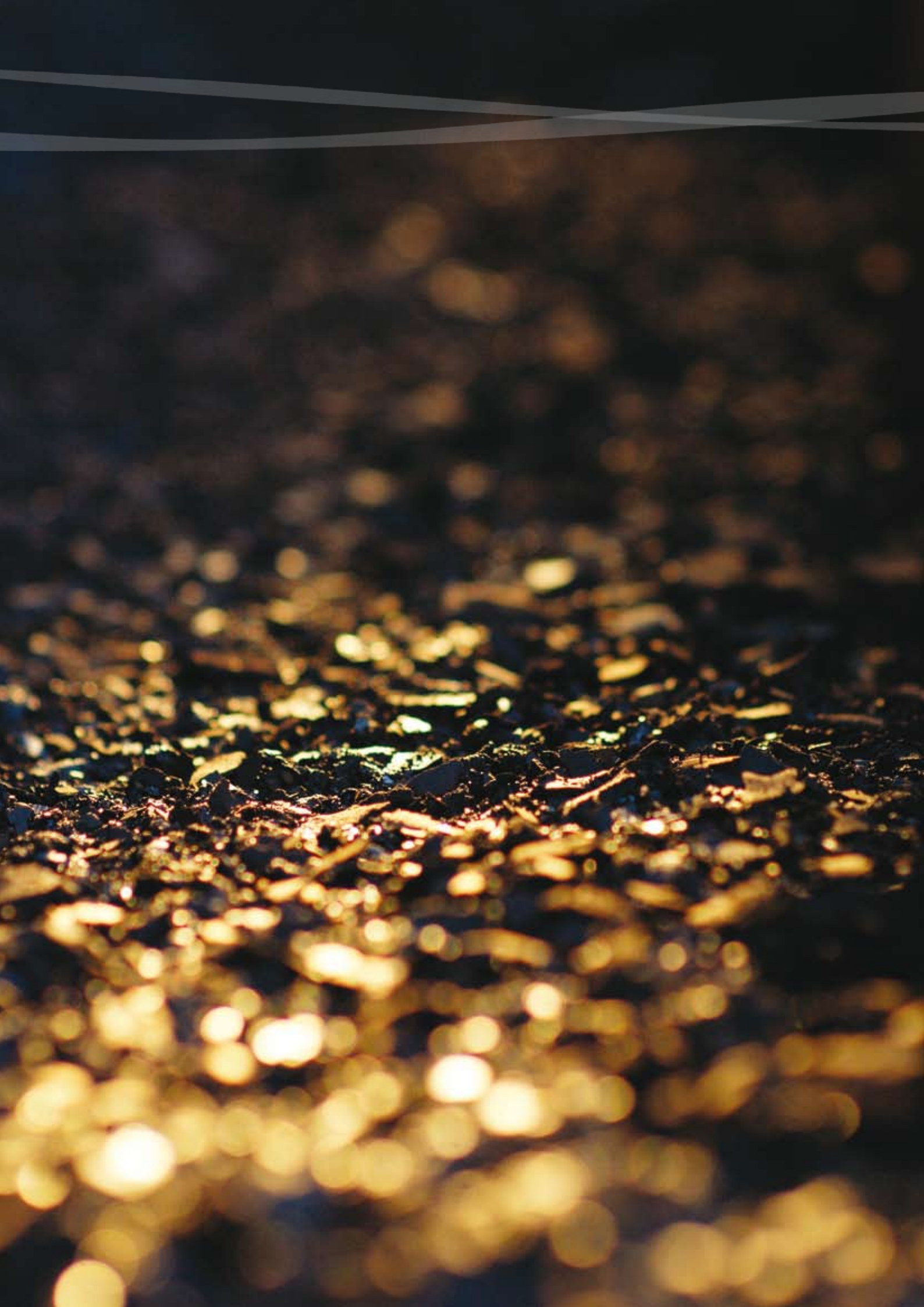


1 Introduction

The state of Victoria is committed to reducing its greenhouse gas emissions. A key technology likely to deliver the deep cuts required for this reduction from the stationary energy sector is carbon capture and storage. As articulated in the *Strategic Policy Framework for Near Zero Emissions from Victoria's fossil Fuels* Position Paper, commercial development of this technology requires comprehensive and effective legislation. To support development of this regulatory framework, the Victorian Parliament has passed the *Greenhouse Gas Geological Sequestration Act 2008* (GGGSA) to regulate the large-scale commercial and sustainable injection and permanent storage of greenhouse gas substances in onshore Victoria. The Act received Royal Assent on 5 November 2008 and will come into effect no later than 1 January 2010.

