

Better Regulation Statement

Greenhouse Gas Injection and Storage



Industry &
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**Greenhouse Gas Injection and Storage
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Executive Summary

New South Wales meets 90 per cent of its energy needs from electricity generated by coal-fired power stations. While this form of power generation is relatively cheap as well as an efficient means of supplying Australia's largest domestic market, power generation based on coal emits 38 per cent of New South Wales total greenhouse gas emissions.

The need to mitigate greenhouse gas emissions has become evident from Australian and international scientific evidence, and the community has raised concerns about the predicted impacts of global warming. The NSW Government is committed to achieving a 60 per cent cut in greenhouse gas emissions from year 2000 levels by 2050 and at the same time maintaining the reliability of its power supply for industry and the community to ensure a sustainable economy.

As coal fired power stations provide NSW's baseload energy, an emissions' reduction strategy needs to ensure continuity of electricity supply from this source at least for the medium term, but not at a cost to the environment. One of the options for managing greenhouse gas emissions while ensuring a sustainable economy is through the capture and underground storage of the gases emitted during the generation of electricity from coal and gas fired power stations.

To facilitate use of this potentially efficient and effective greenhouse gas abatement measure, the NSW Government is proposing a legislative framework for greenhouse gas injection and storage that will incorporate current NSW legislation and enact the proposed Greenhouse Gas Storage Bill 2010, 'the GGS bill'. The bill provides for the issues particular to greenhouse gas injection and storage that are not addressed in other existing legislation.

The costs and benefits of the proposed legislative framework have been identified and compared with two other options. These are: 1) the status quo, which would limit regulation of this activity to the extent of existing legislation; and 2) not allowing greenhouse gas injection and storage in NSW.

The bill meets community expectations by facilitating the use of this greenhouse gas abatement technology while addressing safe and secure storage of greenhouse gases, by providing for responsible environmental management and for secure greenhouse gas titles with accompanying responsibilities. The bill also provides for Government responsibility for the long term liability of stored greenhouse gases.

The proposed legislative framework is considered the most effective means of achieving the long term safe and secure geological storage of greenhouse gases. In doing so, it provides the highest net benefit to the community.

The community and stakeholders were consulted on the proposed legislation through the release of a Position Paper. Seven submissions were received. There was considerable support for the Government's approach to the proposed legislative framework and many of the suggestions in the submissions have been included in the proposed legislation.

1 Introduction

Australia's energy supply in a global context

Around the world, and in Australia, energy demand is on the rise, with world demand projected to grow by 45 per cent between 2006 and 2030.¹ Global greenhouse gas emissions are estimated to have already increased by 70 per cent between 1970 and 2004 due to human activities.²

This rising demand with its associated increase in greenhouse gas emissions runs counter to the repeated calls made by the United Nations Intergovernmental Panel on Climate Change (IPCC), that reductions of at least 50 per cent in global greenhouse gas emissions compared to 2000 levels will need to be achieved by 2050 to limit a long-term global average temperature rise of between 2.0 and 2.4 degrees Celsius. Recent studies suggest that climate change is occurring faster than previously expected and that even the "50 per cent by 2050" goal may be inadequate to prevent considerable climate change.

In Australia, despite the increase in energy production from renewable sources, fossil fuels (in particular, coal) continue to dominate the electricity fuel mix, with estimates of it still comprising 43 per cent in 2029–30.³

Australia's energy market differs from that of many other countries in world energy markets. Coal plays a much larger role in Australia's primary fuel mix than many other countries, reflecting Australia's large, low-cost coal resources located near demand centres.

New South Wales meets approximately 90 per cent of its energy needs from electricity generated by coal-fired power stations. While electricity generated from coal is reliable, relatively cheap and an efficient means of supplying Australia's largest domestic market, it is also responsible for about 63 million tonnes of the State's greenhouse gas emissions annually or 38 percent of total NSW emissions.⁴

NSW Government approach to emissions reduction

Under the NSW State Plan, and in keeping with the goals of the Commonwealth Government, the NSW Government is committed to achieving a 60 per cent cut in greenhouse gas emissions from year 2000 levels by 2050 and at the same time maintaining the reliability of its power supply.

