



**Submission to the House Standing Committee on
Science and Innovation:**

Inquiry into Geosequestration Technology

August 2006

EXECUTIVE SUMMARY

At Chevron, we recognise and share the concerns of government and the public about climate change.

There is no single technology that has emerged as the 'answer' for reducing global emissions of greenhouse gases.

Geosequestration should be considered one part of a broad suite of responses in dealing with this challenge.

As governments look to regulate geosequestration projects, the initial focus should be on what existing regulatory processes or principles can be adapted. While new or amended legislation may be required to allow the injection of carbon dioxide, many aspects of existing legislation, regulation or the principles behind existing regulation can be readily adapted to facilitate geosequestration projects. Chevron supports early and ongoing consultation as Australian governments look to implement legislation to allow the widespread uptake of geosequestration.

The most effective way to mitigate the risk of containment failure is through rigorous site selection, monitoring and management of injection operations. It is important that this matter is given appropriate weight in discussing how geosequestration projects might be regulated.

A key component of the Gorgon Project is the geosequestration of the carbon dioxide contained in the unprocessed natural gas, provided it is technically feasible and not cost prohibitive. The Gorgon Project has the potential to highlight Australia's position as a leading nation in the implementation of this important greenhouse gas emission reduction tool.

The Gorgon Project highlights that in the absence of a wider carbon price signal in the Australian economy, industry can be encouraged to voluntarily undertake geosequestration projects.

Government can continue to encourage the voluntary uptake of geosequestration by:

- putting in place a low cost regulatory environment that supports the uptake of geosequestration
- providing targeted financial support for geosequestration projects
- ensuring proponents of early geosequestration projects are not disadvantaged in the event of the introduction of a cost-of-carbon to the economy
- implementing a policy where government assumes the long term responsibility of a geosequestration site once certain site-closure criteria have been met.

The Carbon Sequestration Leadership Forum and the recently formed Asia Pacific Partnership for Clean Development and Climate recognise the importance of promoting geosequestration and other clean, efficient technologies. Both these fora will assist in the transfer of geosequestration technologies to developing economies.

BACKGROUND

Chevron is a global energy producer with operations in over 180 countries. In Australia, Chevron has a proud history as part of oil and gas industry dating back almost 90 years.

Chevron's current Australasian interests are managed from its Perth, Western Australia, office and include:

- exploration and production of oil, condensate, domestic gas, liquefied petroleum gas (LPG) and liquefied natural gas (LNG) from the North West Shelf Venture
- commercialisation of the Greater Gorgon gas fields which represent the largest undeveloped natural gas accumulation in Australia
- oil production from the Barrow and Thevenard Island oilfields
- a vigorous exploration program focusing on offshore interests in the north west of Australia
- gas production in the Philippines.

Our current investment in Australia exceeds \$4 billion and we employ approximately 900 people.

At Chevron, we recognise and share the concerns of government and the public about climate change. The use of fossil fuels to meet the world's energy needs has contributed to an increase in greenhouse gases, mainly carbon dioxide and methane, in the earth's atmosphere. There is a widespread view that this increase is leading to climate change, with adverse effects on the environment. Chevron has taken early action to create a comprehensive plan to reduce greenhouse gas emissions and increase energy efficiency within its operations.

Chevron's climate change four fold action plan is now in its fourth year of implementation and involves:

- reducing emissions of greenhouse gases and increasing energy efficiency
- investing in research and development and improved technology
- pursuing business opportunities in promising, innovative energy technologies
- supporting flexible and economically sound policies and mechanisms that protect the environment.

There is not a single technology that has emerged as the 'answer' for reducing global emissions of greenhouse gases. Geosequestration should be considered as one part of a broad suite of responses in dealing with this challenge.

INTRODUCTION

This submission is based on observations from Chevron's involvement in a number of geosequestration research and demonstration activities throughout the world and experience as Operator of the Gorgon Project in Western Australia. The Gorgon Joint Venturers are proposing to implement one of the world's largest geosequestration projects as part of an integrated gas processing facility.