The GGGSA provides certainty for investors concerning their legal rights and obligations and also for other potentially affected interest holders. The Act also provides the community with confidence that injection and storage operations will be undertaken in a manner which minimises risks to public health and the environment.

The GGGSA was developed following an extensive consultation process, which included the release of a Discussion Paper, several public fora, and direct consultation with stakeholders and other State and Commonwealth Government agencies.

The GGGSA provides for the making of regulations to give effect to the legislation. The Department of Primary Industries will consult to develop and deliver supporting regulations and other required subordinate instruments.

This Discussion Paper is the first step in this process.

2 Submissions to the GGGSA Regulations Review

This Discussion Paper outlines the key areas in which regulations and guidelines may need to be developed and seeks your views on the issues identified.

A series of questions is posed throughout the Discussion Paper. The matters raised, and the questions posed, do not imply any particular view or position held by the Victorian Government. Written comments are being sought in response to the issues identified in this Paper by **Wednesday, 20 May 2009.**

Submissions need not be confined to these questions, but should address only issues related to the development of regulations and other material to support the GGGSA.

Comments should be sent by email to:
ccs.legal@dpi.vic.gov.au

Or posted to:
Greenhouse Gas Geological Sequestration Regulations
c/o Department of Primary Industries
GPO Box 4440
Melbourne Vic 3001

The Department encourages respondents to make their submissions available publicly. Unless marked 'IN CONFIDENCE', all submissions will be treated as public documents and may be placed on the Department's website www.dpi.vic.gov.au for public access. Formal requests for confidentiality will be honoured, however, Freedom of Information access requirements still apply to submissions treated as confidential.

Submissions received will assist the preparation of draft regulations, which will be released as part of the formal Regulatory Impact Statement process.

A copy of the *Greenhouse Gas Geological Sequestration Act 2008* can be obtained from www.legislation.vic.gov.au.

Key Dates

May 2009	Initial consultation
July - August 2009	Formal consultation on Draft Regulations and Regulatory Impact Statement (RIS)
1 January 2010	GGGSA proclaimed and Regulations made on or before this date