In keeping with a fuel neutral policy, the Government considers that achieving greenhouse emissions reduction should be through a 'portfolio' approach, that is, through a combination of renewable and alternative sources of energy, as well as through a reduction in emissions from the production of energy from fossil fuels such as coal and gas. Renewable and alternative energy sources by themselves cannot now or in the medium term provide NSW's baseload energy requirements, but can assist in peak load supply. As coal fired power stations provide NSW's baseload energy, it is important to ensure that an emissions' reduction strategy provides for continuity of electricity supply while also making it less emissions intensive.

Carbon capture and storage (CCS) uses technologies to separate emissions and capture gases, except for water vapour which is released into the atmosphere. The

¹ International Energy Agency, World Energy Outlook 2008 reference scenario.

² International Panel on Climate Change, Climate Change 2007: Synthesis Report, p 5.

³ GA report, p 12.

⁴ Department of Climate Change and Energy Efficiency, Australian National Greenhouse Accounts, State and Territory Greenhouse Gas Inventories 2008.

captured gases are compressed before being injected into deep, underground, long-term storage reservoirs.

Greenhouse gas capture and storage technologies are considered to have a significant role in dealing with the complex and challenging problem of providing reliable and economically and environmentally sustainable electricity production in a future carbon-constrained world. These technologies are considered integral to any climate change mitigation strategy as they have the potential to reduce greenhouse gas emissions by up to 19 per cent by 2050, as shown in the International Energy Agency's BLUE Map scenario.⁵ The scenario assumes that global energy-related greenhouse gas emissions are reduced to half their 2005 levels by 2050, and is broadly optimistic on all technologies.

2 Why government should be involved

Extensive scientific evidence supports the conclusion that human activity is contributing to global climate change. Australia's per capita greenhouse gas emissions are the highest of any OECD country and are among the highest in the world.⁶ Australia is also considered one of the countries that will be most affected by climate change.⁷ It therefore has an urgent need to mitigate its greenhouse gas emissions, and while acting alone will not bring about sufficient world wide emissions' reductions to reduce the impacts of forecast climate change. Australian mitigation of gas emissions will support the emergence of an effective global effort.⁸

In 2007, the Stern Review considered climate change a consequence of the greatest example of market failure the world has seen.⁹ Garnaut, in taking this up, points out that:

“A market failure occurs when the market is unable to allocate a resource efficiently, in which case it will be either over- or under-used compared to its true scarcity value. In the context of avoiding dangerous climate change, the misallocated resource is the atmosphere's limited capacity to absorb emissions.”¹⁰

In NSW, the abundance of available coal, the certainty of energy supply, and the low cost of energy compared to most other countries, all contribute to the State's productivity, comparative advantage and prosperity. On the other hand, the cost of burning coal to produce electricity is its major contribution to greenhouse gas emissions. While greenhouse gases are negative externalities, the cost of greenhouse gas pollution is not currently fully costed into the products that are produced and used in NSW.

Greenhouse gas capture and storage is considered to have the potential to contribute significantly to the suite, or portfolio, of measures to significantly reduce

⁵International Energy Agency, 2010, *Energy Technology Perspectives 2010 - Scenarios and Strategies to 2050*, July, OECD/iea, p75.

⁶Garnaut R, 2008, *Garnaut Climate Change Review*, Draft Report, June, Commonwealth of Australia, p199.

⁷Garnaut R, 2008, *Garnaut Climate Change Review*, Draft Report, June, Commonwealth of Australia, p338-9.