In drafting this submission we have focused on Chevron's observations in proposing a large scale geosequestration project and on ways government can support the wider uptake of this technology. We have chosen not to comment in depth on the science and technology behind geosequestration as there is already a substantial volume of published material available. The report of the Intergovernmental Panel on Climate Change into Carbon Dioxide Capture and Storage published in 2005 provides a useful summary of the underlying science and technology development.

We have also not directly addressed the issues around carbon dioxide capture. Where carbon dioxide capture is being done as part of an integrated gas development such as that proposed by the Gorgon Joint Venturers, the technologies are mature and cost effective. Chevron acknowledges that carbon dioxide capture in areas such as stationary electrical power generation require significant technical advances to reduce costs to an acceptable level. This remains an area requiring significant ongoing research. The term geosequestration in this submission is therefore restricted to the process of injecting and containing carbon dioxide in underground reservoirs and does not include the capture of the carbon dioxide.

While there remain areas for ongoing research, development and demonstration, the underlying technologies to enable geosequestration projects to proceed are well established within the oil and gas industry. These include:

- compression and transportation of carbon dioxide by pipeline
- design, drilling and operation of injection and observation wells
- monitoring technologies, such as seismic
- reservoir modelling and simulation
- understanding of fault/fracture seal and activation
- reservoir management tools, such as reservoir pressure maintenance
- risk assessment and mitigation.

Community understanding of geosequestration as an appropriate greenhouse emissions reduction tool can be addressed by ongoing research and demonstration activities but widespread acceptance will only be achieved through securing successful, large scale projects and demonstrating the long-term integrity of this approach.

Chevron believes that the potential risks to the wider uptake of geosequestration would come from a lack of economic incentives, the absence of a clear legislative framework and limited public understanding of the risks and benefits of this approach to reducing greenhouse gas emissions.

The Gorgon Project highlights that in the absence of a wider carbon price signal in the Australian economy, industry can be encouraged to voluntarily undertake geosequestration projects. Voluntary uptake of geosequestration projects can be facilitated by a supportive, low-cost regulatory environment with targeted support from government.

It is of critical importance to protect the interests of early-movers who voluntarily undertake geosequestration projects should there be a future carbon price signal introduced to the Australian economy. A failure to clearly recognise and respect the actions of early movers in any policy discussion on the future imposition of a carbon price signal will drive industry that might otherwise have undertaken geosequestration voluntarily to defer those projects.

GORGON PROJECT OVERVIEW

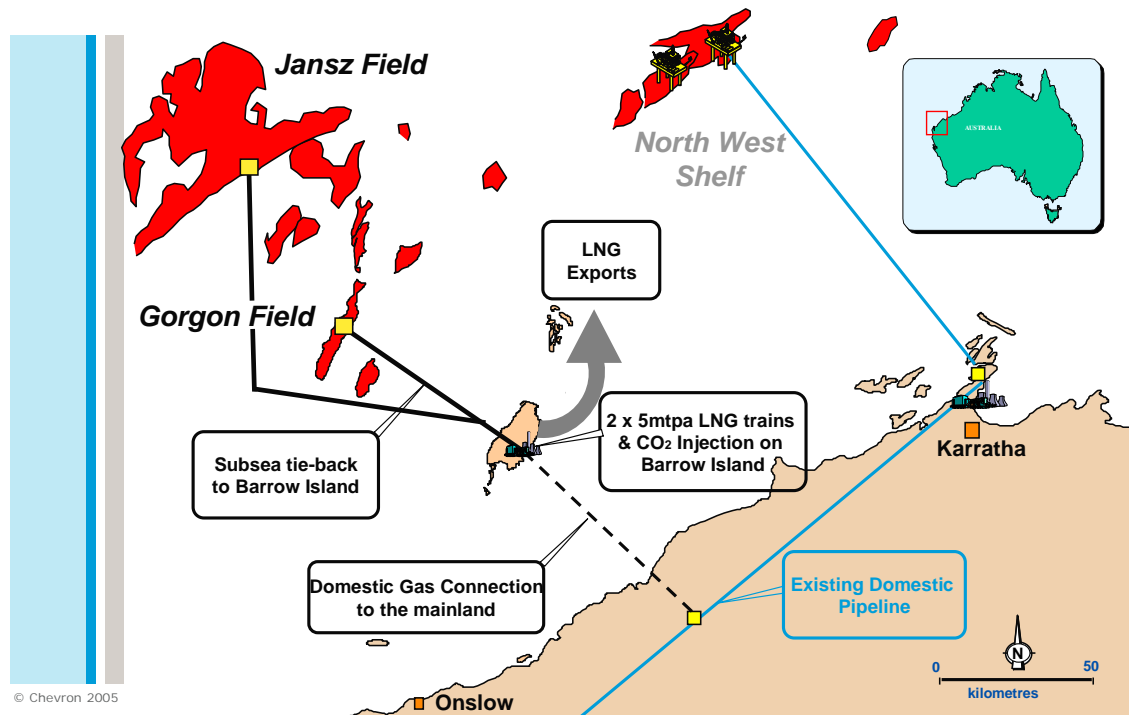
Chevron Australia Pty Ltd manages the Gorgon Project on behalf of the Gorgon Joint Venturers comprising:

- Chevron Australia Pty Ltd
- Chevron (TAPL) Pty Ltd
- Mobil Australia Resources Company Pty Ltd
- Shell Development (Australia) Proprietary Limited

The views expressed in this submission are those of Chevron and do not necessarily reflect the views of the other Gorgon Joint Venture Participants.

The Gorgon Project area, situated 130 km off the north-west coast of Western Australia, comprises the largest gas resource discovered to date in Australia. The reservoirs of untapped natural gas are estimated to contain on a P50 basis in excess of 1.1 trillion cubic metres (40 trillion cubic feet) of natural gas which represents some 25% of Australia's known gas resources.

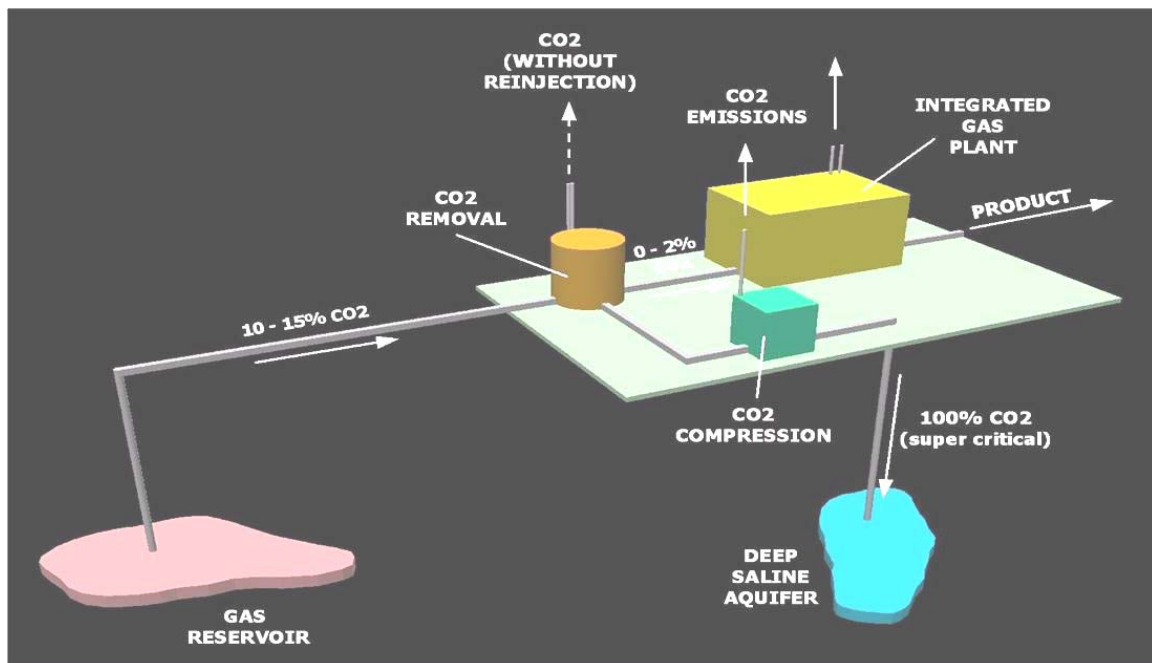
Gorgon Project Development Plan



This gas resource is proposed to be developed by the construction of a 10 million tonne per annum capacity Liquefied Natural Gas plant on Barrow Island. It is proposed that natural gas will be initially supplied via an all sub-sea production system from both the Gorgon and Jansz fields.