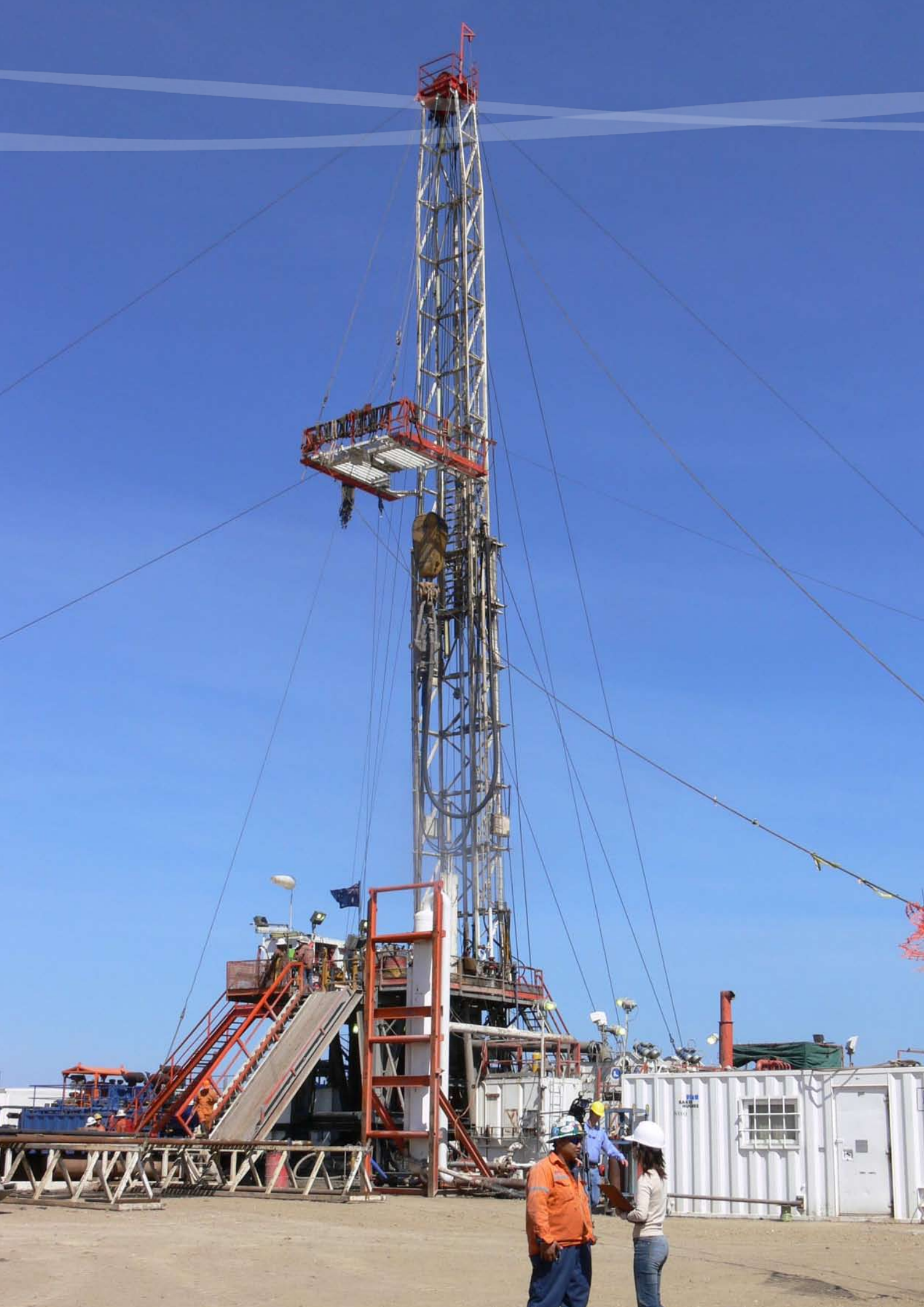
3 Background

The development of policy and regulatory regimes for the underground storage of carbon dioxide and other greenhouse gases (also known as geosequestration) is at a relatively early stage around the world. The *Regulatory Guiding Principles for Carbon Capture and Geological Storage (Regulatory Guiding Principles)*, endorsed by the Ministerial Council on Mineral and Petroleum Resource (MCMPR) in 2005, provides the broad policy framework for the facilitation of regulation of this activity in Australia.

At the national level, the Australian Government has amended its offshore petroleum legislation to provide for the geological storage of greenhouse gas in offshore Commonwealth waters, i.e. *Offshore Petroleum and Greenhouse Gas Storage Act 2006*.

The Victorian Government introduced stand-alone legislation in the form of the GGGSA - an approach that has since been adopted in Queensland. The development of the GGGSA recognises that, while the geological storage of greenhouse gases will involve many of the technologies applied by the petroleum industry, its purpose and effect are very different. Stand-alone legislation also recognises the unique legal issues associated with the underground injection and permanent storage of greenhouse gas substances.

The GGGSA is broadly based on existing regulatory frameworks for petroleum and geothermal operations. Given the similarity of some of the technologies and activities, the *Petroleum Regulations 2000* and *Geothermal Energy Resources Regulations 2006* provide 'models' on which GGGSA regulations can be based.



4 Issues for consideration

1 Regulations

The Victorian Government recognises that regulation is an important tool for achieving policy objectives and responding to community expectations, but understands that it can also represent a significant burden on business. The Government has a clear vision of well-targeted, effective and appropriate regulation that is the minimum necessary to achieve the desired outcomes.

