

CARBON DIOXIDE CAPTURE AND GEOLOGICAL STORAGE

AUSTRALIAN REGULATORY GUIDING PRINCIPLES



Ministerial Council on Mineral and Petroleum Resources

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TABLE OF CONTENTS

Carbon Dioxide Capture and Geological Storage (CCS)	4
Regulatory Guiding Principles	
1 Introduction	6
Developing the COAG Regulation Impact Statement (RIS)	7
Definitions for CCS	9
Scope of the COAG RIS	10
Overarching Regulatory Considerations	10
COAG Agreed Principles	11
2 Background	13
Energy and Greenhouse Gas Emissions	13
CCS – One of a Suite of Technologies	13
Domestic Research and Possible Australian CCS Projects	14
Current Legislation and Regulation Activities in Jurisdictions	14
International CCS Projects	15
International Collaboration	16
3 The Issue	18
Management of Carbon Dioxide in CCS Projects	18
Site Selection for CCS	19
4 Objective	21
5 Analysis of Key Issues	21
Option 1 – Status Quo	21
Option 2 – Self Regulation	21
Option 3 – Additional/Amendments to Government Regulation	22
5.1 Assessment and Approvals Process	22
5.2 Access and Property Rights	26
5.3 Transportation Issues	32
5.4 Monitoring and Verification	37
5.5 Liability and Post-closure Responsibilities	41
5.6 Financial Issues	46
6 Comparative Assessment—Final Recommendation	51
7 Public Consultation	53
Stakeholder Engagement During Development of Principles	53
COAG RIS Public Comment Phase—Submissions	54
Establishment of Consultative Groups	55
Reporting Views of Non-government Stakeholders	58
Further Work Commissioned under MCMPR	63
8 Implementation and Review	64

CARBON DIOXIDE CAPTURE AND GEOLOGICAL STORAGE REGULATORY GUIDING PRINCIPLES

The following guiding principles facilitate a nationally consistent approach to the application of Carbon Dioxide Capture and Geological Storage (CCS). These guiding principles should take account of Council of Australian Governments (COAG) agreed principles relating to Ecologically Sustainable Development, the Intergovernmental Agreement on the Environment, Principles of Good Regulation and relevant COAG agreed Occupational Health and Safety Principles.

ASSESSMENT AND APPROVALS PROCESS

- *Assessment and approvals processes should be consistent with agreed national protocols and guidelines.*
- *Existing legislation and regulations relating to CCS should be identified and modified and augmented where necessary.*

ACCESS AND PROPERTY RIGHTS

- *Surface and subsurface rights for CCS should provide certainty to rights-holders of their entitlements and obligations.*
- *These rights should be based on established legislative and regulatory arrangements, custom and practice and accommodate the likely evolution of multi-user CCS infrastructure and facilities.*
- *In granting rights to inject the CCS stream into subsurface formations, governments should give due consideration to land use planning issues that may arise as a consequence.*

TRANSPORTATION ISSUES

- *Regulation relating to the transport of a CCS stream should be consistent where possible, using agreed national protocols and guidelines.*

MONITORING AND VERIFICATION
<ul style="list-style-type: none"> ■ <i>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.</i> ■ <i>Regulation should provide a framework to establish, to an appropriate level of accuracy the quantity, composition and location of gas captured, transported, injected and stored and the net abatement of emissions. This should include identification and accounting of leakage.</i>
LIABILITY AND POST-CLOSURE RESPONSIBILITIES
<ul style="list-style-type: none"> ■ <i>Current regulatory principles and common law should continue to apply to liability issues for all stages of CCS projects.</i> ■ <i>Governments' overall consideration of post-closure storage of CCS streams must aim to minimise exposure to health, environmental and financial risks for project operators, governments and future generations.</i>
FINANCIAL ISSUES
<ul style="list-style-type: none"> ■ <i>For all stages of a CCS project, wherever practical, established legislative, regulatory and accounting processes should be used in preference to introducing new regulations.</i> ■ <i>The income from, capital and operating costs associated with a CCS project should be treated in the same way as for any other business venture for taxation purposes.</i> ■ <i>Regulation should recognise the potential for post-closure liabilities for CCS activities and consider appropriate financial instruments to assist in the management of such risk.</i>

1 INTRODUCTION

The purpose of this document is to analyse and evaluate options for the management of key issues relating to elements of carbon dioxide capture and geological storage (CCS). This will support the achievement of a nationally consistent approach to the implementation of this technology.

CCS, also known as carbon dioxide geosequestration, is a technology with the potential to reduce emissions of carbon dioxide to the atmosphere. This technology involves the capture and storage of the CCS stream (see definition below). This CCS stream may be produced by the combustion of fossil fuels, or co-produced as a result of oil and gas extraction or some industrial process. The stream would then be compressed and transported to a suitable storage site for injection into a stable subsurface geological reservoir for long-term storage (See Figure 1). CCS could also be potentially applied to some renewable energy sources and industrial processes that produce greenhouse gas emissions. Many aspects of CCS involve well known commercial processes, however as an emerging technology in the application of stationary energy generation, uncertainty in a range of technical, legal, environmental, economic and social impacts need to be addressed and managed.

This Council of Australian Governments (COAG) Regulation Impact Statement (RIS) proposed by the Ministerial Council on Mineral and Petroleum Resources (MCMPR) is concerned with high-level guiding principles which are aimed at providing a 'nationally consistent guiding framework for regulatory consideration of CCS' in Australia (hereafter known as 'guiding framework' in this document). More detailed Regulation Impact Statements (or similar processes) in jurisdictions are likely to be required in the future as individual projects are proposed.

In the long-term if the world is to stabilise atmospheric concentrations of greenhouse gases, major changes will be required in the way we source and use energy. To achieve this end, CCS technology needs to be developed so that it can be considered as one of a suite of possible options for reducing emissions of carbon dioxide to the atmosphere. There may be potential costs to the community if steps are not taken to mitigate these emissions. There may also be costs for operators who do not take steps to mitigate their emissions.

Technically, individual elements of CCS are well understood through international and domestic experience, however, geological storage of CCS streams over the long term has not been demonstrated. As with any large scale industrial process, there are environmental and health and safety issues (both occupational and public safety) associated with CCS. However, experience with some facets of CCS technology indicates that, with appropriate safeguards, these can be managed.

A predictable, transparent and practical management framework for CCS would provide the community and potential investors in the technology with more certainty in the regulatory process. Therefore, the development of a guiding framework is an essential step to manage CCS and position the technology as a greenhouse gas abatement option.

A guiding framework should take account of existing principles in regulation relating to ecologically sustainable development; occupational health and safety and the general principles of good regulation, all of which have been previously agreed by the COAG. A guiding framework for CCS also needs to be consistent with Australia's obligations under international law.

A significant amount of work on technological issues associated with CCS is being pursued and as progress is made in this area, further work on legal and regulatory issues may be required.

This COAG RIS identifies six key areas requiring guiding regulatory principles relevant to CCS. The COAG RIS examines these areas against three options: status quo; self regulation and amendments to government regulation with the aim (following MCMPR Council consideration) of determining an appropriate nationally consistent guiding framework for CCS. This may underpin the development of detailed regulation that can be implemented by jurisdictions across Australia.

Developing the COAG Regulation Impact Statement (RIS)

To progress the issue of regulation for possible future CCS projects, the MCMPR established a Carbon Dioxide Geosequestration Regulatory Working Group in September 2003. The Regulatory Working Group was tasked to report to the Standing Committee of Officials of the MCMPR.

The Regulatory Working Group consisted of representatives from Western Australia (chair) the Australian Government, South Australia, New South Wales, Queensland and Victoria. Tasmania and the Northern Territory participated by correspondence.

A broader 'Carbon Dioxide Geosequestration Regulatory Reference Group', comprising all Working Group members, industry and research organisations was also established to provide advice to the Regulatory Working Group. A set of draft regulatory guiding principles for CCS were developed by the Regulatory Working Group and presented to MCMPR Ministers in July 2004 for consideration. MCMPR gave in principle support at this Council meeting to the draft guiding principles on the basis that they were subject to broad public consultation.

As a consequence, with advice from the Carbon Dioxide Geosequestration Regulatory Reference Group, the Regulatory Working Group developed a COAG RIS which included, as an attachment, the draft regulatory guiding principles. This document

was released for public comment on 8 October 2004 until 29 November 2004 and 22 submissions were received. A summary of the views provided in these submissions is included in Section 7.

Subsequently, a 'CCS Stakeholder Group' was established with representatives from the Australian Government, States and Territories, research organisations, industry and environmental non-government organisations primarily to review the Consultation COAG RIS in light of submissions and expert advice received.

The submissions received on the Consultation COAG RIS identified two key areas that required more information. Specifically, environment issues should be included as an overarching consideration and long term liability required further consideration. Both environment issues and long term liability have been examined closely in this COAG RIS. In addition; it was determined that a number of other key issues should be examined. These included international legal issues; technical risks; impurities in CCS streams; and financial instruments that might form part of a management framework for CCS. The examination of these issues help inform the COAG RIS, however, they will need to be more carefully considered in the implementation of the guiding framework. The MCMPR Contact Officers sought independent advice on these issues from the Australian Government Solicitor, the Attorney General's Department, the Department of the Treasury, the Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC), and Geoscience Australia, respectively.

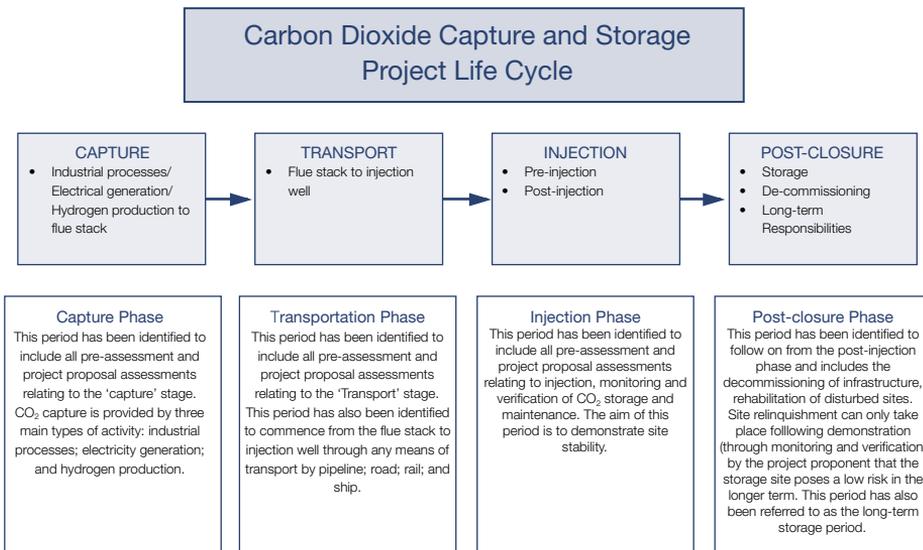
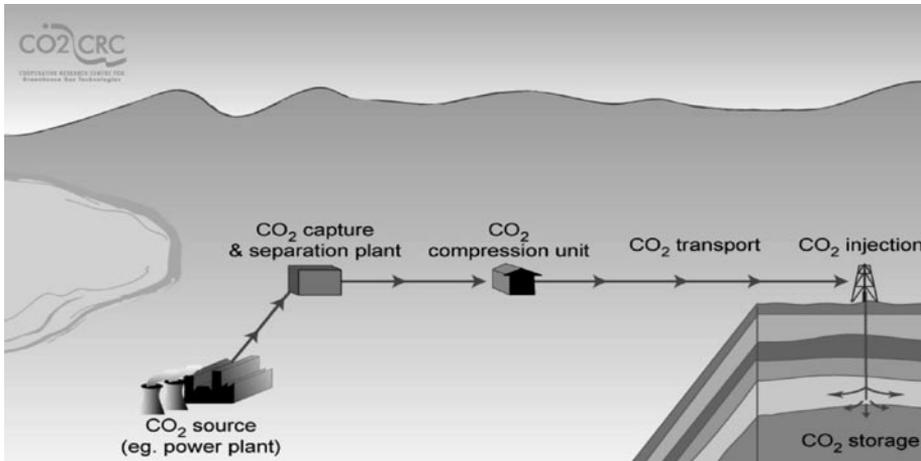


Figure 1: CCS Project Life Cycle



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

Definitions for CCS

As outlined in Figure 1 above, any future CCS project would be structured around a continuum of activities encompassing four broad stages: capture, transport, injection and post-closure. This COAG RIS addresses the above stages in the context of geological storage.

The COAG RIS uses the term 'CCS stream'. A CCS stream consists mainly of carbon dioxide and will likely also contain various impurities depending on the source and the capture process. However, the costs of transport and injection may provide industry with an incentive to reduce the level of impurities to the minimum economic level. To allow for flexibility, the following definition of a CCS stream is proposed:

A CCS stream is a gas or liquid/fluid, consisting predominately of carbon dioxide, which is to be injected into a geological formation for the purpose of avoiding the release of that carbon dioxide to the atmosphere. Such a stream may contain other substances depending on both the source from which the carbon dioxide is being drawn as well as the capture, separation, injection and monitoring processes used.

This COAG RIS also utilises the term 'leakage.' For the purposes of this document, in respect of CCS, the meaning of this term is the escape of a quantity of the CCS stream from the targeted sub-surface storage reservoir (includes migration along pre-determined pathways) into adjoining geological formations or into the atmosphere.

The term 'operator' is used in this COAG RIS. Operator refers to the person(s) responsible for the overall management of the CCS activity. It is recognised that the operator may be different for different stages of a CCS project.