A key component of the Gorgon Project is the geosequestration of the carbon dioxide contained in the unprocessed natural gas, provided it is technically feasible and not cost prohibitive. The Gorgon Joint Venturers propose to dispose of this naturally occurring carbon dioxide by underground injection into the Dupuy Formation, approximately 2.5 kilometres below Barrow Island.

The proposed development highlighting the carbon dioxide removal, compression and injection is shown diagrammatically in the figure below.



To date, the Gorgon Joint Venturers have invested significant resources in undertaking site selection studies for the carbon dioxide injection project and in gaining additional geologic information on the proposed injection site. These studies include the recent drilling and evaluation of a dedicated data well and program of seismic acquisition tests to be conducted over the remainder of 2006.

Once approved, the Gorgon carbon dioxide injection project will be one of the worlds' largest geosequestration proposals and will potentially reduce the Project's greenhouse gas emissions by 2.7 million tonnes per annum.

Importantly, the Gorgon Joint Venturers have committed to making data from the ongoing monitoring activities associated with the injection of carbon dioxide publicly available.

The Gorgon Project has the potential to highlight Australia's position as a leading nation in the implementation of this important greenhouse gas emission reduction tool.

For further information on the Gorgon carbon dioxide injection project please refer to *Environmental Impact Statement / Environmental Review and Management Program, Chapter 13, Greenhouse Gas Emissions – Risks and Management* a copy of which is appended to this submission.

Note: As at the date of this submission, the Gorgon Project is yet to receive its environmental approvals, approvals by the Western Australian Government and final Joint Venture Partner approvals.

ENVIRONMENTAL IMPACT ASSESSMENT

The Gorgon Project, including the proposed disposal of carbon dioxide by injection underground, is undergoing a coordinated environmental impact assessment under both the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* and the Western Australian *Environmental Protection Act 1986*. This process included a significant period of public review and comment.

As indicated above, Chapter 13 of the Gorgon Project Environmental Impact Statement / Environmental Review and Management Program details the forecast greenhouse gas emissions from the Gorgon Project and the actions planned by the Gorgon Joint Venturers to manage those emissions, including the disposal of reservoir carbon dioxide by underground injection.

The discussion on the disposal of reservoir carbon dioxide includes:

- an assessment of potential injection sites
- a description of the geology at the injection site
- a discussion on the sub-surface trapping and behaviour of the carbon dioxide once injected
- a discussion on how the monitoring of the injected carbon dioxide would be undertaken over the life of the project
- a discussion on how injection operations will be managed
- a review of uncertainty management planning
- an assessment of potential failure modes and mitigation strategies
- the Joint Venturers approach to long term responsibilities

Reference should be made to the attachment for a more detailed review of the Gorgon Project proposal.

To our knowledge, this is the first time a major geosequestration project has undergone such an exhaustive environmental impact assessment and it demonstrates that existing environmental protection laws are adequate and capable of assessing and managing the environmental impacts of geosequestration projects.

APPROPRIATE ATTENTION TO SITE SELECTION AND MANAGEMENT

The most effective way to ensure injected carbon dioxide remains contained within the underground reservoir is to select an injection site with attributes that will permanently trap carbon dioxide. Reservoir quality, mineral and formation water chemistry, reservoir depth, nature of overlying sealing units, and the propensity of faults and fractures to leak, all need to be considered.

Much of the ongoing debate around geosequestration deals with what are essentially unlikely events associated with a containment failure and release of carbon dioxide. For

example, there is a focus in many fora on the issue of how to manage long term liabilities. While these are important issues, the most effective way to mitigate the risk of containment failure is through rigorous site selection, monitoring and management of injection operations. It is important that this matter is given appropriate weight in discussing how geosequestration projects might be regulated.

Once an appropriate site is selected and operations commence, rigorous management of the injection operations is required to ensure the carbon dioxide behaves as expected and the risk of containment failure is minimised.