Regulations under the GGGSA must strike a balance between creating regulatory certainty; minimising the regulatory burden on industry; achieving consistency across the earth resources sector; and ensuring that potential adverse effects are minimised or eliminated. Regulations under the GGGSA could be more or less prescriptive, or similar, to the Petroleum Regulations 2000 and Geothermal Energy Resources Regulations 2006.

Activities undertaken, and many of the technologies used for petroleum extraction and geothermal energy, are largely similar to carbon dioxide injection and storage. A similar approach to regulation of activities, such as exploration and drilling, could be adopted to provide a consistent approach.

Commercial-scale geological storage of carbon dioxide, however, is a new industry and knowledge and experience is limited worldwide. This gap could be the driver for more extensive regulation to protect safety, environmental and other interests, or it could encourage a less prescriptive approach to allow for technological change and commercial development of the industry.

New technologies and innovative techniques allow cost savings and efficiency gains. It would be undesirable for regulations to present an obstacle to the adoption of such developments, or to place additional, potentially costly burdens on industry. Since it is difficult to determine where these developments may occur, it would be advantageous to be as flexible as possible when setting the regulatory framework.

Conversely, carbon dioxide injection and storage involves permanently injecting large volumes of gas underground. While injection of gas, or liquid, into underground geological formations occurs in some earth resources industries, such as in enhanced oil recovery, most involve the extraction of heat, gas, or oil resources from natural underground formations. The GGGSA places greater emphasis on monitoring and verification of injection and storage operations. In this way, Government and the community can be assured that foreseeable environmental, health and other risks are managed appropriately and that the potential for any adverse effect is minimised.

Is it appropriate to base regulations under the Greenhouse Gas Geological Sequestration Act 2008 on the Petroleum Regulations 2000 and/or the Geothermal Energy Resources Regulations 2006?

Should a more, or less, prescriptive approach be adopted?

There are a number of aspects that will be unique to the injection and storage of carbon dioxide and other greenhouse gases (e.g. monitoring the behaviour of stored gas, and site closure arrangements). Accordingly, 'greenfield' regulations may need to be developed to address, *inter alia:*

- information to be submitted with any application for an exploration permit, or an injection and monitoring licence; matters related to various operational (work) plans; requirements for injection operations; requirements for monitoring and verification activities; and
- information and data to be provided by an operator during the life of an exploration permit, injection and monitoring licence, retention lease, or special access authorisation.

Are there other aspects of sequestration operations that warrant the development of regulations inherently different from those in the Petroleum Regulations 2000 and the Geothermal Energy Resources Regulations 2006?

2 Fees, rents and royalties

The GGGSA enables the recovery of costs associated with its administration, rent for the use, or occupancy, of Crown land, and the payment of royalties for the use of underground storage formations.

Fees

Fees are imposed by Government to recover costs of providing services to a select group. Fees are generally set at a level to recover the full cost of those services. The GGGSA contains a broad fee-making provision (s.303(1)(d)) in relation to a range of services. In some cases, specific fee-making provisions apply.

The tenure system established under the GGGSA has yet to be used and the costs associated with its administration are unknown. However, given that the activities required to access and administer the tenure system for greenhouse gas geological sequestration are likely to be similar to those for the petroleum and geothermal industries, it may be appropriate, in the first instance, to adopt similar fees as are currently in place under the *Petroleum Regulations 2000* and the *Geothermal Energy Resources Regulations 2006*.

Rent

The GGGSA (s.227) provides that an authority holder is liable to pay rent to the Minister if an operation involves the ongoing occupation of Crown land. The GGGSA requires that the amount of rent payable is to be stipulated in the regulations, or specified by the Minister in the relevant authority.

The same approach is taken in relation to petroleum extraction, for which regulations stipulate that, unless otherwise specified in an authority, the current market value for occupying the land, as determined by the Valuer-General, is applied. The authority holder is liable also for the costs incurred in obtaining the determination.

There is a similar provision under the *Geothermal Energy Resources Act 2005* to prescribe rent that is payable by the holders of authorities for occupying Crown land.