Scope of the COAG RIS

This COAG RIS and guiding framework are concerned with possible future commercial CCS projects in Australia. It is not intended that the proposed guiding framework be applied to pilot-scale research and development CCS projects. These projects should be dealt with outside this COAG RIS process.

The appropriate level of regulation for pilot-scale research and development projects should be determined on a case-by-case basis, and be consistent with relevant environmental and occupational health and safety standards, or existing regulatory requirements, in consultation with stakeholders and in accordance with the need to provide a practical and appropriate level of certainty to project operators, governments and the community.

Overarching Regulatory Considerations

A guiding framework for CCS would need to be transparent, predictable and practical. It should protect the environment, provide community confidence and provide certainty for investors.

A guiding framework for CCS should not consider possible economic incentives for investment in CCS technology; rather, it should provide for the effective management of environmental, health and safety issues while providing for the removal of legal and regulatory impediments (where appropriate) and uncertainties relating to the development of CCS.

To appropriately manage issues relating to CCS a guiding framework should aim to be:

- safeguarding public interest, particularly to minimise risks to health, safety, environment, economic consequences and government accountabilities;
- based on sound risk management principles; science based and rigorous, yet practical in approach;
- clear and consistent in laying out rights and responsibilities of participants;
- efficient (cost-effective) from participant, government and community viewpoints;
- timely and comprehensive in considering planning and approval requests;
- adaptable and learning-oriented to leverage experience and future developments in technologies, markets and institutional arrangements;
- flexible to allow for future government decisions regarding possible greenhouse policy measures;
- consistent with Australia's obligations under international law; and
- in a form that maintains Australia's international competitiveness.

COAG Agreed Principles

The development of a guiding framework for CCS projects will take into account previous experience on CCS as well as agreed COAG generic principles, particularly those relating to:

- ecologically sustainable development;
- occupational health and safety; and
- the general principles of good regulation.

Given that these principles have been agreed by COAG, they do not require specific analysis in this COAG RIS but will be applicable to all stages of a CCS project.

Ecologically Sustainable Development Principles

A guiding framework for CCS will take account of environmental principles that are covered by the ecologically sustainable development (ESD) principles accepted by COAG in 1992, as follows:

- decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations;
- where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- the global dimension of environmental impacts of actions and policies should be recognised and considered;
- the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised;
- the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised;
- cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms; and
- decisions and actions should provide for broad community involvement on issues which affect them.

Further, the *Intergovernmental Agreement on the Environment* (between the Australian Government, States and Territories and the Australian Local Government Association) (1992) outlines that all parties agreed that the development and implementation of environment policy and programs by all levels of Government should be guided by a number of considerations and principles including polluter pays (i.e. those who generate pollution and waste should bear the cost of containment, avoidance or abatement), intergenerational equity and the precautionary principle.

Occupational Health and Safety

A CCS guiding framework for CCS will take account of existing COAG-agreed OH&S principles including those under the National Minesite Safety Framework approved by MCMPPR (COAG) in 2002. Government's contribution should:

- be nationally consistent, both within the CCS [*mining*] industry and with other industries;
- encourage action by stakeholders at an enterprise level;
- be based on and foster a best practice approach and a continuous improvement focus that does not inhibit innovation; and
- recognise that responsibility for health and safety [*at mine sites*] rests with employers and employees, while ensuring that senior management holds the accountability for leadership.

Principles of Good Regulation

A guiding framework for CCS will take account of existing COAG agreed Principles of Good Regulation.

These principles were endorsed by COAG in 1985 in Principles and Guidelines for National Standard Setting and Regulatory Action by Ministerial Councils and Standard Setting Bodies. These principles were amended in 1997 and 2004 and are as follows:

- Regulatory measures and instruments should be the minimum required to achieve the pre-determined and desirable outcomes;
- Regulation should be designed to have minimal impact on competition;
- Regulation should have clearly identifiable outcomes and unless prescriptive requirements are unavoidable in order to ensure public safety in high-risk situations, performance-based requirements that specify outcomes rather than inputs or other prescriptive requirements should be used;
- Wherever possible, regulatory measures or standards should be compatible with relevant international or internationally accepted standards or practices in order to minimise impediments to trade;
- There should be no discrimination in the way regulatory measures, mandatory standards or conformity procedures are applied between domestic products or imported products;
- Regulation should be reviewed periodically;
- Specified outcomes of standards and regulatory measures should be capable of revision to enable them to be adjusted and updated as circumstances change; and
- Good regulation should attempt to standardise the exercise of bureaucratic discretion, so as to reduce discrepancies between government regulators, reduce uncertainty and lower compliance costs.

2 BACKGROUND

Energy and Greenhouse Gas Emissions

On 8 June 2001, the statement on Energy Policy from COAG noted that the energy sector, both stationary and transport, provides an essential underpinning of Australia's economic, environmental and social goals. Competitively priced and reliable energy services are a key part of our international industry competitiveness and standard of living. COAG went on to say that Australian energy demand is growing rapidly, but at the same time energy supply and use is a significant source of greenhouse gas emissions.

CCS is recognised as one medium term option to reduce greenhouse gas emissions into the atmosphere from stationary energy sources. The electricity generation sector, which represents 33 percent of net national greenhouse gas emissions, is potentially well placed to take advantage of CCS technologies given that it is dominated by relatively few large emission sources, although there is a need to improve capture technologies and reduce associated costs. Some of Australia's major natural gas reserves contain significant proportions of carbon dioxide and developers may also be well placed to utilise CCS technology, given that carbon dioxide capture and separation is part of the gas processing system.

Other industry sectors, including some forms of chemical manufacture, natural gas processing, renewable energy sources such as biomass, the cement industry and aluminium production are all large point source emitters of carbon dioxide and may also be able to apply CCS technologies to reduce their greenhouse gas emissions.

CCS – One of a Suite of Technologies

CCS is one of a suite of possible technologies that the Australian, State and Territory governments are considering to enable Australia to meet future greenhouse objectives. This offers the potential for Australia to reduce greenhouse gas emissions while maintaining international competitiveness and economic growth through our competitive advantage in low cost and abundant fossil fuels (coal and gas).

Australia has abundant fossil fuel resources and CCS technologies have the potential to significantly reduce greenhouse gas emissions from the extraction, processing and use of these energy sources. This highlights the potential importance of CCS technologies in mitigating Australian emissions of carbon dioxide.

Other options for reducing greenhouse gas emissions are likely to encompass energy efficiency programs, fuel switching, existing and advanced renewable energy, demand management and other more efficient fossil fuel technologies. Achieving reductions in carbon dioxide emissions will require a combination of all available options. Various technology options are being pursued by Australian jurisdictions.

Domestic Research and Possible Australian CCS Projects

A number of domestic research initiatives are currently underway to progress CCS projects and assess the potential of geological storage sites in Australia. The Geological Disposal of Carbon (GEODISC) program (1999–2003), puts Australia at the forefront in identifying and mapping sites suitable for the geological storage of a CCS stream. GEODISC examined over 100 sites as potential geological storage sites, and identified an ultimate storage capacity in excess of 1600 years of Australia's total current emissions. CO2CRC has subsequently developed a Technology Roadmap for both capture and geological storage of carbon dioxide with an Australian focus. The CO2CRC is also investigating sites where potential pilot injection projects could be initiated. In addition, the Australian Coal Association's COAL 21 program, is currently investigating a variety of technologies, including CCS. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Energy Transformed Flagship Program is also looking at the development of technologies for producing hydrogen from coal.

Several CCS projects have been proposed in Australia. These include a CCS research and development project in Victoria (the Otway project). However it is not intended that the guiding framework be specifically applied to small scale research and development CCS projects. There are four proposals for major commercial projects: the Gorgon project offshore Western Australia, where it is proposed up to 125 million tonnes of carbon dioxide contained in natural gas will be reinjected over the life of the project; two demonstration scale projects in Queensland (the Stanwell and CS Energy projects), which aim to capture and store carbon dioxide produced from power generation; and the Monash Energy project in Victoria which will store carbon dioxide from a brown coal based, coal to liquids project.

The existence of these project proposals adds to the need to develop a sound guiding framework for CCS. The further development of these commercial project proposals will be monitored and taken into consideration by governments in the context of developing detailed regulations based on the principles.

Current Legislation and Regulation Activities in Jurisdictions

Some states have legislation/regulations that cover CCS. The South Australian *Petroleum Act 2000* and the Queensland *Petroleum and Gas (Production and Safety) Act 2004* provide for transport by pipeline and storage in natural reservoirs of substances including carbon dioxide, regardless of the source location or the activity that produced it. There is also other legislation in jurisdictions that applies to aspects of CCS. For example, the Commonwealth, State and NT Petroleum (Submerged Lands) Acts (*PSLAs*) provide a mechanism for authorising and regulating the capture and storage by a production licensee of carbon dioxide separated from the petroleum stream in a licence area, as part of integrated petroleum operations of the licensee. CCS streams from other sources (e.g. from a power station onshore or other offshore petroleum operations) cannot at present be authorised for offshore CCS under the PSLAs.

It is important to note that legal advice from Australian Government Solicitor (AGS) commissioned by MCMPR indicates that substantive changes to current regulatory arrangements, to deliver greater certainty and consistency, will not be required. Rather changes to a number of pieces of existing legislation will likely present the most efficient and effective option. However, individual jurisdictions may consider that the most efficient way of managing CCS is through the development of new regulation.

International CCS Projects

Injection of carbon dioxide and other gases into deep geological structures has been occurring for many decades. While the purpose of these projects has not been to store carbon dioxide long term, they have advanced considerable understanding of the process and geology relevant to CCS.

The use of carbon dioxide for Enhanced Oil Recovery (EOR) has been used extensively in the United States of America (USA) and, to a lesser extent, in Canada with over 70 projects currently operating. Several of these have been continuously operating since 1988. Carbon dioxide EOR is a commercially proven technology which can provide valuable insight into aspects of the CCS process.

In northern Alberta, Canada, 2.5 million tonnes of carbon dioxide has been injected into 48 wells as part of the storage of acid gas (carbon dioxide and hydrogen sulfide mixtures). The reason for injection was to eliminate the environmental and health impacts of gas flaring and they have been safely operating without incident since the late 1980s.

Weyburn Project

The Encana Weyburn oil field in Canada is one of the largest carbon dioxide EOR in the world where some twenty million tonnes of CCS stream will be injected over the 20-year lifetime of the project. Under the sponsorship of the International Energy Agency (IEA), an international project team used the Weyburn project in Canada as an opportunity to monitor the sequestration of a CCS stream in a geological formation. Several Australian researchers were members of the project team.

Sleipner Project

The first large scale CCS project has been operating successfully since 1996 when Statoil began injecting one million tonnes of CCS stream per year in the subsurface beneath the North Sea in Norway. The CCS stream has been stripped from produced natural gas and injected into sandstone. Since injection started, the CCS stream has been injected without any significant operational problems observed in the capture plant or in the injection well. The Sleipner project is the first large scale commercial application of carbon dioxide storage in a deep saline aquifer in the world. Australian researchers have participated in the Sleipner Project.

Frio Project

This USA Department of Environment pilot project injected a pure carbon dioxide stream into the Frio formation in southern Texas and used geochemical and geophysical monitoring techniques, combined with detailed numerical modelling to successfully predict the movement of the CCS plume. Australian researchers are involved in the Frio monitoring and verification project.

In Salah Project

In April 2004, the In Salah project in Algeria commenced injecting approximately one million tonnes into the subsurface. The project is the world's first large-scale carbon dioxide storage project in a gas reservoir. It is estimated that 17 million tonnes will be geologically stored over the life of the project. At this point in time there have been no regulatory breaches in this project. Australian researchers are discussing potential collaboration in this project.

International Collaboration

Carbon Sequestration Leadership Forum

Australia is contributing internationally to consideration of CCS through a rigorous program of research and development and through active membership of the Carbon Sequestration Leadership Forum (CSLF). The CSLF is an international climate change initiative that is focused on the development of improved cost-effective technologies for CCS.

The purpose of the CSLF is to make these technologies broadly available internationally; and to identify and address wider issues relating to CCS. This could include promoting the appropriate technical, political, and regulatory environments for the development and deployment of such technologies. The charter of the CSLF establishes a framework for collaboration between governments, industry, researchers, and non-government organisations in 21 countries and the European Commission. They are: Australia, Brazil, Canada, China, Colombia, Denmark, European Commission, France, Germany, Greece, India, Italy, Japan, Korea, Mexico, the Netherlands, Norway, Russian Federation, Saudi Arabia, South Africa, United Kingdom, and United States.

International Legal Considerations

While the Australian regulatory guiding principles for CCS have been drafted specifically with national regulatory needs in mind, the need for regulation of CCS to be consistent with Australia's obligations under international law is an overarching consideration. In addition, the principles are consistent with international leading practice dealing with legal/regulatory considerations identified through the CSLF and International Energy Agency (IEA) collaborative processes.

Australia's obligations under international law are not examined in detail in this COAG RIS. However, preliminary advice from the Office of International Law in the Australian Government Attorney-General's Department advised that CCS, particularly in offshore areas, raises several novel issues under international law. There is not yet a settled legal position on some of these issues. Further work in relevant international forums would assist to clarify the status of CCS under international law. Australia is a party to a number of treaties which contain obligations that are relevant to CCS. The key treaties are the London Convention, its 1996 Protocol, and the UN Convention on the Law of the Sea. However, there are other environmental treaties which are potentially relevant. In addition, certain principles of customary international law need to be considered, such as the duty not to cause transboundary environmental damage; which may be relevant depending upon the geographic location of particular CCS projects. Breaching these obligations could leave Australia liable to pay compensation to other countries. Ultimately the consistency of CCS with Australia's international obligations will depend on the individual circumstances of particular CCS projects. Therefore, specific legal advice should be sought in relation to any proposed project.