The approach taken by the Gorgon Joint Venturers is to implement a thorough uncertainty management planning process.

Uncertainty management seeks to:

- understand areas of uncertainty in the injection operation
- understand the consequences, both negative and positive, associated with each area of uncertainty
- identify signposts that might signal an early deviation from expected reservoir performance
- consider monitoring activities that will identify these signposts
- develop contingency plans for implementation should identified signposts suggest a negative consequence may occur.

As a general rule, the likelihood of a large geosequestration project not performing as expected is greater in the early years of the project. Correspondingly, the ability to modify reservoir performance by implementing defined contingency plans is also highest in the early years of the project. If a geosequestration project has been performing as expected for several decades the probability that it will perform unexpectedly into the future is greatly reduced.

By implementing rigorous site selection processes and by diligent monitoring and reservoir management, the residual risk and resulting liability for containment failure following site closure is greatly reduced.

INDEPENDENT REVIEW

Government agencies have the technical capability to assess and regulate geosequestration projects via the skills and data sets already established to regulate the oil and gas industry. However, either due to a lack of resources or lack of familiarity with particular aspects of proposed projects, government may feel inadequately prepared to assess and regulate these projects. This may be a particular concern until geosequestration projects become more widespread and government develops the corresponding technical competencies.

In order to overcome this issue, governments can commission independent review panels to support government regulators. Such a process has been used in Western Australia for the assessment of the Gorgon Project.

The Western Australian Government has undertaken a number of independent reviews into the technical merits of the Gorgon Joint Venturers geosequestration proposal. These reviews have been timed to coincide with Government assessment of the Project. To date, two independent reviews have been timed to coincide with:

- consideration of 'in-principle' support for the development on Barrow Island (Environmental, Social and Economic Review Process), undertaken in 2003, and;
- the Environmental Impact Assessment process, commenced in 2004.

A third review has been commissioned to provide advice around the time that the Western Australian Government considers granting final project approval.

While it is ultimately for the Western Australian Government to comment on the usefulness of these independent technical reviews, it would appear the process has value in providing independent, unbiased advice in areas where government may not have the required technical expertise or available resources.

We note that the Western Australian Environmental Protection Authority considered the results to the independent review conducted in 2004 in undertaking its assessment of the Gorgon Project (Environmental Protection Authority, Perth Western Australia, Bulletin 1221, Page 60, June 2006)

Independent reviews undertaken by suitably qualified consultants may have a role in assisting government as it becomes familiar with these types of projects.

ENABLING LEGISLATION

The *Barrow Island Act 2003* provides a legislative mechanism to allow the approval of the proposed disposal of carbon dioxide below Barrow Island. However, the legislation is limited to activities on Barrow Island and is unavailable to other projects.

The process of considering the widespread regulation of geosequestration projects by the Ministerial Council on Minerals and Petroleum Resources represents an attempt to develop a fit for purpose and consistent regulatory framework across all Australian jurisdictions.

As governments look to regulate geosequestration projects, the initial focus should be on what existing regulatory processes or principles can be adapted. While new or amended legislation may be required to allow the injection of carbon dioxide, many aspects of existing legislation, regulation or the principles behind existing regulation can be readily adapted to facilitate geosequestration projects.

For example, it has been acknowledged that existing laws are adequate to deal with environmental impact assessment and approval of geosequestration and for the transportation of carbon dioxide. It is also been recently proposed that the process of awarding title rights for the exploration and production of oil and gas can be modelled for the process of awarding geosequestration title rights.

The laws governing the transportation of oil and gas can be adapted for the transportation of carbon dioxide. World-wide there are in excess of 3000km of pipelines capable of transporting approximately 45 million tonnes per annum of carbon dioxide.

Similarly, there are well established regulations dealing with the design, drilling and production from petroleum wells that can be readily adapted to carbon dioxide injection and monitoring wells. It should be noted that the corrosive environments that can exist around carbon dioxide injection wells are also encountered from time to time in oil and gas wells and are dealt with by the existing petroleum regulations. While not specifically dealt with in the *Barrow Island Act 2003*, it is likely that Ministerial approval for the

Gorgon Joint Venturers to inject carbon dioxide will include a condition that all carbon dioxide injection and observation wells be designed, drilled and operated in accordance with the States regulations for petroleum wells.