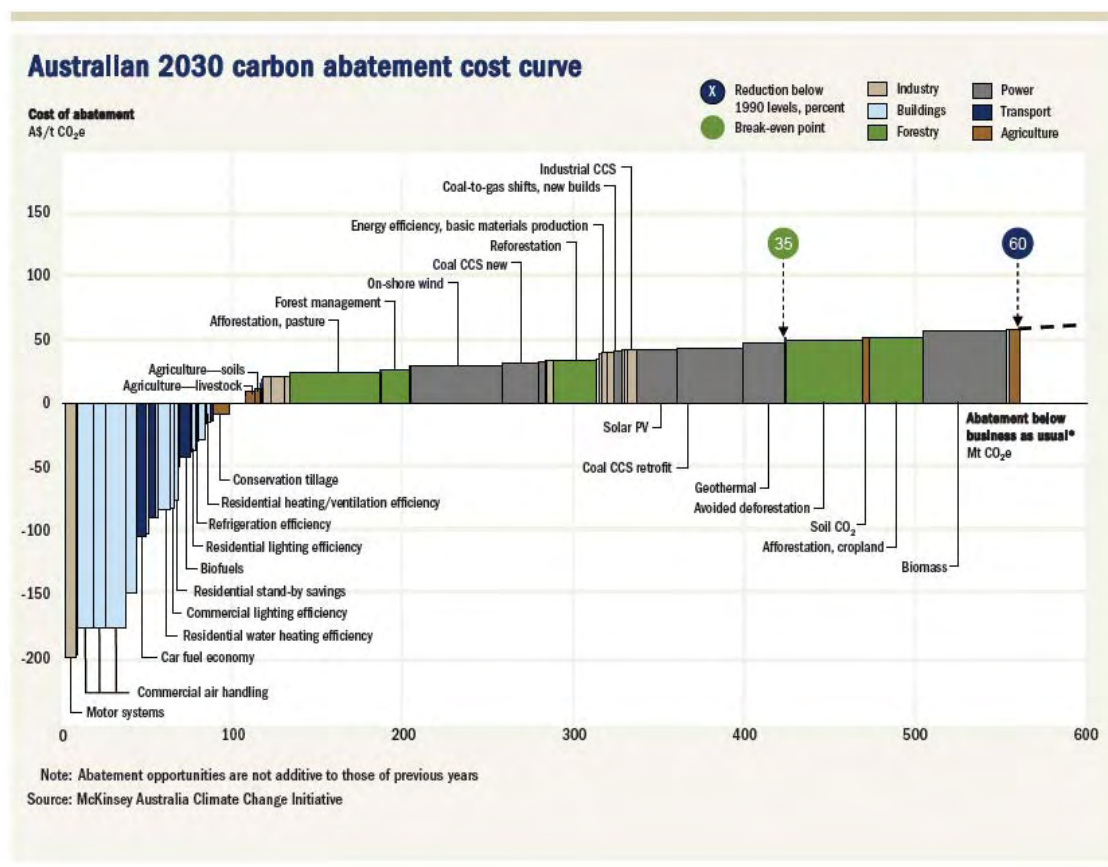
⁸Garnaut R, 2008, *Garnaut Climate Change Review*, Draft Report, June, Commonwealth of Australia, p337.

⁹Garnaut, R. 2008, *The Garnaut Climate Change Report: final report/Ross Garnaut*, Cambridge University Press, Port Melbourne, Victoria

¹⁰Garnaut, R. 2008, *The Garnaut Climate Change Report: final report/Ross Garnaut*, Cambridge University Press, Port Melbourne, Victoria

and stabilise greenhouse gas emissions in the atmosphere.¹¹ Analysis by the International Energy Agency shows that greenhouse gas capture and storage is an essential component of a portfolio of technologies and measures to reduce greenhouse gas emissions. McKinsey & Co demonstrates this in its Carbon Abatement Cost Curve, shown overleaf.¹²

The carbon abatement cost curve shows a range of emissions reduction opportunities including renewable energy sources, alternative fuels, energy efficiency measures and new technologies, including carbon capture and storage. The emissions reduction opportunities are plotted on the cost curve as rectangles from lowest to highest cost. The width of each rectangle represents the amount of greenhouse gas emissions that could potentially be reduced per year by implementing that opportunity. The height represents the average cost of avoiding one tonne of emissions for each identified opportunity. All the abatement opportunities plotted cost less than \$65 per tonne.



Government action can support research and development of these technologies to help prevent the market failure of no first mover being prepared to take the financial risks associated with their development. Industry may not take the financial risks associated with developing these technologies without this support. Without a first mover, the climate change problems associated with increasing emissions will become worse.

