

INTERNATIONAL CARBON SEQUESTRATION REGULATORY MEETING

DRAFT AUSTRALIAN PRESENTATION AND PAPER

Comments on this International Workshop

Australia appreciates the opportunity to meet with Carbon Sequestration Leadership Forum (CSLF) member countries to outline individual domestic experiences, interests and desired aims regarding regulatory principles for sequestration of carbon dioxide. These principles are to be reflected through standards, regulation and legislation.

Through the identification of these experiences and issues, we can work together to highlight priorities and timeframes, to feed into the development of the technical and policy roadmaps currently under consideration by the CSLF Working Groups.

The development of case studies from continents including Europe, America and Asia will highlight regional issues and approaches to carbon dioxide geosequestration. From case studies, real-time issues may be identified, which can provide a framework within the broader international policy context, where countries would initially like to be placed. The United States, as Chair of the Policy Working Group, has advised it is preparing a strategic plan, covering what needs to be in place by 2013. The preparatory work coming out of this workshop could feed into this strategic plan.

Australian Experience – General Overview

Australia recognises that it will need to continue to rely heavily on fossil fuels for at least the next several decades. Sustainable solutions are needed to meet future greenhouse challenges.

Australia particularly needs affordable solutions to address greenhouse gas emissions from domestic power generation and to manage high levels of carbon dioxide contained in some of Australia's undeveloped offshore and onshore gas resources.

Carbon dioxide sequestration has the capacity to provide a practical option to decrease carbon dioxide emissions to the atmosphere. Whilst carbon dioxide sequestration may involve ocean and forest storage, Australian research has indicated that the geological environment is potentially a major long-term sink for carbon dioxide and has shown that Australia has a very high potential for cost-effective geological storage.

Geological sequestration (or geosequestration for short) involves the capture, separation and storage of carbon dioxide in a geological formation

From a national perspective, geosequestration is one of a suite of possible technologies under consideration to enable Australia to meet future greenhouse constraints. For the next few decades at least, the bulk of base-load electricity is expected to be generated from coal. However, this electricity will need to be generated in an environmentally acceptable manner.

Australian coal, oil and gas industries recognise the potential and value of geosequestration of carbon dioxide and are working actively in this area. Australia's petroleum industry's previous research program for the geological storage of carbon dioxide (GEODISC) provides a robust technical assessment that has regionally mapped Australia's potential geological storage capabilities and requirements. This work is being continued and expanded through the Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC). The Cooperative Research Centre for Coal

in Sustainable Development (CCSD) has been formed to undertake a lifecycle assessment of the environmental, economic and social aspects of coal use with the aim of facilitating the development and use of sustainable coal-based energy technologies. This will incorporate a review of the financial implications relating to new technologies.

In addition, the Australia Coal Association has developed a partnership with governments, industry and the research community, aimed at reducing greenhouse gas emissions from coal. This process is working towards identifying and realising the potential for reducing or eliminating greenhouse gas emissions through the development of a national plan to scope, develop and demonstrate near zero emissions coal-based electricity generation.

Other technologies to address reduction in greenhouse gas emissions include cost-effective renewable energies and ongoing improvements in the efficiency of energy production, transformation and use.

Australia is already undertaking work into assessment of geosequestration potential which it can share globally. We also need to be able to access technologies being developed internationally and to coordinate our own research, development and demonstration experiences with other nations.

As an island continent, Australia is less likely than other countries to be affected by international trans-boundary issues. However, Australia's federal government system, which divides responsibilities and legislative powers between Commonwealth and State and Territory Governments, raises issues that in some respects mirror international cross jurisdictional issues.

Australian Experience – Current Developments

Australia has a number of potential domestic projects which are in the planning stages. These include :

- **Gorgon Project** – a proposed LNG project which will potentially inject up to 5 million tonnes per annum of carbon dioxide contained in natural gas into a saline formation; and
- **APEL Project** – a proposed lignite coal gas-to-liquids project, which may sequester up to 10 million tonnes per annum of carbon dioxide.

The projects mentioned above have elements that are subject to well established regulatory processes. For instance, proposed changes to existing petroleum and pipeline legislation is currently being considered to address the bulk of sequestration regulatory considerations for the Gorgon project. However, the geosequestration stage of these projects may potentially extend beyond the scope of existing regulatory experience.

Some of Australia's most promising geosequestration sites are in sedimentary basins in the offshore region and their utilisation is likely to involve using infrastructure associated with offshore petroleum extraction. Many of these sites lie under Commonwealth controlled waters, but can involve State activities or, as is the case with the Gorgon LNG project, involve carbon dioxide contained in natural gas extracted from Commonwealth waters being injected into geological formations that come under State government jurisdiction. It is possible that future projects may involve carbon dioxide pipelines crossing State boundaries and sedimentary basins that extend beyond State and National borders.