The concept of ongoing management of the injection reservoir can also be adopted from the oil and gas industry. It is likely that as a condition of approval to inject carbon dioxide, the Gorgon Joint Venturers will be required to undertake its geosequestration activities in accordance with an approved Disposal Management Plan. This provides for the management of the geosequestration activities in much the same way as oil and gas extraction operations are managed. The Disposal Management Plan is intended to be updated as information on the carbon dioxide monitoring is gained and reservoir management practices refined.

We have noticed that discussion around establishing geosequestration regulation tends to focus on the unlikely situations of project failure. It is perhaps more useful to consider how such projects may be regulated during the site selection and operational phases so as to ensure that the risks of project failure are minimised by appropriate uncertainty analysis and implementation of risk mitigation plans.

Finally, it is important to recognise that each geosequestration site will have unique geological and physical attributes. There is no 'one size fits all' ideal geosequestration site, approach to reservoir management or monitoring. This highlights the need for flexible, objective-based regulation.

Chevron supports early and ongoing consultation as Australian Governments look to implement legislation to allow the widespread uptake of geosequestration.

The Department of Industry Tourism and Resources circulated a discussion paper on 'Implementing the Australian Regulatory Guiding Principles for Carbon Capture and Geologic Storage' in early August 2006. As the release of this paper occurred as this submission was being drafted, Chevron has not included the issues discussed in the paper within the scope of this submission.

SKILL BASE

The skills required for the implementation of geosequestration projects are essentially those developed in the fields of earth science and engineering and applied to the oil and gas industry.

Australia, by virtue of its strong earth science and engineering skill base, is well placed to become a world leader in geosequestration, but only if projects are progressed.

The work of the Cooperative Centre for Greenhouse Gas Technologies and the preceding Australian Petroleum Cooperative Research Centre GEODISC Program have positioned Australia as a potential world leader in geosequestration research.

Continued support for earth sciences and engineering in tertiary education institutions and targeted support for research and demonstration of geosequestration through organisations such as the Cooperative Research Centre for Greenhouse Gas Technologies are effective ways to ensure that Australia develops the skill base to implement geosequestration projects.

COSTS OF GEOSEQUESTRATION

Experience with the Gorgon Project has shown that the cost per tonne of carbon dioxide disposed is below that of alternative greenhouse gas mitigation options, such as organic offsets. This may not be the case with all projects, particularly those that require the transportation of carbon dioxide over long distances.

It must be noted that this comment only applies to the compression, transportation, injection and ongoing reservoir management or geosequestration costs. We understand that costs to capture carbon dioxide from sources such as stationary electricity generation remain significant and that technological advances are required to reduce these costs to acceptable levels.

Geosequestration projects tend to be large in scale and therefore upfront costs can also be commensurately large. There may be a tendency for some to interpret these large up front costs as signalling that geosequestration is not a cost-effective greenhouse emissions reduction tool. A considered approach that relates cost of the project with the total volume of carbon dioxide to be sequestered is required.

IMPEDIMENTS AND DRIVERS TO UNDERTAKE GEOSEQUESTRATION PROJECTS

Many companies recognise the community concern around increasing greenhouse gas emissions and have commenced voluntary actions to reduce emissions. This is best demonstrated by the diverse participation in the Federal Government's Greenhouse Challenge Plus Program.

It is worth noting that even without a carbon price signal in the Australian economy, industry is investing significant funds in geosequestration research, development and demonstration and a number of projects such as the Gorgon Project are being proposed.

Government can continue to encourage the voluntary uptake of geosequestration by:

- putting in place a low cost regulatory environment that supports the uptake of geosequestration
- providing targeted financial support for geosequestration projects
- ensuring proponents of early geosequestration projects will not be disadvantaged in the event of the introduction of a cost of carbon to the economy
- considering implementing a policy where government assumes the long term responsibility of a geosequestration site once certain site-closure criteria have been met.