¹¹International Energy Agency, 2010. *Carbon Capture and Storage, Progress and Next Steps*, IEA/CSLF Report to the Muskoka 2010 G8 Summit.

¹²McKinsey & Company, 2008. *An Australian Cost Curve for Greenhouse Gas Reduction*, McKinsey Australia Climate Change Initiative, McKinsey Pacific Rim, Sydney, p15.

Without government action, carbon injection and storage is unlikely to proceed, and other means of reducing emissions effectively may take much longer to develop. Government action to overcome the market failure inherent in the development of injection and storage technologies could include, among other actions, financial, information, and/or legislative support.

Provision of a legislative framework will allow critical research steps to be taken that ultimately enable the commercial injection and storage of greenhouse gases to take place. Currently research needs to be carried out under other legislation such as the *Environmental Planning & Assessment Act 1979* that has more time consuming and expensive approvals processes. This would make the development of the technology to deliver commercial-scale capture and storage more difficult to successfully achieve.

Further, government needs to take legislative action to ensure that the interests of the community are served by a carbon injection and storage industry. Appropriate issues to be addressed in this regard include the secure underground storage of potentially large amounts of greenhouse gases, as well as the potential long term liabilities associate with that storage, even if the risk of any potential liabilities is considered to be very low.

The overall objective of government action in developing a greenhouse gas injection and storage legislative framework is to facilitate use of a greenhouse gas abatement option, within a portfolio of measures, to meet NSW's greenhouse gas emissions reduction targets and, at the same time, to address the responsibilities of the industry and the health and safety of the community. As well, in providing for injection and storage of greenhouse gases, the legislation may help ensure continuity of energy supply to NSW in an environmentally responsible way.

The legislative framework takes community interests into account through providing for sound environmental management, the monitoring and verification of gases in storage sites, and for Government to take long term liability for the stored gases. In doing so, the legislation helps mitigate any potential risks to the environment and to public health and safety.

The legislation allows for a consistent and transparent framework which will give industry certainty and provide the community with access to information on stored gases and a clear expectation as to how any potential storage issues will be managed in the short and long term.

3 Proposed legislative framework

The proposed NSW legislative framework is based on the Australian regulatory guiding principles for carbon capture and storage developed by the Ministerial Council on Mineral and Petroleum Resources. In keeping with the principles, it takes into account several existing NSW Acts that are significant to the overall framework. However, greenhouse capture and storage legislation needs to address several issues that are beyond the scope of existing legislation. New legislation has been developed to address these issues.

The proposed legislation for the injection and storage of greenhouse gases in geological formations will:

- provide for the resumption by the Crown of underground reservoirs;
- regulate exploration for suitable storage reservoirs;

- create a rigorous licensing regime for the injection and storage of greenhouse gases;
- provide for access and compensation for affected land holders;
- require ongoing monitoring of injected substances by licence holders;
- provide for the issue of site closure certificates and the transfer of liability to the State once certain rigorous standards have been complied with;
- provide a scheme to consider the impact of greenhouse gas injection and storage activities on existing mining and petroleum titles and unlicensed resources;
- provide for occupational health and safety to be regulated under the *Mine Health and Safety Act 2004*;
- include cost recovery mechanisms and means to minimise the financial risk for Government in accepting liability after site closure; and
- establish an environmental management regime which is similar to the *Mining Act 1992* as amended in 2008.

As activities relating to injection and storage of greenhouse gases are considered to be major projects under the *Environmental Planning & Assessment Act 1979* (EP&A Act), development consent from the Minister for Planning under Part 3A of this Act will be required before an Injection Licence will be granted and a project can proceed. Assessment of a proposed project under the EP&A Act will take into account the public interest as well as environmental management among other things.

It is also proposed that the *SEPP (Major Projects) 2005* be amended to allow for exploration activities for greenhouse gas reservoirs to be approved under part 5 of the EP&A Act, not under Part 3A.

4 Consideration of options to achieve objectives of government action

Three options were considered regarding greenhouse gas capture and storage in NSW. The options, discussed below, are:

Option 1: No change – industry regulated to the extent of requirements in existing legislation (base case)

Option 2: Not allow greenhouse gas injection and storage developments in NSW

Option 3: The proposed legislative framework.