Australia's regulatory regime for geosequestration will need to take account of the full range of these issues. These include consideration of :

- existing legislation versus new legislation;
- resource access issues;

- conferral of property rights;
- surface and subsurface rights;
- standards; monitoring and verification;
- public liability;
- environmental and safety management;
- taxation, including the impact of capital expenditures on existing systems ; and
- consistency with international legal requirements.

As with international arrangements, it is essential that Australia develops a national regulatory framework that applies consistently across jurisdictions and allows for the coordinated development and future management of projects. In order to achieve this framework, the Commonwealth, State and Territory governments are working with stakeholders and various regulatory authorities to develop a national regulatory framework for geosequestration.

Potential Australian Projects

a) Gorgon LNG Project:

The proposed development will include around 30 offshore sub-sea development wells, a pipeline from offshore to Barrow Island, a gas processing facility, a 5 million tonne per annum (mtpa) LNG train in the first stage (projected at around 2008), and a second 5 mtpa train in the second stage (projected at around 2010). Other options also include a domestic gas pipeline from Barrow Island to mainland Australia, and a gas to liquids plant.

It is proposed that up to 5 mtpa of carbon dioxide will be sequestered in a saline formation below Barrow Island. The initial injection rate is estimated to be between 2.6 and 4.2 mtpa of carbon dioxide, depending on the initial LNG plant capacity. The total volume proposed to be injected over 30+ years is about 150 million tonnes of carbon dioxide. The injected gas composition will be primarily carbon dioxide, but may also include small quantities of hydrocarbons, water, hydrogen sulphide and nitrogen.

b) Australian Power and Energy Limited (APEL) Project:

APEL proposes to develop Australia's first commercial coal gasification and gas to liquids project. The plant would produce 52,600 barrels per day of diesel fuel using the Fisher Tropsch process and about 500MW of surplus power. The plant is required to sequester about 10 million tonnes per annum of carbon dioxide to stay within overall emission targets agreed with the Victorian State government and included as a licence condition. The project, as initially conceived, consists of the following:

- Brown coal drying and gasification process plant producing clean synthesis gas;
- Synthesis gas based hydrogen production and purification plant;
- Fischer Tropsch fuel synthesis plant;
- Associated waste heat recovery and off gas power plant;
- Geosequestration facility; and
- Geological storage of carbon dioxide in an offshore sedimentary basin.

Australian Aims for National Regulatory Framework

Developing a policy and regulatory framework that has the support of the community and encourages increased research and development, commercialisation and transfer of technology, will ultimately provide sufficient certainty for investors and will facilitate the development of geosequestration projects in Australia.

It is proposed that such a domestic framework aims to:

- Establish clear rights, responsibilities and obligations with regard to geosequestration projects, including property rights.
- Be consistent across all Australian jurisdictions where possible and complement any agreed national and international standards and protocols for the measurement, monitoring and verification of carbon dioxide emissions and carbon dioxide emissions abatement;
- Address public and private costs and benefits;
- Encourage new technologies and project proposals by creating well defined property rights, obligations and protections for potential project proponents and the community; and
- Be consistent with Australia's obligations under the international treaties and conventions to which it is a signatory and be responsive to the wider international policy and legal environment in which it must operate.

Australian Carbon Dioxide Geosequestration Regulatory Reference Group

To realise these aims, Australia has recently established a domestic Reference Group to assess, identify and make recommendations leading to the development of appropriate standards, regulation and, if appropriate, legislation to facilitate use of geosequestration to reduce emissions.

The Reference Group comprises representatives from government agencies, including environment, technical, industry and legal advisory agencies, alongside industry representatives and research organisations, with the aim of developing a partnership with all stakeholders. Industry, government and research organisations have worked closely together, allowing for information dissemination and sharing between technical and policy specialists. Significantly, policy and technical analysis is developing in parallel, which will ultimately provide comprehensive and realistic approaches to geosequestration.

To move forward on developing a domestic framework, the Australian Reference Group has agreed to assess the range of regulatory issues and legislative options that Australia faces by:

- Developing [and implementing] requirements for identifying and prioritising potential legislative and regulatory objectives and impediments to carbon dioxide geosequestration in Australia;
- Utilising, building on or refining, established regulatory processes wherever appropriate;
- Reporting to the appropriate Commonwealth and State governments, agencies and committees to seek input and agreement on priorities and goals; and
- Contributing to developing an Australian position for the CSLF Policy Working Group meeting in January 2004.

