

# HOUSE OF REPRESENTATIVES INQUIRY INTO GEOSEQUESTRATION

## Victorian Government Submission

The Victorian Government is committed to greenhouse gas abatement and to economic and social development and growth using its natural resources, including low cost energy provided by coal.

Geosequestration has the potential to support both economic development and deep reductions in greenhouse gas emissions. Victoria therefore welcomes the opportunity to provide a submission to this Inquiry on this important technology.

Victoria's vast reserves of low cost brown coal, in close proximity to geosequestration storage sites, have the potential to attract a wide range of new business developments to Australia. Victoria also supports the advancement of technologies relating to geosequestration and low greenhouse emission that could be readily marketable around the world.

The Victorian Government supports the early development of large scale commercial geosequestration to position Australia for the future.

### **1. The science underpinning geosequestration technology**

It is understood that the only major projects injecting CO<sub>2</sub> specifically for permanent storage are Statoil's Sleipner North Sea project and BP's In Sala project.

However, the majority of technologies associated with geosequestration are well known to the petroleum industry.

For at least three decades, this industry has undertaken injection and storage programs including for the temporary storage of natural gas and for the injection of CO<sub>2</sub> to enhance oil recovery rates. Examples of such gas storage projects include the Western Underground Gas Storage project operating in Western Victoria and the Weyburn project in Canada.

However, there is a need to further research the way CO<sub>2</sub> is trapped and how it moves through deep geological structures, particularly within saline aquifers. Further research is also needed to refine modelling and monitoring methods, to ensure that geosequestration can be effectively managed and regulated to ensure community confidence.

The Cooperative Research Centre for Greenhouse Gas Technologies (CO<sub>2</sub>CRC) is the major Australian body undertaking significant research into geosequestration. This includes conducting a major project in the Victorian Otway Basin to demonstrate CO<sub>2</sub> injection and storage.

Victoria is both a member of the CO<sub>2</sub>CRC Board and contributes financially to its programs.

It is understood that Geoscience Australia is also undertaking leading work to identify and assess potential storage sites.

The Victorian Government understands that research into CO<sub>2</sub> capture is also critical to the practicability and economic viability of geosequestration. Technologies currently exist for the capture of CO<sub>2</sub> from mixed gas streams, but these are generally costly and have not yet been used to capture the very large volumes of

CO2 that are produced by major power stations. Development of high volume, low cost capture technologies would significantly accelerate the development and use of geosequestration.

## CONCLUSIONS

- The science underlying injection and storage is well understood. Work such as that being undertaken by the CO2CRC and Geoscience Australia needs to confirm that modelling, monitoring and verification technologies are sufficient to gain community and government approval.
- The separation of CO2 from natural gas is well understood and is already included in the cost of natural gas extraction.
- Other than in the case of CO2 from natural gas extraction, CO2 capture is likely to be the major constraint in making geosequestration economically viable.
- Research needs to continue in complementary low greenhouse technologies, particularly those associated with coal drying and combustion technologies.

## **2. The potential environmental and economic benefits and risks of such technology**

Climate change will impact on the economy of Victoria, Australia and the world through changes such as variation in crop yields, reduction in water availability in some regions and the occurrence of more frequent storm events. There will also be significant impacts on economic growth as world attention on climate change and greenhouse effects increases and reduces our ability to trade freely with economies that have placed constraints and costs on carbon emissions.

In its December 2004 policy paper *The Greenhouse Challenge for Energy* the Victorian Government indicated its support for a suite of policy measures to meet both its greenhouse and energy policy objectives. A copy is at Attachment 1. Measures include:

- a national greenhouse gas emissions trading scheme;
- support for cleaner coal technology;
- increased renewable energy generation; and
- improved energy efficiency.

The Victorian Government supports early action to develop and apply new greenhouse gas abatement technologies, such as geosequestration, to enable Australia to meet the world's greenhouse challenge.

Early action will also position Australia to take advantage of the opportunities to market low greenhouse gas technologies and products, particularly in countries such as China and India that are experiencing high growth.