3 THE ISSUE

There are potential health, safety and environmental risks associated with most industrial processes. CCS is no exception. Ensuring that these risks are managed is an essential consideration. This is particularly the case for elements of CCS not dealt with under current regulatory frameworks.

In the absence of a clear, consistent and a transparent guiding framework, it will be difficult for operators to perform in a way that meets the expectations of the community.

Further, current uncertainty about a guiding framework that will apply to CCS projects means that industry is unlikely to invest in the technology. Without this certainty, industry and the community cannot have confidence in the costs or in the rights and obligations that might apply for management of CCS.

Management of Carbon Dioxide in CCS Projects

An understanding of the processes associated with the management of carbon dioxide in CCS projects continues to evolve. The brief summary of this process that follows is based on advice received from Geoscience Australia and Cooperative Research Centre for Greenhouse Gas Technologies. It also draws upon international experience as it relates to CCS. The summary is an overview and planned Australian research and development demonstration projects will further inform the development of a risk profile for the management of CCS activities in Australia.

Interactions between carbon dioxide and the atmosphere, soils, water and the biota are relatively well understood from a modelling perspective. Carbon dioxide, a naturally-occurring constituent of air that is essential to all life forms, is a non-toxic, inert gas and is generally regarded as safe. At elevated concentrations, however, carbon dioxide can cause harm to oxygen breathing organisms. A hazard can arise if carbon dioxide, which is denser than air and odourless, is allowed to accumulate in low-lying, confined or poorly ventilated spaces or if there is a significant gas cloud release. However, these risks can be significantly reduced with adequate management and monitoring.

Carbon dioxide and numerous other gases/substances are managed on a regular basis as part of current petroleum and resource-extraction activities. Specifically:

- Carbon dioxide is much less hazardous than many materials that are handled by industry every day;
- Large quantities of CCS streams are transported by pipeline every day without any adverse consequences;
- Immense quantities of extracted natural gas are stored in the subsurface in many parts of the world;

- There are massive quantities of gas (including carbon dioxide) trapped naturally in the subsurface under parts of Australia which are not regarded as constituting a safety hazard to the general public; and
- Large amounts of fluids (including hazardous materials) are injected into the subsurface every day throughout the world. These waste disposal projects have provided a knowledge base for the regulatory control of the injection of fluids into the subsurface.

Site Selection for CCS

CCS projects will have their own unique safety issues including operational risk and other technical risks associated with the specific storage site chosen. The selection of an appropriate site has been identified as the most effective means of reducing to as low as reasonably practicable any risks over the long-term.

The highest perceived operational risks associated with CCS projects result from the combination of different or newly applied technologies and lack of experience of combined operations.

The technical risk associated with each storage site will be unique and must be determined at the beginning of a project and subsequently managed. When considering environment and OH&S issues in the management of CCS; capture, transport, injection and storage may be safer than typical petroleum production projects; as carbon dioxide is not flammable or explosive. As stated previously, carbon dioxide does however, represent a hazard to human respiration when it is locally present in high concentrations. Further, it could potentially result in the contamination of freshwater aquifers, and/or interfere with the activities at producing oil/gas reservoirs or coal mines.

As noted in the introduction, the impact of impurities in a CCS stream must be considered through all stages of a CCS process and must take into account issues such as risk and mitigation when storing carbon dioxide. The likely concentration of impurities that may be present can be readily estimated but due to the emerging nature of CCS technology and the potential range of compositions for CCS streams, it is not possible at this time to prescribe appropriate impurity levels. Early projects will need to be managed on a case by case basis, including environmental assessment, to confirm that risks are as low as reasonably practicable and the environment is protected.

Overall, near term challenges for risk evaluation for CCS activities will be to:

- Continue to improve and standardise modelling techniques enabling accurate predictions of injected CCS stream movements on sites;
- Determine and agree on site selection criteria to ensure minimal leakage rates;
- Obtain and/or establish processes that provide up to date, accurate and comprehensive geological and hydrodynamic data to determine the suitability of proposed storage sites;

- Continuously improve technology to accurately monitor the mass and movement of CCS streams in the deep sub-surface in different geological structures; and
- Develop an adequately robust verification system.

A nationally consistent guiding framework for CCS that aims to minimise environmental, health and safety risks and provides methods for dealing with any long-term risks and ensuring investor certainty would provide a significant starting point for jurisdictions when considering their own regulatory needs. However, it is important to note that each jurisdiction would decide how to apply such a guiding framework.

4 OBJECTIVE

To facilitate the introduction of CCS activities in an efficient, effective and safe manner.

5 ANALYSIS OF KEY ISSUES

The proposed guiding framework covers six key issues:

- Assessment and Approvals Process;
- Access and Property Rights;
- Transportation Issues;
- Monitoring and Verification;
- Liability and Post-closure Responsibilities; and
- Financial Issues.

Each issue will be analysed against three options: status quo; self-regulation and additional/amendments to government regulation.

Option 1 – Status Quo

The option of status quo involves the application of current regulatory arrangements and existing principles to CCS activities. Currently, CCS activities would be regulated by a range of Commonwealth, State and Territory laws, including environmental laws, occupational health and safety laws and, in some circumstances, petroleum laws. This option maybe relevant where the element of the CCS project is adequately covered by existing government regulations and no additional regulations or amendments to existing regulation would be required.

Option 2 – Self Regulation

Self regulation is generally characterised by industry formulating rules and codes of conduct, which could include consultation with relevant stakeholders, with industry solely responsible for enforcement. In some cases governments may also be involved, by providing advisory information etc. Self regulation may be considered where low risk events present no major public health and safety concerns and environmental or other impacts on the community. Self regulation in the context of this COAG Regulation Impact Statement is characterised by industry formulating rules/standards and codes of conduct. Sometimes rules or codes of conduct are developed to protect or confer

commercial advantage on one group over another, or to exclude new entrants to an industry. There may be an opportunity for co-regulation where industry develops a model and government accepts this model conditionally.

Option 3 – Additional/Amendments to Government Regulation

The option of additional/amendments to government regulation may be relevant where existing arrangements are not adequate. The Office of Regulation Review's *A Guide To Regulation*, outlines that explicit government regulation should be considered where:

- the problem is high risk, of high impact/significance, for example a major public health and safety issue;
- government requires the certainty provided by legal sanctions;
- universal application is required (or at least where the coverage of an entire industry sector or more than one industry sector is judged as necessary);
- there is a systemic compliance problem with a history of intractable disputes and repeated or flagrant breaches of fair trading principles and no possibility of effective sanctions being applied;
- existing industry bodies lack adequate coverage of industry participants, are inadequately resourced or do not have a strong regulatory commitment.

5.1 ASSESSMENT AND APPROVALS PROCESS

Under existing arrangements, to gain approval for a major project, an environmental impact assessment process and adherence to relevant occupational health and safety legislation is required. As part of this process, conditions are usually applied to the project.

These processes are important to ensure the rights and responsibilities of commercial parties and interests of communities, environment protection and safety (both public safety and occupational health and safety) are addressed.

Current scientific understanding indicates that site selection is the key to minimising risks. With appropriate site selection and effective monitoring and verification, the probability of leakage is understood, on the basis of current scientific knowledge, to be very low. However, the potential scale of costs for remediation, in the case of leakage, could be high.

Given that CCS is an evolving technology, it is important to recognise that assessment and approvals processes will deal with all stages of a project and incorporate leading practice.

Option 1 – Status Quo

With respect to assessment and approval, existing legislation and regulation does not apply to all parts of CCS projects in all jurisdictions. As a result, not developing new regulation may lead to inconsistencies in the way in which CCS projects are regulated.

This lack of consistency could occur in several ways, for example, differing requirements between different parts of an integrated CCS project; different requirements compared with other resource-based or industrial projects of similar scale; or different requirements between jurisdictions. In the latter case, there is also potential for inconsistencies of requirements to arise between parts of a single project if it crosses jurisdictions. These inconsistencies have the potential to increase industry uncertainty.

While transport and injection involve little that is fundamentally new, the selection of storage sites and issues surrounding long-term storage pose new elements. A framework to address these elements, including approval of the site selected and the proposed monitoring and verification process for the stored CCS stream will reduce the risks of leakage.

In the absence of clear and consistent regulation and a transparent guiding framework for CCS, it will be difficult for operators to perform in a way that meets the expectations of the community. There is also the potential for an increase in risks to the environment, health and safety if these public interests are not managed appropriately.

However, by not changing the status quo, there would be no increase in compliance costs for industry, as existing processes are already generally well-known to industry.

Option 2 – Self Regulation

Similar issues apply to self regulation as for the status quo option above, in particular the potential increase in risks to the environment, health and safety if these public interests are not managed appropriately. There is also a potential for reduction in transparency and consistency.

While transport and injection involve little that is fundamentally new, the selection of storage sites and issues surrounding long-term storage pose new elements. A framework to address these elements, including approval of the site selected and the proposed monitoring and verification process for the stored CCS stream will reduce the risks of leakage.

As the technology and the CCS industry matures, there may be opportunity for the application of a self-regulation regime to elements of CCS projects which may in turn assist in delivering continuous improvement potentially greater industry stewardship. However, as the CCS industry is relatively immature, such regulation at this stage would likely be premature.

However, by not introducing any additional or amendments to government regulation, there would be no increase in compliance costs for industry.

Option 3 – Additional/Amendments to Government Regulation

Ensuring that regulation applying to CCS projects is consistent with regulation applying to other similar scale projects will require additions and amendments to government regulation in most jurisdictions.

The purpose of such amendments or additions would be to ensure that all aspects of a CCS project are addressed in the same way as for any other comparable scale project.

While assessment and approvals processes will generally apply under existing regimes, explicit recognition that these processes will apply to CCS projects will materially increase industry certainty in relation to the regulatory regime. Such consistency and transparency will also provide the wider community with a clear expectation as to how issues such as project performance will be managed, and will also provide for a potential reduction in potential risks to the environment as well as health and safety aspects of the project. In addition, this option helps to ensure protection of community interests relating to the long-term nature of CCS.

Ensuring consistency with national protocols will provide a sound basis to enable CCS to evolve in different ways, for example, by providing the level of consistency between jurisdictions to facilitate project approvals processes when a project straddles jurisdictions, or if a multi-user storage site is proposed.

Failure to apply assessment and approvals processes similar to those for other comparable projects and which addresses issues such as approval of the site selected and the proposed monitoring and verification process for the stored CCS stream, will increase both environmental and safety risks. A key part of this assessment and approval process would be appropriate storage site selection, which will be fundamental to ensuring that overall risks are kept as low as practicable in both the short and long term.

With any additional government regulations or amendments to existing government regulation, there is always the resultant effect of increased complexity and compliance cost to industry and the potential for an increase in compliance burden.

The below table attempts to summarise the discussions under each option analysed above.

	POTENTIAL DISADVANTAGES	POTENTIAL ADVANTAGES
Option 1: Status Quo	<ul style="list-style-type: none"> ■ Reduction in consistency ■ Reduction in industry certainty ■ Increased risk to environment, health and safety 	<ul style="list-style-type: none"> ■ No increase to compliance costs for industry
Option 2: Self Regulation	<ul style="list-style-type: none"> ■ Reduction in transparency and consistency ■ Increased risk to environment, health and safety ■ Current state of CCS industry immature to apply self-regulation 	<ul style="list-style-type: none"> ■ Increased industry stewardship ■ Reduced compliance costs for industry
Option 3: Additional/ Amendments to Government Regulation	<ul style="list-style-type: none"> ■ Increased complexity and compliance costs/burden 	<ul style="list-style-type: none"> ■ Increased industry certainty ■ Increased clarity for industry of community expectations ■ Increased consistency and transparency ■ Reduction in risk to environment, health and safety

Recommendation

A consistent management approach, which minimises risks associated with CCS processes, should be applied to assessment and approvals processes for CCS. This would be best achieved through regulation. As such, Option 3 is recommended, whereby existing regulation be amended or added to as appropriate which aims for consistent assessment and approvals processes across all parts of a CCS project and provides for similar treatment to other comparable industries.

Assessment and Approval Process: Guiding Regulatory Principles

- *Assessment and approvals processes should be consistent with agreed national protocols and guidelines.*
- *Existing legislation and regulations relating to CCS should be identified and modified and augmented where necessary.*

5.2 ACCESS AND PROPERTY RIGHTS

Given the likely cost and long periods of operation of CCS projects, operators will require a high degree of certainty about access to a selected injection site before they will be willing to invest in such a project. This need to clearly identify relevant parties' rights and obligations is a key consideration in examining whether a regulatory basis for access and property rights is required. In this context, possible impacts on differing land use titles, the use of contract, commercial and property law to regulate proprietary rights as opposed to defined statutory requirements, the potential for monopoly power and an understanding of the meaning of a CCS stream in terms of its nature and purpose may need to be considered.

A property right in this context is an entitlement, or bundle of entitlements, defining the owner's right to use a resource and any limitations on its use. For property rights to be effective, the owner must be able to manage access of others to the property, to appropriate the benefits from the property, to prevent others from damaging the property, and to enforce the property rights.

When such property rights exist, the benefits, costs and responsibilities associated with an activity are borne by the owner or user and behaviours are modified to provide certainty. Specifically, reservoirs and injection sites may be subject to competing claims from other users.