The Reference Group developed a list of key issues and priorities to be addressed in establishing a domestic approach to geosequestration. Through case studies, the Reference Group has commenced the development of a focussed work program, including priorities, timeframe and responsibilities for the group. It is anticipated that from this work program, real-time regulatory priorities will be identified alongside the identification of areas of carbon dioxide geosequestration that are and are not covered by existing legislation in Australia and international obligations.

The result of these processes will be the identification of a set of principles, in the form of desirable characteristics of a geosequestration policy and regulatory regime, to provide clear rights, responsibilities and obligations.

The Working Group has determined that there are many areas of overlap between the two Australian projects mentioned above in relation to carbon dioxide capture, injection and storage. Existing legislation, particularly in the areas of oil and gas, mineral extraction, environment and safety may provide a framework to build on when developing new regulations for geosequestration of carbon dioxide. The key areas which need to be considered are outlined in the following clusters:

- 1) Ownership and Property Rights;
- 2) Liability;
- 3) Environmental Issues;
- 4) Authorisation and Compliance;
- 5) Monitoring and Verification;
- 6) Transportation;
- 7) Cross-jurisdictional Issues; and
- 8) Financial

Other specific issues which have been identified and which feed into these categories include land access, compliance with international treaties, intellectual property rights, foreign investment approval, taxation and royalty issues, local government approvals and interaction with abatement schemes.

Australia has already undertaken a regional technical and risk assessment of Australia's geological storage capacity, through our previous geo-science research program (GEODISC). The understanding gained of geological requirements and risk profiles for potential injection sites will make a substantial contribution towards the development of national and international standards for geosequestration. For example, research has identified that saline formations provide the greatest potential for geosequestration in Australia. The work of the petroleum industry in relation to GEODISC is being extended through the Cooperative Research Centre for Greenhouse Gas (CO2CRC) with members from petroleum, coal mining and electricity generation sectors, plus researchers, providing further research into innovative greenhouse gas technologies covering carbon dioxide capture, transport, injection, storage, monitoring, verification, community consultation and related issues.

In developing a nationally consistent regulatory framework, we have recognised that an important first step is to have standards or guidelines in place. Such standards can be used to assess geosequestration proposals, verify the technical viability of sequestration sites, both in the short and the long-term and the management of these sites during and after injection.

Agreed policy objectives will be used to develop legislation, where appropriate, governing geosequestration across jurisdictions. National standards will set objectives for best practice sequestration projects, which may be reflected in regulations. Where possible and appropriate, these regulations will be objective based rather than prescriptive, to take account of changing technology and best practice.

Australia's national standards will also need to take account of international obligations.

International Implications

Australia is actively considering the regulatory arrangements needed for geosequestration. We have given some thought to the issues and processes involved, both within Australia and internationally. In this way, Australia has the potential to provide input into international discussion on regulatory and legal issues associated with geosequestration

In addition, carbon dioxide has been successfully transported and injected for many years in other parts of the world, for enhanced oil recovery, disposal of 'acid gas' and storage of carbon dioxide, under existing oil and gas regulations, for example, in the USA, Canada and Norway. The experiences and observations of these countries will provide a basis for developing a consistent and comprehensive approach to international standards and protocols.

The International Energy Agency Working Party On Fossil Fuels, in its May 2002 Technology Status Report on Zero Emissions Technology, found that there is no legal framework for geosequestration projects and that at some point the range of legal issues including liability issues, licensing and leakages will need to be addressed. The report noted that it may be rare for control of the carbon dioxide source and responsibility for the carbon dioxide storage site to rest with the same legal entity, resulting in significant land owner and royalty rights. The report also highlighted some of the legal obstacles to ocean sequestration of carbon dioxide.

The Intergovernmental Panel on Climate Change (IPCC) is undertaking work on a Special Report on Carbon Dioxide Capture and Storage. The IPCC has just completed its first draft and the Special Report is due for completion in 2005. Regulatory issues and potential protocols for carbon dioxide capture and storage should be developed and provided to the IPCC process to illustrate the issues and facilitate consistency across international jurisdictions. It should be noted that the IPCC will undertake this assessment over a two year period from 2003-2005; the Special Report will then be considered by governments as part of the formal IPCC and United Nations Framework Convention on Climate Change (UNFCCC) processes.

To identify a way forward in the development of international protocols, it is important that we work concurrently with and sometimes ahead of these processes. Working with these bodies may help to ensure that a comprehensive and consistent approach towards sequestration regulatory issues is developed, taking full account of the technical and policy issues that may evolve.