Victoria is continuing to pursue non-fossil fuel forms of clean energy and will remain a nuclear-free state. By taking action now to reduce carbon emissions, Victoria will have a smoother transition to a low carbon economy and take advantage of economic opportunities offered by our abundant reserves of coal.

## **Setting a Carbon Price**

Since 2004, Victoria has been working with the other State and Territory Governments, through the National Emissions Trading Taskforce, to design a national emissions trading scheme. This will allow the market to set a price on greenhouse gas emissions and provide financial incentives for investment in emissions reduction. A discussion paper proposing an outline for the Scheme is at Attachment 2.

The essential elements of an emissions trading scheme are that:

- emissions are capped at some level in each period;
- permits to emit greenhouse gases are issued for each period;
- there is a penalty for non-compliance which underpins a value for emissions; and;
- participants can trade these permits.

Many of the current and likely future low emissions technologies, such as carbon capture and sequestration, will not be commercially viable without some form of price on carbon, particularly given Australia's very low electricity prices. Emissions trading or other market based measures will provide an impetus for the commercialisation of these technologies.

Preliminary modelling undertaken for the National Emissions Trading Taskforce indicates that the economy could continue to grow strongly with an emissions trading scheme, while also reducing greenhouse gas emissions.

## **Cleaner Coal Technologies**

The Victorian Government is investing in facilitating emerging technologies such as coal drying, combustion efficiency, and coal gasification. This includes supporting the CO2CRC and offering \$103.5 million for low emission technologies through its Energy Technology Innovation Strategy (ETIS).

Through the development of such clean coal technologies, coal can potentially be used to make not just electricity, but new high value energy based products with very low or near zero emissions. These products could include low sulphur diesel, fertilisers, methanol and hydrogen.

The Monash Energy project, owned by Anglo American, is an example of using coal for substantial economic and social growth while achieving very low greenhouse gas emissions. This is a US\$5 billion project to convert coal on Victoria's LaTrobe Valley into high grade diesel fuel, using geosequestration to permanently store carbon dioxide emissions.

If successful, the Monash Project will be the largest commercial geosequestration project in the world, providing jobs and economic growth in the Latrobe Valley. Furthermore, it will produce high grade diesel fuel at a time when Bass Strait oil production will be starting to decline.

## **Managing Risks**

Broad principles for managing economic and environmental risks associated with geosequestration have been agreed by the Ministerial Council for Minerals and Petroleum (MCMPP) Regulatory Guiding Principles for Carbon Capture and Storage (2005) (MCMPP Guiding Principles). These principles have been endorsed by the Victorian Government.

In relation to risk, the MCMPP Guiding Principles provide that a guiding framework should aim to "minimise risks to health, safety, environment, economic

consequences and government accountabilities" and should be "based on sound risk management principles".

The MCMPR Guiding Principles emphasise that geosequestration should take account of the existing COAG ecologically sustainable development (ESD) principles outlined in the *Intergovernmental Agreement on the Environment (1992)*, including polluter pays, intergenerational equity and the precautionary principles.

The Victorian Government supports the application and communication of these principles to decision making processes relating to geosequestration.

## CONCLUSIONS

- Coal, including Victorian brown coal, will remain the major source of energy for many decades and can provide a feedstock for a range of value added products.
- The early application of geosequestration and other low greenhouse gas emission technologies will provide environmental, social and economic benefits.
- Measures such as a national emissions trading scheme are necessary to support the continued development of emission reduction technologies.
- Without a price for carbon, there is little incentive for energy producers to voluntarily invest in new and emerging clean coal technologies, including geosequestration.
- Emission reduction technologies are likely to increase the cost of electricity.
- Economic and environmental risks associated with geosequestration technology should be addressed in accordance with the MCMPR Guiding Principles.