Proprietary rights and access for each stage of a CCS project relating to the surface and sub-surface need to be clear. The ownership of the CCS stream at each stage of a CCS project needs to be established with clearly defined rights and responsibilities.

The Department of the Environment and Heritage's Australian Greenhouse Office commissioned Minter Ellison to provide legal advice on access and property rights as they relate to CCS. The advice was received in December 2004. Further advice on this issue was also sought by MCMPR from AGS. These pieces of advice indicate that there is no existing legislative scheme that sets up a regime that establishes ownership of a CCS stream, including enabling the identification of the owner. There is existing legislation in Western Australia and South Australia that contemplates CCS, but neither of these legislative arrangements provide a comprehensive property right regime for CCS in the long-term. More recently, AGS advised that the Queensland *Petroleum and Gas (Production and Safety) Act 2004*, which recently came into force, contains quite extensive provisions about property in stored 'prescribed storage gases' including carbon dioxide.

The Minter Ellison advice also outlines that in considering what forms of property rights that exist under current laws which could be applied to injection and storage of carbon dioxide, it is necessary to appreciate the legal jurisdiction of the States and the Commonwealth in respect of onshore and offshore lands. Specifically, onshore lands

are principally regulated under State property laws. Offshore lands (i.e. the seabed and subsoil) are principally regulated under the state laws in respect of the area extending from the shoreline out to three nautical miles and under Commonwealth laws beyond that point.

For the purposes of CCS, sites may occur on freehold land, unallocated State land, unallocated State land which has been dedicated for use as a specific purpose, onshore or offshore or under State or Commonwealth jurisdiction. Differing legal rights and restrictions apply for these different types of land. A preferred CCS scheme would be one which allows for CCS in all of these types of land without needing complex variations of the scheme for each different land type.

It will also be necessary to consider native title issues on a case-by-case basis. Native title issues may arise in relation to site selection for CCS and government regulation of CCS activities. Native title is a pre-existing interest in land or waters (onshore and offshore) that is recognised by the common law and the *Native Title Act 1993*. Depending on the activity to be undertaken, the Native Title Act may require procedural rights to be given to native title holders or native title claimants.

The Minter Ellison advice further outlines that Part IIIA of the *Trade Practices Act 1974 (Cth)* (TPA) establishes legal rights for third parties to share the use of particular infrastructure services which are of national significance, on reasonable terms and conditions. Accordingly, Part IIIA provides a mechanism by which third parties may encroach on the private property rights of another party. The regime applies to both privately and publicly owned infrastructure. There is potential for third party access rights to be accorded to services provided by essential infrastructure facilities at the various stages of the CCS process, although pipelines used to transport carbon dioxide and the storage reservoirs are seen as most likely to be susceptible to applications for third party access rights.

The Minter Ellison advice states that government policy in relation to CCS activities will need to consider:

- the possibility that Part IIIA of the TPA may apply to infrastructure involved in CCS and, accordingly, the possibility of third parties applying to the NCC to have certain CCS services declared; and
- the extent to which a third party access regime should be provided for in any legislative scheme introduced to regulate CCS activities.

Another feature of the existing regime in Part IIIA of the TPA is the scope for giving an access undertaking. Part IIIA of the TPA provides for a person who is, or expects to be, the provider of a service to voluntarily give a written access undertaking to the ACCC. This can provide for terms and conditions on which third parties may access the service and for other matters such as information to be given to prospective users and transparency in the operation of the facility.

Option 1 – Status Quo

Contract, commercial and property law could be used to regulate the ownership and transfer of CCS sites. However, as the application of CCS technology is relatively new, no legal precedents have been applied directly to any issues that might arise between owners of the land, owners of the CCS stream and suppliers of the CCS stream. Thus, resolving any such issues without any changes to current arrangements could prove costly and time consuming.

In some instances, land owners could allocate pore space in accordance with freehold title in some jurisdictions. Landowners could also use veto rights to block site access to those wishing to conduct CCS activities. Access arrangements would need to be negotiated with the persons and entities holding interests in land. This may impede CCS if the owner utilised that veto power. Any contractual arrangement for access to a CCS site would need to include such risks, which would be negotiated and agreed with the landowner prior to signature. Current Queensland and South Australian petroleum legislation provide for third party access to storage reservoirs. These Acts do not have the threshold requirements as to economic effects that must be satisfied in order for a facility to be declared under the TPA. These inconsistencies and gaps have the potential to increase industry uncertainty. Further, differing treatment from other similar scale industries without a sound basis could undermine existing regulatory systems.

Specifically, reservoirs and injection sites may be subject to competing claims from other users. Without clear proprietary rights and access arrangements for each stage of a CCS project relating to the surface and sub-surface, industry will face uncertainty. Similarly, the ownership of the CCS stream at each stage of a CCS project needs to be established to clearly define rights and responsibilities.

In cases where there are a limited number of storage sites, lack of competition for access to storage sites could prevent third party access and could result in monopolies leading to sub-optimal outcomes. When examining this option it is important to note the existing provision for third party access in Part IIIA of the TPA, if a facility used for CCS is declared by the ACCC. AGS advise that there are threshold criteria to be satisfied in order for the Part IIIA regime to be used for regulating CCS activities. This is because:

- There is a question as to whether a natural reservoir is itself a ‘facility’ for the purpose of Part IIIA (facility in this context being largely an economic concept);
- The barrier for declaration of a facility under Part IIIA is set fairly high. For example, a facility can only be declared if it is of national significance, and CCS activities would not necessarily be conducted on such a scale. There is also a requirement as to the effect of the facility on markets, which might not be met in the case of a storage reservoir; and
- While there is no such barrier to offering access undertakings under Part IIIA of the TPA, it is uncertain how widely applicable this option is given the lack of a CCS specific precedent.

Specifically AGS advise that there are not the same economic criteria to be satisfied in order for an access undertaking to be accepted by the ACCC as there are in the case of an application to have a facility declared (except that there must be a facility). It should be noted, however, that the giving of an access undertaking is voluntary.

In the absence of clear and consistent regulation and a transparent guiding framework for CCS, it will be difficult for operators to perform in a way that meets expectations of the community. There is also the potential for an increase in risks to the environment as well as health and safety if these public interests are not managed appropriately.

However, by not changing the status quo, there would be no increase in compliance costs for industry, as existing processes are already generally well-known to industry.

Option 2 – Self Regulation

A code of conduct could be established to govern access and property rights for instance in negotiating access to land with landowners. This could include industry standards such as those that are already utilised in similar areas such as petroleum and mining, for instance native title. Where matters of access are uncertain common law and existing legislation could be required for dispute resolution.

However, reservoirs and injection sites may be subject to competing claims from other users. Without clear proprietary rights and access arrangements for each stage of a CCS project relating to the surface and sub-surface, industry will face uncertainty. Similarly, the ownership of the CCS stream at each stage of a CCS project needs to be established to clearly define rights and responsibilities.

By not introducing any additional amendments to government regulation, there would be no increase in compliance costs for industry, however, there is likely to be uncertainty for both project operators and landowners in relying on common law. As CCS is an immature technology and as for the option of status quo, no legal precedents have been applied directly and resolving any legal issues could prove costly and time consuming.

Given this relative immaturity of CCS technology, self regulation at this stage would likely be premature. As the technology and the CCS industry matures, there may be opportunity for the application of a self-regulation regime to elements of CCS projects which may in turn assist in delivering continuous improvement and the potential for greater industry stewardship.

As outlined in Option 1, there is the potential for an increase in risks to the environment as well as health and safety if these public interests are not managed appropriately.

The third party access provision under the TPA as well as the potential applicability of the South Australian and Queensland legislation referred to in Option 1 is also relevant to this option.

Option 3 – Additional/Amendments to Government Regulation

Ensuring that regulation applying to CCS projects is consistent with regulation applying to other similar scale projects will require additions and amendments to government regulation in most jurisdictions.

To provide certainty, the point of change in ownership/responsibility for the CCS stream needs to be clarified to allow storage and movement of the stream. In addition, ownership of storage sites including government or private landowners, veto power and compensation need to be clearly defined. The nature and scale of future CCS projects will be influenced by technical practicalities, costs and the arrangements. Seeking such consistency and transparency will increase industry certainty and provide the wider community with a clear expectation as to how issues such as land access and management is addressed, and provide for a potential reduction in potential risks to the environment, health and safety aspects of the project.

While these factors cannot be anticipated, suitable CCS stream reservoirs may be contested. There may also be a need to allow for more than one operator to access a reservoir. Further regulations may need to recognise the potential for the multiple and sequential use of a reservoir.

Government regulation will ensure that a management framework provides for issues including, multiple and sequential uses of the surface and sub-surface, permits that cover exploration and utilisation of storage sites, duty of care considerations, compensation, and cost recovery/pricing structure for storage and access.

With any additional government regulations or amendments to existing government regulation, there is always the resultant effect of increased complexity and compliance cost to industry and the potential for an increase in compliance burden.

The below table attempts to summarise the discussions under each option analysed above.

	POTENTIAL DISADVANTAGES	POTENTIAL ADVANTAGES
Option 1: Status Quo	<ul style="list-style-type: none"> ■ Uncertainty in relation to ownership of land/reservoir ■ Costs may be high if litigation pursued ■ Reduction in consistency ■ Undermine existing regimes ■ Increased risk to environment, health and safety 	<ul style="list-style-type: none"> ■ No increase to compliance costs for industry ■ Existing TPA provisions may accommodate third party access for CCS activities
Option 2: Self Regulation	<ul style="list-style-type: none"> ■ Uncertainty in relation to ownership of land/reservoir ■ Costs may be high if litigation pursued ■ Reduction in transparency and consistency ■ Increased risk to environment, health and safety ■ Current state of CCS industry immature to apply self-regulation 	<ul style="list-style-type: none"> ■ Increased industry stewardship ■ Reduced compliance costs for industry ■ Accepted industry practice well-established
Option 3: Additional/ Amendments to Government Regulation	<ul style="list-style-type: none"> ■ Increased complexity and compliance costs/burden 	<ul style="list-style-type: none"> ■ Increased industry certainty ■ Increased clarity for industry of community expectations ■ Increased consistency and transparency ■ Reduction in risk to environment, health and safety

Recommendation

Options 1 or 2 increase industry uncertainty compared with Option 3 in respect of propriety rights to storage sites and ownership of CCS streams. These considerations will be relevant to issues of responsibility and liability. In relation to third party access, existing provisions under Part IIIA of the TPA may provide an avenue for the status quo option to be applied. However, there are no precedents in relations to CCS. Both options also potentially could lead to high costs if litigation is pursued and are unlikely to be appropriate for all potential storage sites.

Additional government regulation to fill the above gap (Option 3) is the preferred option as it would be transparent, provide certainty and specifically define property rights in relation to CCS. The basic principles underpinning such regulation would be the same as those applying to activities such as mining and petroleum operations.

Access and Property Rights: Guiding Regulatory Principles

- *Surface and subsurface rights for CCS should provide certainty to rights-holders of their entitlements and obligations.*
- *These rights should be based on established legislative and regulatory arrangements, custom and practice and accommodate the likely evolution of multi-user CCS infrastructure and facilities.*
- *In granting rights to inject the CCS stream into subsurface formations, governments should give due consideration to land use planning issues that may arise as a consequence.*

5.3 TRANSPORTATION ISSUES

Transportation constitutes an integral component of a CCS project.

The risks associated with transportation of a CCS stream relate to potential safety hazards to workers and the general public and potential impacts of leakages on the environment.

There are different means of transportation for a CCS stream, including pipelines, pressurised road tankers, and pressurised sea tankers. Given the large volumes of CCS stream that are likely to be injected as part of commercial operations in Australia, the most common and practical method of transporting the stream will be pipeline. As a consequence, this form of transportation is the focus of analysis in this section. It must be recognised however that other means of transportation may be proposed and regulation should adequately provide for consideration of other proposals.

Given that gas has been transported by pipeline both here in Australia and overseas for many years with very few safety and/or environmental incidents, it is not envisaged that there will be a major concern for the transportation of CCS stream. The transportation of CCS stream, albeit in small volumes, is already undertaken by road in Australia and by pipeline in the USA and Canada. Further, many of the safety measures and monitoring techniques employed by the Australian natural gas industry would apply to CCS stream pipeline transport.

As a holder of a Pipeline Licence in Australia, the pipeline owner is responsible at law for the safety of the public. The Licensee has important responsibilities in the event of an incident.

Currently, Australia has over 20,000 kilometres of high pressure natural gas pipelines in operation and this figure is expected to increase because of projected growth in natural gas. It is important to note that there are also a number of standards currently governing the transportation of compressed gases and liquids.

For example, the Australian Standard for oil and gas pipelines AS 2885 (the Standard endorsed by all Australian governments to apply nationally in 1994) can be readily applied to CCS stream transportation by pipeline. As pipelines are likely to be the method used to transport CCS stream for most projects, the adoption of AS 2885 for CCS stream transportation should not be a significant undertaking.

This Standard specifies requirements for the design and construction of steel pipelines and associated piping and components that are used to transmit single phase and multiphase hydrocarbon fluids, such as natural and manufactured gas, liquefied petroleum gas, natural gasoline, crude oil, natural gas liquids and liquid petroleum products.

The key differences between transporting natural gas and a CCS stream by pipeline from a safety/environmental perspective are:

- when carbon dioxide mixes with water it becomes acidic and corrosive;
- carbon dioxide is heavier than air;
- carbon dioxide is odourless; and
- carbon dioxide is not flammable.