However, the *Geothermal Energy Resources Regulations 2006* do not include any reference to how rent is to be determined. This means that a rental arrangement would have to be included in an authority as and when required. This approach provides the flexibility for the Minister to set rents based on the circumstances at that time, but does not provide the same level of certainty to industry regarding the manner in which rent would be set if it was to be established in regulations.

Should the method by which rent for occupying Crown land be specified in the regulations?

If so, should the regulations specify a rent equivalent to the market value of the occupied Crown land as determined by the Valuer General, or some other method?

Royalties

The GGGSA (s.224) allows a royalty to be charged on the volume of a greenhouse gas substance injected into an underground geological storage formation. It also allows the responsible Minister, in consultation with the Treasurer, to waive the payment of a royalty.

State and Commonwealth jurisdictions routinely charge royalties for extraction of state-owned resources. This is the case for petroleum and gas extraction, coal mining and other mineral resources (although no royalties are payable for gold). This allows the State to benefit from the utilisation of its earth resources.

Under the *Petroleum Act 1998*, the production licence holder must pay to the Minister a royalty for all petroleum extracted, or recovered. A royalty is paid at the rate of 10 percent of the value of the petroleum at the well-head or, if a different rate is specified in the licence, then at that different rate.

The *Geothermal Energy Resources Act 2005* includes a provision for royalties on energy extraction. Government has yet to set or impose royalties in relation to this energy source, but has stated that such a charge may be introduced in the future.

The Crown owns all underground geological storage formations at depths of 15.24 metres or more below the surface of any land in Victoria. Storage capacity, therefore, can be thought of as a state-owned resource from which Victorians could reasonably expect to derive benefit.

The adoption of a royalty, based on the volume of a greenhouse gas injected, would recognise the value of that storage capacity and support the long-term management of stored gas for which the State assumes responsibility post closure of an injection operation. Conversely, the imposition of a royalty on a fledgling industry could impede its development.

A royalty on stored greenhouse gas could be established either as a condition of licence, or by regulation. The setting of a royalty on a case-by-case basis for each injection licence would provide the flexibility to determine the value of a storage formation based on relevant drivers, such as a carbon price, at the time of negotiating the licence. However, this may not provide sufficient certainty to potential investors when planning future operations. A fixed rate, set in regulations, may provide that certainty.

Note: A royalty would not be used to cover the costs of long-term monitoring and verification activities post surrender of an injection and monitoring licence.

Should a royalty apply to greenhouse gas geological sequestration? If so, how should the value of such a royalty be determined?

Should a similar approach to geothermal energy be adopted, with no royalty applicable in the early stages of the industry?

3 Information requirements

The *Australian Guiding Principles for Carbon Capture and Geological Storage* require that regulation should provide:

- for appropriate monitoring and verification requirements enabling the generation of clear, comprehensive, timely, accurate and publicly accessible information that can be used to effectively and responsibly manage environmental, health, safety and economic risks; and
- a framework to establish, to an appropriate level of accuracy, the quantity, composition and location of gas captured, transported, injected and stored, and the nett abatement of emissions. This should include identification and accounting for leakage.

In establishing legislation to encourage and facilitate greenhouse gas geological sequestration, the Victorian Government recognises the need to ensure public health and environmental impacts are considered and effectively managed, and that the injection and underground storage of greenhouse gas also has the potential to impact on other resource utilisation activities, such as petroleum and gas production.

The Act is explicit in identifying much of the information an applicant or authority holder needs to provide to Government to:

- enable a better understanding of the nature of potential and proposed underground storage formations;
- identify possible risks associated with proposed injection operations and the means by which they would be managed; and
- identify the impacts of operations.

The GGGSA also provides for regulations to be made where an increased level of information is required.

The need for information must be balanced against the burden that its collection and provision can impose. It is essential that the nature and level of information required are sufficient to support sound decision-making and inform the public, while not compromising commercial confidentialities.

The areas in which additional information may be required can be defined broadly as:

- supporting decision-making in advance of operations;
- increasing the understanding of underground resources;
- ensuring the integrity of intended operations; and
- increasing the understanding of the impact of operations.