A difficulty in the analysis of the costs and benefits of the options is the current lack of knowledge of the extent of suitable storage sites in NSW and firm forecasts of an anticipated future price on carbon. The analysis is based on the assumptions that sites suitable for greenhouse gas storage will be found and that carbon capture and storage technologies will prove cost effective as part of a portfolio of measures for mitigating greenhouse gas emissions in NSW.

Comparisons throughout the cost benefit analysis are generally made against the base case. Where this is not possible or where wider comparisons add value, other options are considered.

4.1 Option 1 – No change (industry regulated to the extent of requirements in existing legislation)

Option 1 is the base case. Under Option 1, no changes would be made to legislation.

No specific legislation that explicitly addresses the unique aspects of greenhouse gas injection and storage activities compared to other types of development would be implemented.

This does not mean the industry would be completely unregulated as proponents of such activity would be subject to existing development application and assessment processes and would be required to comply with relevant environmental regulations such as those in the *Protection of the Environment Operations Act 1997*.

In this scenario the industry would effectively 'self-regulate' any aspects of its activities that are not addressed by existing legislation.

There is a general recognition that self-regulation is often more flexible and less costly for both business and consumers than direct government involvement. However, the community may have concerns that partial self-regulation of greenhouse gas injection and storage activities may disadvantage the community and the environment, particularly in the long-term.

A significant disadvantage under self regulation in meeting public policy objectives for greenhouse gas emissions reduction through injection and storage is that the industry may take actions in its own interests that do not necessarily meet the interests of public policy. For example, industry may have incentives to minimise short term costs by not paying adequate attention to ensuring the longer term secure storage of the gases through adequate monitoring and verification.

Further, given the industry is not well established, it may not have a full understanding of the risks and how they should be managed. Specific legislation can provide safeguards to address the potential risks.

4.2 Option 2 – Not allow greenhouse gas injection and storage developments in NSW

Option 2 would prevent the establishment of a greenhouse gas injection and storage industry in NSW by amending legislation so this type of development is not allowed (for example by specifying it is not allowed in an environmental planning instrument under the *Environmental Planning & Assessment Act 1979*).

This would mean a potentially effective option for mitigating greenhouse gas emissions is not available within NSW and that achieving greenhouse gas reduction targets would be more dependent on other strategies and technologies which may not be as cost effective. The only way the technology could be used to reduce NSW emissions would be by transporting gases produced in NSW by pipeline to other States which have established greenhouse gas injection and storage industries – the additional costs of building and maintaining pipelines and possible storage fees in other states would make this less viable compared to other mitigation strategies.

As a result coal based power generation might decline more than it otherwise would as other low carbon sources of energy are sought to manage the cost of emissions. This could impact on the economy of the State given its existing reliance on relatively cheap coal fired power generation and would lessen the ongoing security and

affordability of its power supply. There could be other economic and social impacts, such as regional job losses and less buoyant regional economies. NSW would also be less competitive compared to other States which already facilitate these developments with specific legislation.

4.3 Option 3 – The proposed legislative framework

The proposed legislative framework addresses concerns that result from the other options outlined, and provides additional advantages.

It provides a consistent and transparent framework which gives industry certainty in how it will operate, and the wider community a clear expectation as to how issues that may arise will be managed.

The proposed legislation also provides for a reduction in potential risks to the environment as well as to health and safety, and ensures protection of community interests relating to the long-term nature of greenhouse gas injection and storage.

In doing so, it addresses the overarching regulatory guiding principles developed by the Ministerial Council on Mineral and Petroleum Resources, and provides a responsible regime for the introduction of a new industry with the potential for significant public benefit.

5 Identification of Costs and Benefits

5.1 OPTION 1: No change (industry regulated to the extent of requirements in existing legislation)

Option 1: Costs for businesses

Lack of certainty of tenure of an area without greenhouse gas titles

Without additional legislation, an injector of greenhouse gases would have no certainty of exclusive right over an area for injection or a clear process to resolve possible conflicts with other interests. Petroleum, minerals or water titleholders might consider that they have priority over the area in question, and challenge the greenhouse gas injector, causing delays, potentially costly lawsuits and/or inability to continue the project.