The risk assessment process established by the pipeline industry in Australian Standard AS2885 involves identifying all possible threats to the pipeline, metre by metre along its entire length. These risks are either eliminated completely in the design of the pipeline or are managed in the pipeline operations phase to ensure that any risks are as low as reasonably practical. This risk assessment is a 'cradle to grave' process which commences with the development of the pipeline project and continues until the pipeline is decommissioned.

Transporting CCS streams relies on existing technology which has been used in the chemical and petroleum industry for many years, for example emergency shutdown valves on pipelines. However, legal advice on the applicability of existing regimes to regulate the transport of CCS streams by pipeline indicates that there are gaps in the coverage. For example, legal advice received in May 2005 from AGS indicates that under the Petroleum Submerged Lands Act (1967) (PSLA), even where all stages of CCS take place as part of a single licensee's operations under the PSLA, a CCS stream pipeline cannot be licensed under the PSLA. In addition, CCS streams captured from produced petroleum may be injected into a seabed reservoir by a person carrying on a separate CCS enterprise offshore. Such an enterprise cannot be regulated under the PSLA.

Victoria and New South Wales have pipeline Acts that provide for the licensing and regulation of pipeline operations. These Acts may apply to carbon dioxide pipelines in State coastal waters. South Australia, Queensland and, in a more limited form, Western Australia have Acts that expressly provide for the licensing of carbon dioxide pipelines, but none of those Acts seem capable of applying in state coastal waters.

All jurisdictions have legislation regulating the handling, storage and transport of dangerous goods. Carbon dioxide is a dangerous good for the purposes of this legislation. The National Dangerous Goods Framework provides a model for jurisdictions in this context. The statutory provisions for handling and storage of dangerous goods are not uniform across jurisdictions. However, they generally impose duties on persons involved in handling and storing dangerous goods. This includes complying with requirements for installing and testing containers, placarding and training, keeping registers of dangerous goods and making emergency plans. In many cases, premises where dangerous goods are stored or handled need to be licensed.

Whether a particular piece of State/NT dangerous goods legislation applies in coastal waters depends on whether it is capable of applying offshore, whether the provisions of the legislation show an intention to apply in coastal waters and its interaction with other State/NT laws (such as pipelines legislation). Each jurisdiction has in substance adopted the provisions for transport of dangerous goods in the Road Transport Reform (Dangerous Goods) Act 1995 (Cth), Road Transport Reform (Dangerous Goods) Regulations 1997 (Cth) and Rail (Dangerous Goods) Rules (Cth). These provisions will not apply to transport in State/NT coastal waters. Without specific legislation, approvals for a pipeline would be obtained through the relevant land use planning legislation or environmental impact process.

Option 1 – Status Quo

Existing legislation relating to pipeline transport would require amendments/additions if it was to apply to pipelines carrying CCS streams.

If these amendments/additions are not made, then regulation applying to aspects of CCS pipelines would be inconsistent, as well as being inconsistent with existing frameworks of regulation for other pipelines. These inconsistencies have the potential to increase industry uncertainty. Further, in the absence of clear and consistent regulation and a transparent guiding framework for CCS, it will be difficult for operators to perform in a way that meets expectations of the community and there is the potential for an increase in risks to the environment, as well as health and safety if these public interests are not managed appropriately.

However, by not changing status quo, there would be no increase in compliance costs for industry, as existing processes, which could be applied to the OH&S and handling of dangerous goods elements of CCS are already generally well-known to industry.

Option 2 – Self Regulation

While industry standards or a code of conduct could be used, this raises the same issues as under Option 1, above. Specifically, there is the potential for an increase in risks to the environment as well as health and safety if these public interests are not managed appropriately. There is also potential for reduction in transparency and consistency. In addition, differing treatment from other similar scale industries without a sound basis raises the issue of possibly undermining existing regulatory systems. These inconsistencies have the potential to increase industry uncertainty.

As the technology and the CCS industry evolves, there may be opportunity for the application of a self-regulation regime to elements of the transportation phase of a CCS project which may in turn assist in delivering continuous improvement and the potential for greater industry stewardship. However, as the CCS industry is relatively immature, such regulation at this stage would likely be premature.

By not introducing any additional or amendments to government regulation, there would be no increase in compliance costs for industry.

Option 3 – Additional/Amendments to Government Regulation

Environmental standards currently apply to the route selection, construction and operation of pipelines and in most jurisdictions relevant planning approval or environmental impact assessments are required. Significant additional regulation relating specifically to CCS stream pipelines is unlikely to be necessary, however, there is likely to be a need for some slight changes to existing legislative arrangements to ensure consistency with other similar scale industrial process.

Some amendments to existing pipeline legislation may be needed. All jurisdictions have relevant regulations governing major hydrocarbon pipelines. In some jurisdictions this is contained in State/Commonwealth Pipeline Acts while in others it is contained in Petroleum Acts.

Any new regulation should allow access to private and public property for the purpose of transportation of CCS stream and construction of purpose built pipelines. Making such amendments will also ensure that CCS pipelines are treated in the same way as other pipelines, such as natural gas pipelines, where the issues are very similar.

This option will provide the wider community and operators with clear and transparent expectations as to how issues such as project performance, environmental impacts and occupational health and safety are to be addressed particularly in relation to pipelines.

With any additional government regulations or amendments to existing government regulation, there is always the resultant effect of increased complexity and compliance cost to industry and the potential for an increase in compliance burden.

The below table attempts to summarise the discussions under each option analysed above.

	POTENTIAL DISADVANTAGES	POTENTIAL ADVANTAGES
Option 1: Status Quo	<ul style="list-style-type: none"> ■ Reduction in consistency and transparency ■ Increased risk to environment, health and safety 	<ul style="list-style-type: none"> ■ No increase to compliance costs for industry ■ Current processes could be applied to CCS specific activities
Option 2: Self Regulation	<ul style="list-style-type: none"> ■ Reduction in transparency and consistency ■ Increased risk to environment, health and safety ■ Current state of CCS industry immature to apply self-regulation 	<ul style="list-style-type: none"> ■ Increased industry stewardship ■ Reduced compliance costs for industry ■ Accepted industry practice well-established
Option 3: Additional/ Amendments to Government Regulation	<ul style="list-style-type: none"> ■ Increased complexity and compliance costs/burden 	<ul style="list-style-type: none"> ■ Increased industry certainty ■ Increased clarity for industry of community expectations ■ Increased consistency and transparency ■ Reduction in risk to environment, health and safety

Recommendation

Government regulation already exists in relation to environmental and OH&S issues associated with pipelines operating in very similar situations to those that would be used in a CCS project.

It is recommended that gaps in the existing regulatory system be addressed by amendments/additions to existing legislation. In general, such amendments/additions would be those required to ensure that the existing pipeline regulatory framework was explicitly extended to cover CCS pipelines. In the future, there may also be a need to develop technical standards to apply to CCS pipelines, analogous to those that already exist for natural gas and other pipelines, but having regard to the likely constituents of CCS streams. As such a combination of Option 1 and Option 3 is recommended.

Using solely the status quo and/or self-regulation options has the potential to undermine the existing regulatory framework and would be inconsistent with current industry practice.

Utilising this existing regulation should be cost effective as minimal new regulation would be required. The community's interests will also be protected as this existing regulation takes environmental, health and safety issues into account. Therefore, for the transport of the CCS stream, regulatory principles behind existing legislation and standards for pipeline transport relating to OH&S, access and environment protection should be applied in the amendment of legislation where appropriate.

Transportation Issues: Regulatory Guiding Principle

- *Regulation relating to the transport of a CCS stream should be consistent where possible, using agreed national protocols and guidelines.*

5.4 MONITORING AND VERIFICATION

Monitoring and verification is required to ensure operationally safe performance of CCS projects; particularly the condition of the injection well and the conditions in the storage reservoir. It also verifies that the amount of CCS stream measured has actually been injected as well as its behaviour over time. In the long-term, monitoring can confirm the continued storage of the CCS stream in its intended location or storage formation. Verification of the methods used in monitoring and the data collected will bring confidence to the process.

Current scientific understanding indicates that effective monitoring and verification of the stored CCS stream is a key component for minimising risks. While the probability of a leakage, on the basis of current scientific knowledge, is understood to be very low, the costs of such an incident could be high.

Although projects will necessarily be assessed on a case-by-case basis, any monitoring and verification system needs to ensure industry provides accurate and relevant information, which is readily available to the community and independently verifiable.

This is likely to come in the form of operating and reporting standards or objectives that apply to all projects to deliver a high degree of certainty to operators and the community.

It is envisaged monitoring should be carried out pre-injection, continuously during injection and for an appropriate period thereafter. Such monitoring may, for example, involve the use of wells to confirm movement of the CCS stream in the storage formation, periodic surface and sub-surface geochemical and geophysical surveys and possibly, the use of tracer compounds. The frequency of such surveys will depend on key factors such as site conditions.

Monitoring and verification of CCS projects needs to be able to deliver high quality information that can be used to effectively and responsibly manage health, safety, environmental and economic risks; information on the volume and location of greenhouse gas emissions that have been abated and are stored underground which

are accurate enough to meet inventory reporting and commercial requirements; and to engender public confidence. There is a need to develop and establish procedures for carbon dioxide accounting for CCS projects, which include accounting in the event of any leakage of the CCS stream. These procedures could form the basis of possible future CCS standards, covering standards for certification, auditing, management and accounting for stored carbon dioxide.

Option 1 – Status Quo

It is important to note that currently the concept of verification is not thoroughly considered in all jurisdictions beyond providing audit powers. As such, existing legislation and regulation in some jurisdictions will need to either be adopted or changed to apply to all parts of CCS projects in all jurisdictions. In such cases, the absence of specific or new regulation for CCS monitoring and verification would not provide the assurances that would be needed to ensure the injected CCS stream can be consistently and accurately accounted for and therefore risks adequately managed. As a result, not developing new regulation may lead to inconsistencies in the way in which CCS projects are regulated.

Differing treatment from other similar scale industries without a sound basis raises the issue of possibly undermining existing regulatory systems.

In the absence of clear and consistent regulation and a transparent guiding framework for CCS, it will be difficult for operators to perform in a way that meets the expectations of the community. There is also the potential for an increase in risks to the environment as well as health and safety if these issues are not managed appropriately.

However, by not changing the status quo, there would be no increase in compliance costs for industry, as existing processes are already generally well-known to industry.

Option 2 – Self Regulation

Similar issues apply as for the status quo option above, in particular the potential increase in risks to the environment as well as health and safety if these public interests are not managed appropriately. There is also a potential for reduction in transparency and consistency.

As the technology and the CCS industry evolve, there may be an opportunity for the application of a self-regulation regime to elements of CCS projects and a code of conduct could be established. This may in turn assist in delivering continuous improvement and the potential for greater industry stewardship. However, as the CCS industry is immature, such regulation at this stage would likely be premature.

However, by not introducing any additional or amendments to government regulation, there would be no increase in compliance costs for industry.

Option 3 – Additional/Amendments to Government Regulation

The main reasons for conducting monitoring and verification are to identify whether the CCS stream is behaving in the reservoir as predicted by modelling, to safeguard the public interests in environment, health and safety and account for greenhouse emissions. A regulatory framework should be able to deliver mechanisms for monitoring and verification to:

- establish data on the atmospheric, near-surface and sub-surface environment;
- monitor the project environment to manage and mitigate health, safety and environment risks;
- ensure certain standards for health, safety and environment and subsurface behaviour of the CCS stream are met before responsibility for the project is transferred from private to public interests (if deemed appropriate); and
- develop and manage a monitoring and verification plan to cover all stages of the CCS project including post-closure.

Monitoring and verification is currently carried out in relation to storage of other materials such as underground gas storage. Projects could be monitored under existing frameworks including, inter alia, for pipelines, petroleum, mining, or waste disposal with minor legislative amendments. A regulation framework specifically for CCS could be developed using information based on existing regimes. Such a framework would maintain consistency of treatment of CCS with that of other large scale industries.

While existing regulation could enable CCS projects to be managed effectively in the short term, CCS, given its long-term nature, is a different process from extraction of hydrocarbons, and may involve different monitoring and verification requirements that may not fit easily within current legislative frameworks. For example, new monitoring and verification standards and guidelines in management plans will need to be developed for CCS before the site can be decommissioned. Therefore, ensuring that regulation applying monitoring and verification for CCS projects is consistent with regulation applying to other similar scale projects will require additions and amendments to government regulation in most jurisdictions. A new regulatory framework which would enable monitoring and management of CCS stream in-situ would also need to be developed as appropriate. After the well has been sealed in accordance with regulatory requirements, monitoring should continue until the relevant regulatory authority is satisfied.

Establishing a suitable verification regime may involve legislating additional powers for regulators or third party verifiers, and will involve developing regulations or guidelines that outline what needs to be verified and to what standard, to meet potential international reporting and commercial requirements.

The development of strategic and project-specific monitoring and verification strategies would increase industry certainty and provide the wider community with a clear expectation as to how issues such as project performance will be managed and will

also provide for a potential reduction in potential risks to the environment as well as health and safety aspects of the project. In addition, this option ensures protection of community interests relating to the long-term nature of CCS. Government regulation would also allocate responsibility for monitoring and reporting during storage of the CCS stream.

With any additional government regulations or amendments to existing government regulation, there is always the resultant effect of increased complexity and compliance cost to industry and the potential for an increase in compliance burden.

The below table attempts to summarise the discussions under each option analysed above.