### **3. The skill base in Australia to advance the science of geosequestration technology**

Many of the skills related to geosequestration technology are held within the petroleum industry. However, the Australian Petroleum Production and Exploration Association (APPEA) highlighted significant shortages in the availability of skilled labour in its May 2006 Issues Paper<sup>1</sup>.

The CO2CRC is the only major Australian body with a direct focus on geosequestration. This CRC is funded under the Commonwealth CRC program and also receives significant funding from the Victorian Government and industry. In this way, it contributes to a wide range of work, including training of post graduate students. However, the CRC has funding only for another four years.

Some universities, including those supporting the CO2CRC, offer a range of graduate and post graduate programs to build expertise in areas associated with the petroleum industry and in some cases geosequestration specifically. For example the Adelaide University has established a Chair of Geosequestration, which may be the first Chair of its type in the world. However, there are only a few petroleum related courses offered around Australia to meet the growing need for scientists and engineers in this area.

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<sup>1</sup> APPEA (May 2006), Australian's Upstream Oil and Gas Industry: A Platform for Prosperity.

Labour shortages are also occurring in related areas, particularly in the development of technologies relating to greenhouse gas abatement from brown coal. While the Commonwealth Low Emissions Technology Development Fund and the Victorian Energy Technology Innovation Strategy (ETIS) support the construction of major demonstration plants, there is currently no broad program to lead future brown coal research, development and demonstration.

As part of ETIS, Victoria recently announced a \$12 million fund to support clean coal research.

Australia was a world leader in brown coal technologies through the work of the Cooperative Research Centre for Clean Power from Lignite. This CRC studied areas such as coal drying, combustion efficiency and brown coal gasification. It also trained many post graduate students. However funding for this CRC was not continued due to lack of Commonwealth support and it closed on 30 June 2006. Victoria strongly supported the on-going operation of this CRC.

## CONCLUSIONS

- There is likely to be an increasing shortage of skilled staff in the petroleum industry and this will impact on the development of geosequestration.
- Programs need to be developed in universities and other research bodies to ensure that Australia has sufficient trained labour to be able to research, design, assess, construct and operate geosequestration operations.
- Research Centres, such as the CO2CRC and the CRC for Clean Power from Lignite, should continue to be supported by all governments and industry.

## **4. Regulatory and approval issues governing geosequestration technology and trials**

Geosequestration offers the best short to medium term means of making significant greenhouse emission reductions, particularly for new fossil fuel plants.

The geosequestration industry needs a certain, clear regulatory regime including rights to storage capacity to support major investment. The regulatory framework must also provide governments and communities with confidence that geosequestration will be properly designed, managed and monitored including to ensure stable, permanent storage.

The MCMPR Guiding Principles provide a basis for developing nationally consistent regulatory frameworks. They identify the following six major areas that need to be addressed to provide security to investors and certainty and transparency to the community:

- Access and property rights
- Transportation
- Assessment and Approvals
- Monitoring and Verification
- Post closure
- Financial Issues

The development of assessment and approvals requirements and monitoring and verification methods that are supported by industry, government and the community will take time. However, to support early geosequestration projects, such as that proposed by Monash Energy, companies urgently require legislation that will ensure

secure access to a geosequestration site or capacity. The Victorian Government believes it is important that the Australian jurisdictions continue to work through the MCMPR to develop amendments to the Commonwealth *Off-Shore Petroleum Act* to provide a mechanism to grant such storage access rights.

The first geosequestration sites are likely to be in areas already held by petroleum producers, such as in the Gippsland Basin in Bass Strait. The legislation will therefore need to deal with overlapping petroleum and geosequestration rights and the management of access for both petroleum extraction and carbon storage. Victoria believes that these are both legitimate and valuable industries and that there should be few conflicts in practice. As such, both petroleum and geosequestration companies should be given separate, equivalent access rights to their respective resources.

This would allow for the grant of overlapping licences and for licence holders to negotiate and develop a commercial agreement over access. Where an agreement cannot be reached, access decisions should be made jointly by the relevant State Government and Commonwealth Government regulators. These decisions should take into account the broad national interest, including factors such as the commercial value of the projects, impact on petroleum resources, greenhouse gas objectives and the protection of sovereign rights. There are established models for such agreements in the petroleum sector.