There is also potential for cost through having to contend with other operators who have also obtained development consent to inject gases in the same area.

This option imposes costs compared to Option 2 and 3.

Costs incurred by industry to conduct exploration for GHG storage sites

Currently *SEPP (Major Projects) 2005* includes “development for the geosequestration of carbon dioxide” (Schedule 1, clause 8). This means that exploration activities such as drilling would have to be assessed under Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act) and development consent determined by the Minister for Planning. The required application documentation will be costly for industry to prepare, and the process could take considerable time to complete. This would impose greater costs and time for industry than Option 3 under which exploration approvals could be granted under Part 5 of the EP&A Act. Part 5 exploration applications under proposed amendments to relevant legislation would require far less time and cost to submit and would take less time to process.

Potential loss of productive lands to farmers and more expense in resolving conflicts with the greenhouse gas injection and storage industry

Landholders could lose the use of productive surface land if proponents gained development consent to explore and inject greenhouse gas under their land. This loss might be offset if the greenhouse gas proponent was prepared to pay compensation although there may be no compulsion to do so. Farmers might have to undertake costly litigation to be compensated for loss of productive land. Under Option 3, explorers and proponents of injection and storage projects are required to negotiate compensation.

Option 1: Costs for Government

Potential for increased administration costs

Government would incur increased administration costs in assessing Part 3A applications for exploration compared with the proposed exploration approvals process in Option 3.

Potential costs to remediate environmental incidents

Under the base case, there may be no requirements for industry to undertake surface rehabilitation or to remediate leaks from storage sites. Instead, Government might have to cover the cost of addressing such situations. By comparison, industry would be liable for such costs under Option 3.

Potential for long term liability costs

Without legislation, Government would have no means of prescribing a levy on injectors against post closure and long term safety incidents and would incur the full cost of remediating the hazard. This imposes a cost compared to Option 3.

Option 1: Costs for community

Greater potential for health and safety risks

The community is reliant on safe practice by industry. Without safety legislation addressing risks associated with greenhouse gas and storage, the community may be at higher risk of health and safety incidents and issues than under Options 2 and 3 as industry may take actions in its own interests that do not necessarily meet the interests of the community.

Community may not have access to storage data

Without government requirements for the industry to report data, and government then providing data for the community on such subjects as injection and storage sites and results of monitoring, compared with option 3, industry may not provide this information publicly. The community and future generations may need this information for environmental, health and safety reasons.

Potential for less injection and storage (than under Option 3)

Without the certainty that legislation can provide, industry may be less likely to invest in greenhouse gas injection and storage. As a consequence, the community could suffer from less or more expensive greenhouse gas abatement with poor economic and environmental outcomes compared to Option 3.

Option 1: Costs for environment

Potential for increased risk to the environment from poorer standards of site rehabilitation

As there would be no specific requirements for managing the environment or a security bond held against completion of surface rehabilitation, rehabilitation to currently expected standards may not be undertaken, with poorer outcomes for the environment during and after completion of injection. This option would lead to increased risk to the environment when compared with Options 2 or 3.

Potential for increased risk to the environment from lower standards of site assessment and monitoring

Without legislation, there would be no established requirements to manage the potential risks associated with injection and underground storage of greenhouse gases in particular sites. This could lead to poor environmental outcomes from sites which had not been sufficiently assessed or monitored. Under this option, when compared to Options 2 or 3, there would be an increased the risk to the environment.

Option 1: Benefits for businesses

Industry does not incur financial costs imposed under proposed legislation

Industry may incur lower costs compared to Option 3, by avoiding such imposts as security deposits, levies and fees proposed under the legislation. However the potential costs under the base case may be greater than potential costs under Option 2.

Option 1: Benefits for Government

No cost to develop or administer the proposed legislation

Government does not incur a cost to develop or administer legislation. However, this is a core function of government and a relatively small cost.