	POTENTIAL DISADVANTAGES	POTENTIAL ADVANTAGES
Option 1: Status Quo	<ul style="list-style-type: none"> ■ Decreased consistency in reporting required ■ Reduction in transparency ■ Reduction in consistency ■ Reduction in industry certainty ■ Undermine existing regimes ■ Increased risk to environment, health and safety 	<ul style="list-style-type: none"> ■ No increase to compliance costs for industry
Option 2: Self Regulation	<ul style="list-style-type: none"> ■ Reduction in transparency and consistency ■ Increased risk to environment, health and safety ■ Current state of CCS industry immature to apply self-regulation 	<ul style="list-style-type: none"> ■ Increased industry stewardship ■ Reduced compliance costs for industry ■ Greater industry cooperation leading to the latest 'leading practice' being applied
Option 3: Additional/ Amendments to Government Regulation	<ul style="list-style-type: none"> ■ Increased complexity and compliance costs/burden 	<ul style="list-style-type: none"> ■ Increased industry certainty ■ Increased clarity for industry of community expectations ■ Increased consistency and transparency provided by universal application ■ Reduction in risk to environment, health and safety

Recommendation

A consistent monitoring and verification regime will help to minimise risks associated with long-term storage of CCS streams and will also help deliver transparency. This would best be achieved through regulation. Thus Option 3 is recommended.

Monitoring and Verification: Guiding Regulatory Principles

- *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.*
- *Regulation should provide a framework to establish, to an appropriate level of accuracy, the quantity, composition and location of gas captured, transported, injected and stored and the net abatement of emissions. This should include identification and accounting of leakage.*

5.5 LIABILITY AND POST-CLOSURE RESPONSIBILITIES

Defining liabilities and post-closure responsibilities associated with CCS projects is a priority. The lack of a clear guiding framework for CCS with which to consider post-closure responsibilities and liabilities could leave project operators, governments and future generations exposed in terms of environment, health and safety risk and financial cost.

How post-closure responsibilities and liabilities are managed will be a key factor for operators to perform in a way that meets the expectations of the community.

Liability to pay monetary compensation (damages) could potentially arise from a leakage of the CCS stream, resulting from negligence, during any part of the CCS process, including after injection. There could be liability for injury to a person or persons (for instance, workers or members of the public) or for damage to property.

Liability to pay monetary compensation may arise for CCS from the common law of nuisance or negligence.

Liability in negligence arises where a person or body has a duty to take reasonable care to avoid harm to a person or property and fails to do so. Liability involves an element of fault.

Liability in nuisance arises where a person causes substantial and unreasonable interference with use of land. There will be no liability if the nuisance is the inevitable result of an activity authorised by statute. Also, in some circumstances the reasonableness of the person's actions may mean that person or body is not liable.

These common law liabilities are generally not excluded by legislation regulating industrial activities and would be likely to apply to all aspects of CCS.

The liabilities exist in perpetuity in the sense that liability does not arise until the injury or damage occurs. Thus, if in 100 years there is a leakage of the injected CCS stream and injury or damage occurs through negligence, the person who was injured or whose property was damaged could conceivably bring an action in a court to recover monetary compensation.

An operator or an owner or occupier of land could also be liable, under State or Territory legislation. Again, this requirement could be imposed at any time in the future (assuming that the State and Territory laws do not change and that the relevant party still exists).

The overriding arrangements applying to liability in relation to CCS projects should not differ from those applying to any other industry. Any underlying regulation may differ in detail, but should not establish a situation where CCS projects are treated as a special case.

Nevertheless, there is a need to ensure that existing regulatory frameworks/arrangements and government policy cover all aspects of liabilities that might arise from any unique aspects of CCS projects, both while the project is in operation as well as in the post-closure period.

Management of liabilities in the post-closure period will need to be clear to CCS project operators, regulators and the community. Principles applying from the decommissioning of petroleum and mine sites operations, long-term management of hazardous waste disposal sites and contaminated site remediation provide models to assist in understanding liabilities in the post-closure phase.

It is clear that under most circumstances and in line with current industry practice, an operator of a CCS project would be responsible for managing liabilities for all operational aspects of the project (capture, transport, injection, monitoring/verification as well as decommissioning).

If the operator has complied with all the terms and conditions of the regulators' approval, the regulator would accept the surrender (of a permit, lease, license or other instrument in respect) of the site. After this time, the responsibility of the operator in respect of the site would cease subject to any other statutory requirements. The project operators would retain liability over the site in the post closure period for any negligence on their part.

Given the potential timeframes associated with both the storage of the CCS stream (geological time) as well as the longevity of commercial organisations there exists some important government policy considerations in relation to dealing with any potential risk over the long-term.

The Consultation COAG RIS and some submissions proposed that government accept post-closure responsibility for the stored CCS stream once the regulator has approved

site closure. Under current regulatory regimes, there is no government policy for the acceptance of post-closure responsibilities. Currently, an operator must minimise risks to as low as reasonably practicable and current industry practices are well proven and accepted. Legal advice from the AGS commissioned under MCMPPR, advises that liability under common law continues to apply to the operator post-closure.

Government will need to investigate the risks associated with long-term storage (that is those arising after the project has been decommissioned) and determine how these should be provided for. These measures might be regulatory or financial in nature. These will be matters for government policy and measures are outlined in the financial issues section.

To summarise, where damages result as a consequence of CCS, liability will be the responsibility of the operator in accordance with relevant regulation; or the operator in accordance with common law where negligence can be proven. In other circumstances, there may be no one responsible for the damages. In this situation, any costs will lie where they fall and may be accepted by government(s).

Where more than one jurisdiction is involved, responsibility should be subject to an agreement between the relevant jurisdictions.

Option 1 – Status Quo

Currently, CCS activities would be regulated by a range of Commonwealth, State and Territory laws, including environmental laws, occupational health and safety laws and, in some circumstances, petroleum laws. These laws impose statutory obligations to do or not to do things, often supported by criminal offences and financial penalties. In addition, there is common law liability to pay monetary compensation for negligence or nuisance. However, there is no general regulation dealing with carbon dioxide emissions. This latter issue, however, is a matter of broader government policy and regulatory issues relating to such law should be addressed in the context of any specific proposed law and are thus outside the scope of this COAG RIS.

With respect to post-closure responsibilities, existing legislation and regulation does not apply to this part of CCS projects in all jurisdictions. As a result, not developing new regulation may lead to inconsistencies in the way in which CCS projects are regulated. These inconsistencies have the potential to increase industry uncertainty.

In the absence of clear and consistent regulation and transparent management regimes, it will be difficult for operators to perform in a way that meets expectations of the community and there is the potential for an increase in risks to the environment as well as health and safety if these public interests are not managed appropriately.

However, by not changing the status quo, there would be no increase in compliance costs for industry.

Option 2 – Self Regulation

While potentially providing for greater industry stewardship, self regulation in relation to liabilities is not a viable consideration given the long-term time scales that CCS streams are likely to be stored, as well as the range of environmental, health, safety and sectoral regulating regimes in operation for industrial activities of this nature. With self-regulation, there is also a potential for reduction in transparency and consistency.

However, by not introducing any additional or amendments to government regulation, there would be no increase in compliance costs for industry.

Option 3 – Additional/Amendments to Government Regulation

Existing regulatory frameworks cover, for example, the need for environment, occupational health and safety, and rehabilitation plans to be addressed at the project proposal stage and that they be approved by the relevant regulatory authorities. This enables risks associated with projects to be kept as low as practicable.

There may be a need in some jurisdictions to amend existing regulations or develop regulations to ensure that these also extend to cover CCS projects and apply relevant standards to ensure consistency. Responsibilities relating to long-term site maintenance will need to be considered by governments to ensure that operators provide adequate assurance of storage containment and regulation.

Seeking such consistency and transparency will increase industry certainty and provide the wider community with a clear expectation as to how issues such as project performance will be managed and will also provide for a potential reduction in potential risks to the environment as well as health and safety aspects of the project. In addition, this option ensures protection of community interests relating to the long-term nature of CCS.

Decommissioning and rehabilitation regulations that are currently in place for the mining and petroleum industries could potentially be adopted for CCS. In particular, the existing petroleum regulation at both a State and Commonwealth level provides guidelines for the decommissioning of facilities that are similar in nature to those for CCS projects, which could be utilised. This is particularly relevant for high pressure pipelines and wells.

Government will permit site closure when they are satisfied to a high degree of certainty that future land use objectives are met, residual risks of leakage and liability are at an acceptably low level, and ongoing costs associated with the site are acceptably low or can be otherwise managed. It is at this point, following decommissioning that a regulator would allow the operator to vacate the site. For CCS, key matters for regulators could include initial assessing of site options, surveillance and enforcement of the regulation; ensuring that the closure of sites is adequately addressed and monitored in future years; and possibly accepting any long term liabilities of the site.

With any additional government regulations or amendments to existing government regulation, there is always the resultant effect of increased complexity and compliance cost to industry and the potential for an increase in compliance burden.

The below table attempts to summarise the discussions under each option analysed above.

	POTENTIAL DISADVANTAGES	POTENTIAL ADVANTAGES
Option 1: Status Quo	<ul style="list-style-type: none"> ■ May not deal with all aspects of CCS, especially long-term storage ■ Reduction in consistency ■ Reduction in industry certainty ■ Increased risk to environment, health and safety 	<ul style="list-style-type: none"> ■ Appropriate for all liabilities until the operator vacates the site ■ No increase to compliance costs for industry
Option 2: Self Regulation	<ul style="list-style-type: none"> ■ Reduction in transparency and consistency ■ Increased risk to environment, health and safety given long-time scales of storage ■ Current state of CCS industry immature to apply self-regulation 	<ul style="list-style-type: none"> ■ Increased industry stewardship ■ Reduced compliance costs for industry
Option 3: Additional/ Amendments to Government Regulation	<ul style="list-style-type: none"> ■ Increased complexity and compliance costs/burden 	<ul style="list-style-type: none"> ■ Increased industry certainty ■ Increased clarity for industry of community expectations ■ Increased consistency and transparency ■ Reduction in risk to environment, health and safety ■ Long-term aspects may require specific government regulation, which will require specific government policy consideration

Recommendation

Liability should be based on existing regulatory arrangements and common law. Thus the status quo should be adopted for all parts of a CCS project up until closure. Using this model, the practical consequence is that government may assume responsibility in the post-closure period. A consistent regulatory framework that considers post-closure responsibilities and liabilities associated with CCS activities will be required to ensure project operators, governments and future generations are not exposed to health, environmental and financial risks and financial burden. As a consequence, a combination of Option 1 and Option 3 is recommended for this issue.

Liability & Post-closure Responsibilities: Guiding Regulatory Principles

- *Current regulatory principles and common law should continue to apply to liability issues for all stages of CCS projects.*
- *Governments' overall consideration of post-closure storage of CCS streams must aim to minimise exposure to health, environmental and financial risks for project operators, governments and future generations.*

5.6 FINANCIAL ISSUES

In the context of this COAG RIS, financial issues refer to:

- (a) the general fiscal system of taxes applying to CCS projects;
- (b) insurance; and
- (c) the provision of funding for any post-closure obligations/liabilities.

In this context, the term financial issues does not refer to the provision of any government incentives for investment in CCS. This is a matter of broader government policy.

The Australian Taxation Office advises that CCS costs are an allowable deduction for income tax purposes because they are associated with deriving assessable income from petroleum production, whether CCS is obligatory for petroleum production or optional and carried out for reasons related only indirectly to income production.

Therefore, for most taxpayers, such costs would be treated as normal business expenses with deductibility for CCS falling under the general deduction provision and various capital allowance provisions. The PRRT treatment of CCS costs depends on the specific project circumstances.

Normally, industry makes its own decisions about whether to seek insurance or to self-insure over the various aspects of a project (construction, operation, liabilities). However, following MCMPPR discussions with the insurance industry it appears that insurance for all operational phases of a CCS project up until post closure can be obtained but gaining insurance for the post-closure period is currently more complex.

While some submissions suggested that governments might take on the role of an insurer, this would require a policy decision by governments and would, de facto, provide a form of 'special assistance' to the industry.

CCS projects may involve costs that are incurred after injection into a reservoir ceases, which will, most likely, be after any income generation (for example, from petroleum production or electricity generation) associated with the project also ceases. These costs may include the cost of plant decommissioning, site rehabilitation, reservoir monitoring and possible liabilities arising from leakage of the CCS stream from the reservoir resulting from negligence.

In relation to site rehabilitation and decommissioning, precedents exist in the mining and petroleum industries, both in Australia and internationally. These may involve the establishment of trust funds or bank guarantees to cover the estimated costs. These mechanisms could be considered for CCS projects.

Monitoring of the storage site could be dealt with in the same way. Such monitoring may take place over a longer period than decommissioning and rehabilitation.

The issue of liabilities that might arise from leakage, caused by negligence, from the reservoir in the post-closure period is more complex. While a company continues to exist, liabilities would lie with the company involved under common law. However, given the time scales involved, responsible entities may no longer exist if an event occurs.

A range of financial instruments may be required to address the long-term risks associated with CCS to underpin a sound guiding framework.

There are a number of criteria which should be taken into account when considering an appropriate financial instrument which may assist in the management of a potential liability.

The major (but not exhaustive) criteria to assess these instruments would include the following:

- It would be compatible with the timeframes of the above identified phases of CCS activities, including decommissioning and post closure.
- It would need to have flexibility to the site specific nature of CCS activities.
- The financial instrument should promote 'leading practice' in CCS.
- It should be consistent with all legal, regulatory, property lease and taxation requirements. A financial instrument would only be adjunct to a well defined regulatory regime and would not replace other aspects of it.
- It should reflect the cost of the risk being undertaken and therefore the total cost associated with CCS.

Option 1—Status Quo

In respect of taxation and insurance, no reason is seen to depart from the status quo.