Supportive Regulatory Environment

As discussed earlier, many aspects of geosequestration projects are similar to routine oil and gas operations and existing laws, regulations and regulatory principles can be applied. Regulation needs to be low-cost, objective-based and flexible to allow for the differing attributes of particular sites. Rushed, poorly drafted, overly complex and procedural based legislation will act as a disincentive for proponents of geosequestration projects.

Early consultation and engagement with potential stakeholders will be critical in developing legislative proposals that will support the uptake of geosequestration projects.

At times there has been discussion about government imposing fees or charges on geosequestration projects. In the absence of a carbon price signal in the economy to drive investment in geosequestration, the imposition of additional fees and charges on what is essentially a voluntary undertaking would act as a substantial disincentive to the uptake of this technology.

Targeted Financial Support

Geosequestration projects have the potential to realise significant reductions in the emission of greenhouse gases. For example, the Gorgon Joint Venturers are proposing to dispose of potentially 120 million tonnes of carbon dioxide over the life of the Project. Put simply, this is the equivalent emissions reduction provided by 500 wind turbines each of two megawatt capacity.

Projects of such scale come at a significant capital and operating cost. Government can assist industry in voluntarily implementing such projects by carefully targeted financial support. This would build upon the support already offered by the Federal Government through such projects as the Low Emissions Technology Demonstration Fund.

Government should consider the extension of fiscal support mechanisms (such as the Low Emissions Technology Demonstration Fund) beyond the demonstration phase so as to encourage the wider uptake of voluntary geosequestration projects. This support must ultimately target actual geosequestration capacity rather than technology development and could take the form of direct grants, interest free funding or tax concessions. Such government support recognises that these projects do not directly produce income for the proponents but have a significant community benefit.

Expenditures on geosequestration are currently treated the same as any other business expense, that is, capital costs are depreciated over the lifetime of the assets. This means that these costs can take in excess of 20 years to be recovered for tax purposes. A more favourable tax treatment, such as "immediate capital deduction" or "accelerated depreciation" would significantly lower the economic cost of undertaking geosequestration projects and thereby facilitate the voluntary uptake.

The implementation of such fiscal support mechanisms will incur a potential cost to the community but this should be compared to the community cost of alternative greenhouse mitigation programs such as the Mandatory Renewable Energy Targets scheme. Any such comparison needs to be on the basis of dollars per tonne of emissions avoided not on total cost of program.

No Disadvantage

A significant disincentive to the early adoption of any greenhouse gas emissions reduction project, including geosequestration, is the risk that if a future greenhouse emissions trading scheme was introduced, early movers would not be able to realise saleable emissions credits from the previously implemented project. This risk may cause companies to defer investment in greenhouse reduction projects until after the introduction of an emissions trading scheme and thereby improve the probability that they would realise saleable emissions credits from such projects.

In order to support the early and voluntary implementation of geosequestration projects, a clear guarantee is required from government that early proponents will not be disadvantaged and will be given every opportunity to realise saleable emissions credits from the geosequestration projects implemented prior to the commencement of any potential emissions trading.

The Federal Government has previously endeavoured not to disadvantage 'early movers' in the Australian LNG industry who have previously implemented greenhouse gas abatement measures (Liquefied Natural Gas - Action Agenda 2000 page 31) however the proposals for a State based emissions trading scheme appears to only consider a 'transition plan' for early movers. Such uncertainty around the rights of early movers acts as a disincentive to the early implementation of geosequestration projects.

Long Term Responsibilities

One of the primary areas of community concern around geosequestration projects is the view that it is unclear as to who will have long-term responsibility for geosequestration sites.

Presently, project proponents have operational responsibility for sites up to the point of site closure and there is an acceptance that common law is appropriate to manage liabilities if any should arise. Chevron has been advised that the Australian Government Solicitor has provided advice to the Ministerial Council on Minerals and Petroleum Resources that project proponents may continue to be liable under common law even after the point of site closure. Statutory laws dealing with matters such as environmental harm may also continue to apply post closure.

In order to address community concerns in this area, government could consider as a matter of policy the assumption of liabilities from project proponents following the point of site closure. It could be argued that proponents are investing significant resources in order to reduce greenhouse gas emissions and this represents a benefit to the wider community. By government agreeing to assume liability following site closure, it is effectively stating that government is also willing to share some burden in order to achieve the wider community benefit.