Detailed issues relating to injection approval, monitoring and verification processes will require significant consideration and development to ensure that they meet industry, government and community needs.

Long term liability for CO<sub>2</sub> storage has been raised by industry, government and non-government organisations as a major issue. The regulatory regime for geosequestration will need to ensure that liabilities are clearly identified, minimised and managed. Victoria believes that future regulatory requirements beyond access rights should be guided by the MCMPR Guiding Principles, and subject to a transparent public development process.

## CONCLUSIONS

- Geosequestration offers Australia the best technological means of achieving significant cuts in greenhouse gas emissions and its early application should be encouraged in Australia.
- Legislation is needed to enable the grant of access rights to provide certainty for emerging large scale commercial geosequestration projects.
- The regulatory framework could provide for the co-existence of geosequestration and petroleum licences allowing them to negotiate equally over access to sites. However where agreement cannot be reached, decisions should be made by the relevant Commonwealth and State regulators.
- Regulatory frameworks for injection approvals processes, monitoring, verification and liability should be transparently developed to ensure that they meet industry, government and community's needs.

## **5. How to best position Australian industry to capture possible market applications.**

While Australia produces high levels of CO<sub>2</sub> per person, it is a low contributor to total global emissions. The Commonwealth Government has not ratified the Kyoto Protocol, and has opposed market based incentives, such as emission trading, to encourage greenhouse gas abatement.

Despite this, Australia has been an active participant in bodies such as the International Carbon Sequestration Leadership Forum (CSLF). This body was established to support the early development of geosequestration, and Victoria has played a leading role, including hosting the second Ministerial Meeting of the CSLF in Melbourne in September 2005. The work of the Asia Pacific Group of 6 (AP6) to support low greenhouse gas emissions is also supported by Victoria.

Australia, through the MCMPPR, has led the world in the development of the Regulatory Guiding Principles for carbon capture and geological storage. The Australian CO<sub>2</sub>CRC and Geoscience Australia are also recognised internationally as leading research bodies across a wide range of geosequestration issues.

The Victorian Government believes that Australia is in a unique position to lead the world in the development and demonstration of large scale commercial geosequestration. This could lead to considerable market opportunities to sell geosequestration technology around the world.

The Monash Energy project shows that one of the largest mining companies in the world, Anglo American, recognises the opportunities from investing in clean coal technologies in Australia. The large reserves of low cost brown coal in Victoria, linked with the geosequestration potential in nearby Bass Strait offer the potential to attract a number of multi billion dollar projects to produce a range of commodities.

The reserves of low cost brown coal close to geosequestration storage sites also make Victoria an ideal place to develop and demonstrate low greenhouse gas fossil fuel generation. These technologies would then be readily marketable around the world, particularly in developing countries of China and India.

In a carbon constrained future, without clean coal technologies, particularly geosequestration, coal could become a stranded asset. Electricity would need to be generated from significantly higher cost sources, particularly if Australia wants to market products to countries with increasingly stringent greenhouse gas requirements.

To position Australia, the early application of geosequestration must be supported. That support should include an economic and regulatory system that provides the right incentives, including a carbon price, to ensure that this technology and other low greenhouse gas technologies can be developed and deployed on a commercial basis.

Importantly, Australia must also ensure that the community understands and has confidence in the regulation of geosequestration or its use will not be supported. This will require effective legislation and community engagement by government and industry.

## **CONCLUSIONS**

- There is an opportunity for Australia build on its emerging leadership in geosequestration technology.

- The close proximity of coal in the Latrobe Valley to geosequestration sites beneath Bass Strait offers a wide range of potential new business opportunities for Australia.
- To capture the widest possible market applications, industry and community support for investment in geosequestration will be needed. This will require effective legislation and engagement.
- Australia should continue to support bodies such as the CO2CRC, CSLF and AP6.