Underground storage formations

Critical to the adoption of carbon storage technology is an increased knowledge and understanding of potential storage formations. The GGGSA (s.230) provides that, when a potential underground storage formation is discovered, the Minister may require information to be provided to assist in:

- clarifying the characteristics and the extent of any underground geological storage formation; and
- assessing the suitability of the formation for the permanent storage of a greenhouse gas.

The GGGSA provides that the Minister may require the holder of an authority to provide information regarding the nature of underground storage formations discovered in the course of their activities. Such a direction could include a requirement to provide information on rock types, structures, faults, porosity, and permeability and existing fluids. The 'standard' requirements for such a direction could be prescribed in regulations.

Should the nature and extent of information to be collected in relation to potential underground storage formations be established via regulations, or requested on a case-by-case basis?

Injection and monitoring planning

Before authorising the injection of gas for either exploration, or long-term storage purposes, the GGGSA requires an authority holder to provide particular information on the intended operations relevant to monitoring the behaviour of injected gas; the management of risks; and rehabilitation of land affected by operations.

These requirements relate to the preparation of injection testing plans for exploration permits and injection and monitoring plans for injection and monitoring licences. The GGGSA (s.38 and s.94) provides guidance on the matters to be included in those plans (including the volume of gas injected and its behaviour after injection). It also provides specifically for regulations to be prepared to guide the preparation of monitoring and verification and risk management plans that are integral to those broader plans.

These more detailed plans are seen to be crucial to ensuring the Minister can be satisfied that any proposed injection activities will not present any undue risk.

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?

Operation plans

The operation plan will guide the day-to-day activities associated with a sequestration operation. It will provide an overview of the entire operation, from commencement to decommissioning, and include details of the facilities and equipment associated with all aspects of the operation.

The GGGSA requires that an authority holder prepare an operation plan that outlines the risks of damage, or injury that may result from the operation, how those risks will be minimised, or eliminated and any rehabilitation required of land affected by the operation.

The Act also provides (s.209) for regulations to be made to specify other matters to be included in an operation plan. Both the Geothermal Energy Resources Regulations 2006 and Petroleum Regulations 2000 identify specific elements to be included in operation plans relating to activities under those respective Acts. The focus of geothermal regulations is on the need for, and content of, an environment management plan. The petroleum regulations are focussed principally on the development and operation of facilities and activities associated therewith.

Are the requirements for an operation plan in relation to sequestration operations already sufficient under the GGGSA?

Utilisation of storage formations

To demonstrate bona fide, applicants for an injection and monitoring licence will be required to include, with their application, the date for commencement of commercial scale injection of a greenhouse gas substance into an underground geological storage (s.73(2) and s.75(2)). That date must be within the time period prescribed in the regulations.

It is understood that there may be uncertainty around timelines and the commencement of operations, particularly for a first mover. Additionally, facilities associated with carbon capture and storage are likely to be of a significant scale, potentially involving complex partnerships, or joint venture arrangements. However, Government is keen to ensure that storage formations are not 'banked' and are utilised.

The GGGSA provides that licences can be cancelled if no greenhouse gas has been injected in accordance with the work program for two years. Production licences under the *Offshore Petroleum Act 1998* are cancelled after five years of inactivity.

What is a reasonable time period, from the date on which an application for an injection and monitoring licence is lodged, within which an applicant should be in a position to commence commercial scale injection?

What other means could the Victorian Government employ to ensure that storage formations are utilised in a timely manner?

Reporting requirements

As discussed previously, the GGGSA requires preparation of various plans. The Act (s.231) also provides for regulations to be made in relation to the collection and treatment of information and samples and for such information and samples to be provided, when required, for the purpose of monitoring compliance.

This could include information relating to:

- performance against the work program;
- other work undertaken during the reporting period;
- injection rates and behaviour of stored gas; and
- rehabilitation efforts.

Information requirements should not only meet the needs of the regulator, but also be consistent with national and international reporting requirements.

How often should this information be provided (e.g. monthly, quarterly, or annually)?

Should the regularity of reporting vary, depending upon the information to be provided?

Would an audit approach be as effective and reduce the burden of regular reporting?