While this proposal may appear to place an unnecessary burden on government, it is worth noting the associated risk to government can be significantly mitigated by diligent site assessment, approval and regulation by government.

The Australian Regulatory Guiding Principles for Carbon Capture and Geological Storage includes the statement that "*Government will permit site closure when they are satisfied to a high degree of certainty that future land use objectives are met, residual risk 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*". If these standards are met, then it is arguable that the risk to government in assuming liability after site closure should be greatly reduced.

In the USA, the state of Texas has legislated to indemnify the proponents of the FutureGen project if that project is sited in Texas. FutureGen is a large, near-zero emissions research and demonstration project with the objective of generating electricity, producing hydrogen, and capturing and sequestering the resulting carbon dioxide. By offering such an incentive Texas regulators hope to secure the project for Texas and

assist Texas in becoming a centre of excellence for this technology. A similar approach by Government in Australia may assist Australia becoming that centre of excellence.

THE CARBON SEQUESTRATION LEADERSHIP FORUM AND THE ASIA PACIFIC PARTNERSHIP FOR CLEAN DEVELOPMENT AND CLIMATE

There is a growing consensus that advances in technology and the deployment of those technologies have a critical role in delivering global reductions in greenhouse gas emissions.

The Carbon Sequestration Leadership Forum and the recently formed Asia Pacific Partnership for Clean Development and Climate recognise the importance of promoting geosequestration and other clean, efficient technologies. Importantly both these fora will assist in the transfer geosequestration technologies to developing economies.

Chevron is a strong supporter of both the Carbon Sequestration Leadership Forum and Asia Pacific Partnership for Clean Development and Climate and will look to participate where we can add value. Chevron is hopeful that once the Gorgon Project is approved, the Gorgon Joint Venturers commitment to make data from the ongoing monitoring activities associated with the carbon dioxide injection project publicly available can be used to assist in delivering on the objectives of the Carbon Sequestration Leadership Forum and the Asia Pacific Partnership for Clean Development and Climate

CONCLUSION

Geosequestration should be considered as one of a range of responses to minimise global greenhouse gas emissions.

While there remain areas for ongoing research and demonstration, the underlying technologies to enable geosequestration projects to proceed are well established within the oil and gas industry. These include the:

- compression and transportation of carbon dioxide by pipeline
- design, drilling and operation of injection and observation wells
- monitoring technologies, such as seismic
- reservoir modelling and simulation
- understanding of fault/fracture seal and activation
- reservoir management tools, such as reservoir pressure maintenance
- risk assessment and mitigation.

Much of the ongoing debate around geosequestration deals with what are essentially unlikely events associated with a containment failure and release of carbon dioxide. For example, there is a focus in many fora on the issue of how to manage long term liabilities. While these are important issues, the most effective way to mitigate the risk of containment failure is through rigorous site selection and management of injection operations. It is important that this matter is given appropriate weight in discussing how geosequestration projects might be regulated.

Continued support for earth sciences and engineering in tertiary education institutions and targeted support for research and demonstration of geosequestration through organisations such as the Cooperative Research Centre for Greenhouse Gas Technologies are effective ways to ensure that Australia develops the skill base to implement geosequestration projects.

Government can continue to encourage the voluntary uptake of geosequestration by:

- putting in place a low cost regulatory environment that supports the uptake of geosequestration
- providing targeted financial support for geosequestration projects
- ensuring proponents of early geosequestration projects are not disadvantaged in the event of the introduction of a cost of carbon to the economy
- considering implementing a policy where government assumes the long term responsibility of a geosequestration site once certain site-closure criteria have been met.

The Carbon Sequestration Leadership Forum and the recently formed Asia Pacific Partnership for Clean Development and Climate have an important role in promoting geosequestration and other clean, efficient technologies. Importantly both these fora will assist in the transfer geosequestration technologies to developing economies.

Attachment:

Gorgon Project - Environmental Impact Statement / Environmental Review and Management Program, Chapter 13, Greenhouse Gas Emissions – Risks and Management