With respect to financial issues, existing legislation and regulation does not apply to all parts of CCS projects in all jurisdictions. As a result, retaining current arrangements could lead to inconsistencies in the way in which CCS projects are regulated compared to similar scale industries. The status quo may not provide for similar treatment between jurisdictions, as some jurisdictions may require some form of performance bonds, while other jurisdictions do not.

Differing treatment from other similar scale industries without a sound basis raises the issue of possibly undermining existing regulatory systems.

These inconsistencies have the potential to increase industry uncertainty.

In the absence of clear and consistent regulation and transparent management regimes, it will be difficult for operators to perform in a way that meets the expectations of the community. There is also the potential for an increase in risks to the environment, health and safety if these public interests are not managed appropriately.

However, by not changing the status quo, there would be no increase in compliance costs for industry, as existing processes are already generally well-known to industry.

Option 2—Self Regulation

Similar issues apply as for the status quo option above, in particular the potential increase in risks to the environment and health and safety if these public interests are not managed appropriately. There is also a potential for reduction in transparency and consistency.

As the technology and the CCS industry matures, there maybe opportunity for the application of a self-regulation regime to elements of CCS projects which may in turn assist in delivering continuous improvement and potentially greater industry stewardship.

However, as the CCS industry is immature and there is the need for separation of powers when dealing with financial issues, self regulation is not appropriate.

By not introducing any additional or amendments to government regulation, there would be no increase in compliance costs for industry.

Option 3—Amendments/Additions to Government Regulation

Existing regulatory models can be adopted to ensure that an operator funds any obligations arising after injection ceases. While contributions to a financial mechanism will place a cost burden on industry, these costs should only be those that any responsible project operator would expect to face. The major benefit of these options is that the community can have confidence that an operator will fund such residual obligations.

There may be a need in some jurisdictions to amend relevant existing regulation or develop regulations to ensure that these also extend to cover CCS projects and apply relevant standards to ensure consistency. New regulation will be required if governments wish to ensure that any costs of possible leakage are to be met. However, the form and nature of any such scheme would need to take into account the risks involved in the specific project. In general however, given that the risks will be very low, any such scheme is unlikely to involve major costs. Existing regulatory frameworks cover, for example, the need for environment, occupational health and safety, and rehabilitation plans to be addressed at the project proposal stage and that they be approved by the relevant regulatory authorities. This enables risks associated with projects to be kept as low as practicable and the environment is protected.

With any additional government regulations or amendments to existing government regulation, there is always the resultant effect of increased complexity and compliance cost to industry and the potential for an increase in compliance burden.

The below table attempts to summarise the discussions under each option analysed above.

	POTENTIAL DISADVANTAGES	POTENTIAL ADVANTAGES
Option 1: Status Quo	<ul style="list-style-type: none"> ■ Reduction in consistency ■ Reduction in industry certainty ■ Undermine existing regimes ■ Increased risk to environment, health and safety 	<ul style="list-style-type: none"> ■ No increase to compliance costs for industry
Option 2: Self Regulation	<ul style="list-style-type: none"> ■ Reduction in transparency and consistency ■ Increased risk to environment, health and safety ■ Current state of CCS industry immature to apply self-regulation 	<ul style="list-style-type: none"> ■ Increased industry stewardship ■ Increased industry certainty in future obligations through a pro-active approach ■ Reduced compliance costs for industry
Option 3: Additional/ Amendments to Government Regulation	<ul style="list-style-type: none"> ■ Increased complexity and compliance costs/burden 	<ul style="list-style-type: none"> ■ Increased industry certainty on taxation matters and assurance about how post-closure costs will be managed ■ Increased clarity for industry of community expectations ■ Increased consistency and transparency ■ Reduction in risk to environment, health and safety

Recommendation

In respect of taxation and insurance, no reason is seen to depart from the status quo.

In respect of post-closure financial liabilities, on the basis of the above discussion, it is recommended that prior to project approval, government and industry address the issue of potential post-closure financial liabilities, having regard to established fiscal systems as they relate to comparable industries. To ensure consistency and transparency, there may be a need for additional regulation or amendments to existing legislative requirements in some jurisdictions. As such, a combination of Option 1 and Option 3 is recommended.

Financial Issues – Regulatory Guiding Principles

- *For all stages of a CCS project, wherever practical, established legislative, regulatory and accounting processes should be used in preference to introducing new regulations.*
- *The income from, capital and operating costs associated with a CCS project should be treated in the same way as for any other business venture for taxation purposes.*
- *Regulation should recognise the potential for post-closure liabilities for CCS activities and consider appropriate financial instruments to assist in the management of such risk.*

6 COMPARATIVE ASSESSMENT — FINAL RECOMMENDATION

The table below summarises the recommendations arising from Section 5. Option 1: Status Quo and Option 3: Additional/Amendments to existing legislation were the only two options considered suitable in the recommendations.

The nature of regulation required varies between issues shown in the table below and between jurisdictions. For some issues in some jurisdictions, no changes to current arrangements are required. In others cases existing regulation can be readily adapted. In other cases, new regulation is needed.

In relation to post-closure responsibility and financial issues, government policy will need to be formulated before regulation can be introduced.

ISSUE	OPTION 1: STATUS QUO	OPTION 2: SELF-REGULATION	OPTION 3: ADDITIONAL/ AMENDMENTS TO EXISTING REGULATION
5.1 Assessment and Approvals Process			Yes in some jurisdictions
5.2 Access and Property Rights			Yes in some jurisdictions. Existing mining and petroleum property rights provides a basis for new regulation
5.3 Transportation Issues	No change with respect to OH&S handling of CCS streams		Yes in some jurisdictions for pipeline regulations. However, existing regulation and industry standards can readily be adapted
5.4 Monitoring and Verification			Yes in some jurisdictions

ISSUE	OPTION 1: STATUS QUO	OPTION 2: SELF-REGULATION	OPTION 3: ADDITIONAL/ AMENDMENTS TO EXISTING REGULATION
5.5 Liability and Post-closure Responsibilities			
– liability	No change to existing principles		
– post-closure responsibilities			Government policy needs to be determined before amendments to regulation
5.6 Financial Issues			
– taxation	Yes- clarification sought		
– insurance	Yes		
– post-closure responsibilities			Government policy needs to be determined before amendments to regulation

These individual issues will need to be further developed within the framework set out in this COAG RIS and may involve further Regulatory Impact Statements in each jurisdiction, when detailed regulatory arrangements based on these principles are proposed.

7 PUBLIC CONSULTATION

In September 2003, the Ministerial Council on Mineral and Petroleum Resources (MCMPPR) established the Carbon Dioxide Geosequestration Regulatory Working Group to look at regulatory issues associated with CCS activities. The aim of this work was to develop regulatory guiding principles which could provide a foundation for a nationally consistent approach for commercial CCS activity in Australia.

Stakeholder Engagement During Development of Principles

The regulatory guiding principles were developed following consultation and briefing workshops with a number of key stakeholders including Commonwealth agencies, State Governments, industry and research organisations, relevant international agencies and environmental non-government organisations. Consultation occurred within the following groups:

- Commonwealth Inter-departmental Committee (IDC) – established in February 2003 and consisted of eleven Commonwealth government agencies.
- Carbon Dioxide Geosequestration Regulatory Reference Group – established in September 2003 and consisted of twenty two member agencies including State and Commonwealth government agencies and industry representatives.

Consultation also took place in the context of Australia's involvement in international activities:

- Carbon Sequestration Leadership Forum (CSLF) – established in June 2003 and currently consists of twenty two members.
- Australian CSLF Reference Group – established in February 2003 and consisted of twenty nine member agencies including State and Commonwealth government agencies, research bodies and industry representatives.

During the development of the principles, information briefing workshops targeting environmental non-government organisations (NGOs) were also conducted. The groups involved in these sessions included:

- Climate Action Network Australia (CANA)
- Australian Conservation Foundation (ACF)
- Western Australian Conservation Council
- Environment Victoria

While only a small number of relevant environment NGOs attended workshops during the drafting of the draft guiding principles, the organisations above were considered key NGOs on CCS. CANA is the peak non-government organisations body with responsibility for climate change issues. The Western Australia Conservation Council is

an umbrella organisation of nearly seventy affiliated conservation groups from throughout Western Australia, and Environment Victoria is the State's peak non-government environment organisation.

Workshops with the environment NGOs included:

- Brief explanation of CCS technologies;
- Overview of Ministerial Council on Mineral and Petroleum Resources Regulatory Working Group work to date;
- Explanation of proposed regulatory principles;
- Next steps, including continued consultation when implementing regulation/legislation;
- Comments and questions; and
- Briefings by researchers

The key concerns raised by the environment NGOs during those workshops were:

- That they are not totally opposed to CCS, but have issues with the use of CCS versus renewables.
- CCS is not being discussed enough in the community.
- How the draft guiding principles fit with Australia's international obligations.
- Guidelines should be implemented before CCS projects go ahead.
- Need for early validation of science to ensure CCS works.
- Post-closure liability issues and whom would be responsible in this period.
- Clarification on the life cycle of CCS projects and leakage rates.

Following the consultative mechanisms and workshops held with key stakeholders, draft guiding regulatory principles were submitted to MCMPR for consideration on 29–30 July 2004. The MCMPR agreed to the draft guiding regulatory principles for CCS on the condition that broader public consultation would take place. Ministers agreed that following public consultation they would consider the use of these principles in their respective jurisdictions.

COAG RIS Public Comment Phase—Submissions

This COAG Regulation Impact Statement (RIS) was released for public comment in October 2004. A consultation advertisement was placed in several state newspapers and two national Australian newspapers (on two separate occasions). The advertisement was also targeted at key stakeholder groups and included in newsletters and websites of industry bodies, research organisations, legal firms and environment NGOs. The Department of Industry, Tourism and Resources (DITR) and the Australian Greenhouse Office (AGO) also made the advertisement available on their departmental websites.

The public consultation period closed on 29 November 2004 with a total of 22 submissions received. Submissions were received from industry, research organisations, State Governments and environment NGOs and all were made publicly available on the DITR website—www.industry.gov.au/ccs.

Comments expressed in the submissions varied greatly. Generally, industry welcomed the opportunity to develop a regulatory framework and recognised the importance of working toward reducing emissions by developing CCS technologies but some raised concerns that the lack of a clear long-term signal from government on climate change policy would limit investment in CCS. Environment NGOs also believe emissions reductions to be of vital importance yet most outlined concerns about a lack of consultation during the early stages of the principles development¹ and environmental risks associated with CCS.

It was apparent from the submission comments that broader consultation was a necessary component to revise the COAG RIS and draft guiding principles, particularly ensuring environment NGOs were actively engaged as part of the review process. Three main consultative bodies were tasked with reviewing the submissions and revising the COAG RIS and principles. Government Interdepartmental Committees (both Commonwealth & State IDCs), MCMPR Contact Officers Group and a Stakeholders Reference Group.

The consultative groups were asked to consider comments from the COAG RIS submissions, broader stakeholder consultation and this further advice during the process to revise the draft guiding regulatory principles and associated COAG RIS.

Establishment of Consultative Groups

Interdepartmental Committees

At the Commonwealth level, an Interdepartmental Committee (IDC) on CCS was formed in September 2003 to inform other Commonwealth Government Departments of work in this area and to ensure a whole of government approach is adopted when dealing with CCS issues.

The chair of the IDC is DITR with other members including the Department of the Environment and Heritage / the Australian Greenhouse Office (DEH/AGO), Department of Education, Science and Training, Department of Foreign Affairs and Trade, the Treasury, Department of Prime Minister and Cabinet, Geoscience Australia, Department of Agriculture, Fisheries and Forestry, Department of Transport and Regional Services, Attorney General's Department and the Australian Bureau of Agricultural and Resource Economics.

The Commonwealth IDC has continued to meet on a regular basis since 2003 to ensure a whole of Commonwealth government approach is adopted.

Some other jurisdictions also use their own IDC process.

¹ CANA, ACF and WA Conservation Council submissions

MCMPR Contact Officers for CCS Group

Following the November 2004 MCMPR SCO meeting, a working group was established to replace the former Carbon Dioxide Geosequestration Regulatory Working Group and undertake future CCS work. SCO representatives were asked to nominate a contact officer from each State and Territory to participate in the newly formed MCMPR Contact Officers for CCS Group.

The Carbon Dioxide Geosequestration Regulatory Working Group was reformed in late 2004 to become the MCMPR Contact Officers for CCS Group. The group facilitated a program for CCS work domestically including commissioning work on outstanding issues requested by MCMPR and consideration of stakeholder input to progress the RIS and principles for final consideration by MCMPR Ministers. Representatives from each jurisdiction participated in monthly meetings from February 2005. The group agreed to work together to facilitate a program for CCS for the next 6 to 12 months and progress work on the principles and commission work on outstanding issues requested by MCMPR Ministers.

State and Territory Governments also conducted consultative approaches within their relevant jurisdictions to meet MCMPR requirements for broader consultation of the principles.

CCS Stakeholder Group

The CCS Stakeholders Group was established in January 2005 to facilitate stakeholder engagement to consider RIS submissions and input into the principles review process.