Assessing impacts on petroleum resources

The GGGSA recognises that carbon dioxide geological sequestration involves activities that may pose environmental and public health risks. The Act contains provisions to ensure any such risks are addressed.

Injection and storage of carbon dioxide may also impact on other activities, such as petroleum and gas extraction, which could, if not adequately managed, contaminate or sterilise those resources.

Where proposed injection operations present a significant risk of contaminating or sterilising other resources (including petroleum and gas) within the licence area, the Minister may approve the proposed operation if the licence holder has the consent of the holder/s of the resource authority/ies so affected, or considers that it is in the public interest to do so. Prior to making a public interest determination, the Minister must refer the matter to an independent panel, or relevant public authority for recommendation.

To assist the Minister reach a fully-informed decision, the GGGSA (s.234) allows the Minister to direct the holder of an authority under the *Petroleum Act 1998* to provide any information required by the regulations (s.234(1)).

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?

5 Miscellaneous matters

The GGGSA provides specifically for regulations in relation to a variety of miscellaneous matters, including the 'form' of work programs (s.148(d)) and time periods relating to: applications to VCAT or the Supreme Court (ss.48, 104, 118, 206); reporting of serious situations (s.181); and term of special access authorities (s.131).

Is it appropriate to adopt a similar approach as employed under the Geothermal Energy Resources Regulations 2006 and Petroleum Regulations 2000 for miscellaneous matters modelled on the corresponding acts?

Special access authorisations are designed to allow the holder of a permit, lease or licence under the GGGSA to carry out monitoring and verification activities in areas adjoining those authorities.

The Act (ss.131) requires the term for a special access authorisation to be prescribed in regulations.

Should special access authorities be for a fixed term, or vary according to the activities to be authorised?

The GGGSA provides for the Minister, in granting an authority, to specify any conditions considered appropriate and broadly sets out the matters that may be covered. The Act (s.303(1)(c) also allows regulations to be made prescribing conditions that are to apply generally, or to particular types of authorities.

Both the Geothermal Energy Resources Regulations 2006 and Petroleum Regulations 2000 include standard conditions for authorities granted under the respective legislation.

Would the inclusion in regulations of a suite of 'standard' conditions provide greater certainty for prospective operators, or should all conditions be determined on a case-by-case basis?

The GGGSA allows for use of a detection agent to help identify and differentiate between injected greenhouse gases and naturally occurring gas formations. A detection agent will also enable monitoring of the behaviour of injected greenhouse gases to take place and help confirm that a stream is behaving as predicted.

The particular substances that can be employed as detection agents, and the concentrations permitted, are to be defined in the regulations.

A list of allowable detection agents could be compiled on the basis of those available currently. However, should new chemical compounds that are more effective, or less costly, become available in the future, they would need to be prescribed also.

Prescribing detection agents would not preclude the use of other technologies that are more effective and/or less costly than the use of detection agents in tracking of injected greenhouse gas streams.

What is the best approach to ensure that appropriate detection agents can be used?

6 Guidelines

In addition to regulations, the GGGSA provides for the development of guidelines to assist industry and the community gain a greater understanding of the processes associated with this new regulatory regime and for the clarification of Government's expectations.

Specifically, the Act provides for Guidelines to be developed for the preparation of community consultation plans that must be prepared by an applicant for an authority.

It is intended that Guidelines will be developed also to assist potential applicants for Exploration Permits to clearly understand the application process and the factors that will guide decision-making.

Guidelines would also be developed to describe the scope and extent of information required by the Act and regulations to be included in operation, and associated, plans.

Are there any other matters or processes for which guidelines should be prepared to assist industry and the community?

7 Next Steps

This Discussion Paper provides an overview of the areas in which regulations may be required. It also seeks comment on the nature and extent of regulations and guidelines necessary to support the implementation of the *Victorian Greenhouse Gas Geological Sequestration Act 2008*.

The Victorian Government expects that draft regulations and a Regulatory Impact Statement will be released for public comment in mid-2009.

Regulations and related material will be finalised to enable the GGGSA to come into effect towards the end of 2009, or at the latest by 1 January 2010.

DOT4038/09