Membership for this group included:

- Australian Coal Association (ACA)
- Australian Petroleum Production and Exploration Association (APPEA)
- Centre for Low Emission Technology (cLET)
- Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC)
- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Department of the Environment and Heritage (DEH)/Australian Greenhouse Office (AGO)
- Department of Industry, Tourism and Resources (DITR)
- Geoscience Australia (GA)
- National Generators Forum (NGF)
- New South Wales Department of Mineral Resources
- Queensland Department of Natural Resources and Mines
- Victorian Department of Primary Industries (VIC DPI)
- Western Australian Department of Industry and Resources (WA DoIR)
- National Environment Consultative Forum (NECF) – representing environment NGOs Australian Conservation Foundation and Conservation Council of Western Australia

Membership of the CCS Stakeholder Group consists of 14 peak bodies with those organisations representing other parties with an interest in CCS activities within their sectoral group. Organisations represented by these 14 peak bodies also continue to receive relevant information associated with the Group via a broad email information distribution system. This broad email list has also allowed stakeholder information to be disseminated to other interested groups such as social NGOs, financial institutions, insurance companies and union representatives.

The environmental NGOs participating on the CCS Stakeholder Group were represented by the NECF. In early 2005, prior to the first CCS Stakeholder Group meeting, DITR liaised with key environmental NGOs to discuss their concerns regarding the development of the principles and to ensure they were fundamentally involved in the consultative processes tasked with revising the documents. NECF agreed to participate in the group and sought nominations from their member organisations for representatives.

The first meeting of the CCS Stakeholder Group was held in March 2005. This meeting established the Terms of Reference of the group and developed the group's forward work program. Two subgroups were also formed to address and revise two key issues in the RIS: environment and liability issues. Representatives from Commonwealth and State Government, research organisations, industry and environment NGOs participated on both drafting subgroups.

The CCS Stakeholder Group met again in May 2005 to consider legal, technical and financial advice commissioned by MCMPR and receive an update on work to date from the environment and liability subgroups. A further RIS revising subgroup was established at this meeting to review the remaining sections of the RIS. Participants on this revising subgroup included a representative from each of the peak organisations and sought to integrate advice, review RIS submissions and other comments received to fill the gaps in the RIS and revise the remaining sections.

The final COAG RIS has sought to clarify a number of issues that were identified as gaps in the Consultation COAG RIS and take on board views of all stakeholders within the consultative groups where possible.

Other Informal Consultation

DITR also informally engaged with organisations that lodged submissions outside the consultative groups mentioned above including Baker Mackenzie, Origin Energy and Stanwell Corporation Limited. Following discussions within the CCS Stakeholder Group it was decided that stakeholder information would be disseminated to other interested groups such as social NGOs, financial institutions, insurance organisations and union representatives. Comments from these groups on the draft COAG RIS were also considered during the drafting process.

Reporting Views of Non-government Stakeholders

VIEWS OF NON-GOVERNMENT STAKEHOLDERS (CCS STAKEHOLDER GROUP MEMBERS)
ENVIRONMENT NGOS
<p>National Environment Consultative Forum</p> <ul style="list-style-type: none"> ■ Broadly supportive of principles and the emphasis of the RIS on a regulatory approach. ■ Particularly supportive of ESD and the Intergovernmental Agreement on the Environment overlaying all CCS activities as these recognise the precautionary principle, intergenerational equity and the polluters pays principle. ■ Welcome to the opportunity to engage in productive dialogue on key issues with government and industry representatives. ■ Some outstanding issues do remain: <ul style="list-style-type: none"> – Definition of CCS Stream: Current definition of the CCS Stream is not stringent enough to ensure other unwanted waste products are not disposed of within the CCS stream. – Scope of RIS: Given the broad nature of the regulatory principles they can and should be applied to RD&D projects. – International Legal Issues: Inadequate attention was given to how Australia's obligations under the Framework Convention on Climate Change and the Kyoto Protocol might affect CCS activities in Australia and Australia's liabilities under these conventions. – Objective: Facilitating CCS is not an appropriate objective. The framework "should provide for the effective management of environmental, health and safety issues while providing for the removal of legal and regulatory impediments and uncertainties relating to the development of CCS." – Assessment and Approval Process: National protocols and standards need to be developed a matter of urgency. These should specifically deal with issues of site selection to help ensure zero levels of leakage. – Monitoring and Verification: The development of national CCS standards and procedures covering certification, auditing, management and accounting for stored carbon dioxide need to be developed as a matter of urgency.

- Liabilities and Post-Closure Responsibilities: Defining post-closure responsibilities associated with CCS projects is still unresolved. Governments must make policy decisions on this as a matter of urgency to ensure project operators, governments and future generations are not exposed in terms of environment, health and safety risk and financial cost. Such a policy must consider the already agreed ESD and Intergovernmental Agreement on the Environment principles (e.g. intergenerational equity and polluter pays.)
- Financial Issues: Disagree with the recommendation, "that prior to project approval, government and industry address the issue of potential post-closure financial liabilities." A consistent national approach, e.g. a bond or other measure, that is consistent with already agreed ESD and Intergovernmental Agreement on the Environment principles (e.g. intergenerational equity and polluter pays) should be applied.

VIEWS OF NON-GOVERNMENT STAKEHOLDERS (CCS STAKEHOLDER GROUP MEMBERS)

RESEARCH ORGANISATIONS

Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC)

CO2CRC welcomes the development of the COAG RIS and considers it to be an essential starting point if CCS is to play its part as a greenhouse gas mitigation option. The Centre has been pleased to contribute to the COAG RIS and applauds the care taken to ensure that a range of views were accommodated in the final document. It might, however, be useful if CO2CRC were to re-emphasise a few key points arising from its extensive research into CCS, its experience of international activities; and its opinions of what is needed for the future application of CCS.

- CCS will be one of the range of mitigation technologies required to make deep cuts to our CO₂ emissions. However, it is important to recognise that application of CCS could confer some particular benefits (and competitive advantages) to Australia in a carbon-constrained world because of Australia's very large storage capacity; its concentration of major emitters at limited number of locations, and its abundance of fossil fuels.
- Pilot research and demonstration projects are a key component for developing a regulatory framework, but if they are to play this role then government must (a) accept post injection responsibility and (b) provide regulatory and liability exemptions to research projects in recognition of the fact that they are not large-scale commercial projects. If these two points are not addressed, then research projects will not go ahead, which will in turn adversely impact on the implementation of Australian CCS projects.

- Regulation should provide guidelines for deciding when it is appropriate to cease monitoring a storage site. Open-ended and unduly onerous monitoring would impose a prohibitive cost on CCS; monitoring should not be a mandatory requirement once the site is shown to be performing as predicted in the original approved application.
- Regulation should not necessarily exclude impurities from a CCS stream. A regime should exist that allows commercial operations to demonstrate the safety and efficacy of a storage site through a process similar to existing environmental impact statements.
- Only Governments can take a long-term responsibility for a CCS site; it is important to recognise that the long-term risk attached to CCS is very low indeed.

CSIRO

- Carbon Capture and Storage is a key element of low greenhouse gas electricity production from fossil fuels and CSIRO is carrying out research in a number of areas to facilitate the development of CCS technologies. These include gasification science, gas separation, solar reforming of natural gas and CO₂ storage.
- The development of guidelines for CCS is an important step in facilitating commercial adoption of near zero emission technologies.

**VIEWS OF NON-GOVERNMENT STAKEHOLDERS
(CCS STAKEHOLDER GROUP MEMBERS)**

INDUSTRY

Australian Coal Association (ACA)

- The ACA believes that CCS will have to play a vital role in mitigating greenhouse gas emissions over coming decades if atmospheric concentrations of carbon dioxide are to be stabilised.
- In this context CCS should be seen as having many potential long term environmental, social and economic benefits. It is essential that these benefits are borne in mind in developing a regulatory framework for CCS.
- The ACA supports the development of a nationally consistent and least cost regulatory framework that encourages rather than deters investment in CCS activities. In this context the ACA supports the involvement of COAG and values the consultative approach to this issue pursued by government in the development of the RIS. There is concern, however, that the RIS document as it stands may not deliver the objectives stated above.

- Advice received from Geoscience Australia during consultations on the RIS emphasised that the risks of CCS are mostly well understood and manageable. They may be less and certainly no greater than many other common industrial processes that involve gas handling. The ACA is concerned that undue caution or exaggeration of hypothetical risks may lead to overregulation. The RIS as it stands focuses unduly on exceptional circumstances rather than normal operating conditions. This focus does not provide confidence that a least cost approach to regulation will be pursued.
- This could seriously affect the viability of CCS projects and act as a disincentive to those considering CCS as a mitigation measure. In this context the ACA believes that additions or amendments to existing regulation by all jurisdictions should be based on objective risk assessments and approached with a view to facilitating CCS activities.
- The ACA strongly supports the principle that RD&D activities should be treated separately and not postponed pending the development of a regulatory framework aimed at future commercial projects.
- Finally, the ACA believes that the issue of long term liability for stored carbon dioxide over very long time frames needs to be approached realistically and that this approach should reflect the public good aspects of CCS. In practice this means that governments will need to assume post closure responsibility once an operator has met all obligations and responsibilities.

National Generators Forum (NGF)

- Believes that a nationally consistent regulatory framework for CCS, based on agreed regulatory guiding principles, is an essential part of moving towards a lower carbon path economy, while maintaining Australia's international competitiveness.
- A nationally consistent regulatory framework will reduce cost and minimise investment risk by providing greater industry certainty.
- By adhering to its sustainability principles and practices, industry engaged in CCS projects will insure minimal risk to the environment, whilst complying with established occupational health and safety processes and meeting community expectations.
- From the perspective of advanced future coal-based electricity generation, the benefits of CCS are many and the risks are minimal. It is therefore disappointing that parts of this RIS are excessively based on emphasizing hypothetical extreme events rather than accepting best industry practice. Excessive caution and qualifications expressed in some parts of the RIS, resulting from input from some state jurisdictions, may distract from achieving the sound regulatory framework so essential in achieving greenhouse gas reductions through CCS projects.

- The NGF supports the proposal that RD&D activities should not be covered by the RIS but should be treated separately in order to ensure rapid progress in advancing CCS processes.
- Failing to clearly address long-term liability at government level for CCS may also impede project viability. Proving industry meets all its stated CCS requirements and obligations at all stages of the project, ultimate post-closure responsibility, which may cover periods of hundreds of years, will need to rest with government on behalf of society benefiting from the CCS process.

Australian Petroleum Production and Exploration Association (APPEA)

- APPEA strongly supports CCS as part of a suite of measures to address greenhouse policy but has two fundamental concerns with the RIS at it stands. The RIS:
 - will not deliver a least cost regulatory approach; and
 - does not adequately identify all implications of the concept of post closure responsibilities and how these are to be met.
- In relation to cost, APPEA
 - strongly believes the objective of the RIS should be able to deliver a regulatory process that is least cost and does not undermine the economic viability of CCS as a concept;
 - holds the view that transportation, injection and storage of CO₂ involves little that is fundamentally new. The Australian Government Solicitor advises that substantive changes to current regulatory arrangements to deliver greater certainty and consistency will not be required; and
 - is concerned that much of the discussion in the RIS is about regulation of exceptional circumstances and not about the normal operating circumstances. As such it is moving the RIS away from a least cost regulatory approach.
- In the area of post closure responsibilities and how to address them APPEA notes:
 - the best available scientific advice is that the risk of leakage is very low;
 - the legal advice is that, as is currently case with a wide number of other industries, for CCS post closure, common law responsibilities will exist and the operator will be responsible;
 - the discussion in the RIS focuses not on the norm but on low probability exceptions to the norm:
 - normal practice would be that any operator would take all practicable steps to minimise legal exposure post closure because of the fiscal implication that would otherwise arise. There is no reason to assume a CCS operator will act in a manner that differs from this norm. They will not knowingly take an action which will expose them to future legal action. These arrangements seem to be acceptable now in other industries - why should CCS be an exception?

- in discussion of post closure responsibilities, the RIS focuses heavily on the obligations of operators. It does not address how government processes will handle a proposed measure over a 100 to 1000 year time period.
- APPEA also has three specific concerns namely:
 - the RIS does not commit to a nationally compatible approach on matters such as assessment and approvals processes, transport and financial issues;
 - APPEA supports strongly the view in the RIS that RD&D should not be covered by the RIS but should be treated separately. In the view of APPEA existing regulatory processes provide the appropriate benchmark for RD&D operations till the closure stage and post that stage any non common law obligations rest with the government; and
 - the RIS notes that leakage may be either into the atmosphere or into adjoining geological formations but does not discuss the fundamental different implications that arise especially in the longer term from each type of leakage.

Further Work Commissioned Under MCMPR

Further work was requested by MCMPR on legal, financial and impurities issues as well as technical and environmental risk matters. The MCMPR Contact Officers Group for CCS commissioned this advice on behalf of MCMPR. This group was also tasked to fill any gaps in the RIS highlighted by submissions.

Advice was commissioned from professional, impartial sources including:

- Australian Government Solicitor – domestic advice on regulatory legal issues, particularly pertaining to long-term liability
- Attorney-General's Department – advice on the consistency of CCS with international law; including the London Convention, its 1996 Protocol, UNCLOS, other relevant treaties, customary international law and issues of liability/state responsibility
- CO2CRC – advice on impurities in the CCS streams
- Geoscience Australia – technical advice on risks associated with CCS projects
- Treasury/Australian Government Actuaries – advice on options for fiscal mechanisms associated with CCS activities

8 IMPLEMENTATION AND REVIEW

- Implementation of the guiding framework for CCS and future consideration of additional/amendments government regulation will be left to the discretion of each jurisdiction;
- Processes for amendment of regulation will be outlined;
- Recognising the principles of good regulation, the MCMPR should review the regulatory framework to ensure that it is effective and efficient in practice and the principles are being interpreted consistently; and
- A review of the implementation status of the CCS Guiding Framework will be conducted five years from the date of MCMPR approval of the principles.