Option 1: Benefits for community

Some reduction in greenhouse gas emissions

There would be some reduction in greenhouse gas emissions compared to Option 2 but it is likely the industry would be smaller and contribute less to reductions than Option 3.

Option 1: Benefits for environment

Some greenhouse gas abatement

There would be some greenhouse gas abatement and benefit for the environment, although less than Option 3.

5.2 OPTION 2: Not allow greenhouse gas injection and storage developments in NSW

Option 2: Costs for business

Increased potential for economic shocks to industry

Not allowing a potentially efficient and effective means of reducing carbon emissions may result in greater shocks to industry and force more rapid and costly structural

change in the coal mining and power generation sectors compared to the base case and Option 3.

Loss of opportunity for potential NSW injection and storage businesses

If greenhouse gas injection and storage were prohibited in NSW, potential opportunities for NSW businesses would be lost compared to the base case or Option 3. Businesses in other jurisdictions that already have legislation in place would have a competitive advantage and may in some cases attract business from NSW if gases could be transported cost effectively to other states for storage.

Option 2: Costs for Government

Increased intervention to achieve emissions reduction targets

Greenhouse capture and storage has been identified as fundamental to least cost carbon abatement strategies (International Energy Agency, IEA). Without it, the IEA predicts that the overall cost of reaching required emissions reductions rises by 70 percent. If injection and storage were prohibited in NSW the remaining available options for mitigating greenhouse gases might result in increased need for government intervention and expenditure to promote the viability of more expensive alternatives compared to the base case and Option 3.

Option 2: Costs for community

Increased energy prices

The community may incur greater energy costs to pay for the increased costs of greenhouse gas abatement activities compared to the base case and Option 3.

Reduced reliability of electricity supply

The community may experience reduced reliability of electricity supply if not allowing injection and storage of greenhouse gases increases dependence on alternative energy sources that currently do not have the capacity to provide baseload power.

Option 2: Costs for environment

Less reduction in emitted greenhouse gases

Compared with the base case there could be less reduction or more expensive reduction of greenhouse gas emissions, so decreasing NSW's contribution to the efficient lessening of global warming.

Option 2: Benefits for business

No expenditure to establish a greenhouse gas injection and storage industry in NSW

As there would be no greenhouse gas injection and storage industry in NSW, business would not incur the cost of finding and developing storage sites compared to the base case and Option 3.

Farmers would not lose productive land

As land would not be required for exploration or storage, agribusinesses would not potentially be deprived of productive land compared to Option 1 and 3.

Option 2: Benefits for Government

No costs to develop or administer the proposed legislation

The NSW government would not incur the expense of developing legislation or its ongoing administration and enforcement compared to Option 3.

Option 2: Benefits for community

Community not subject to potential risks associated with injection and storage

As gases would not be stored in NSW, the community would not be exposed to any potential, though improbable, mishaps such as gas escape from storage sites compared with the base case and Option 3.

Option 2: Benefits for environment

No gases stored beneath NSW land

There would be no potential gas escape from storage sites in NSW compared with the base case and Option 3.

5.3 OPTION 3: Proposed legislation

Option 3: Costs for businesses

Financial imposts under the proposed legislation

Businesses will incur greater costs under the proposed legislation than under the base case or Option 2. Costs would include fees for application and grant of authorities such as exploration permits and injection licences. They would also include security deposits against surface rehabilitation, and monitoring and verification after injection ceases; as well as a levy on stored gases to provide a fund for future liabilities that may arise, and a charge like a royalty for the use of the State's resources.

Cost to comply with legislated arrangements

It will cost industry more than under the base case to comply with the extensive requirements under the proposed legislation. Examples of this are complying with conditions of title, ensuring the environment is managed responsibly and undertaking monitoring and verification to required levels. This option will also impose costs that would not be imposed under Option 2.

Option 3: Costs for Government

Cost to develop legislation

Government would incur greater costs to develop the proposed legislation than under the base case and option 2.

Cost to administer the proposed legislation

Government would incur greater costs to administer the new legislation, and to ensure compliance and enforce the legislation compared with the base case and option 2.

Option 3: Costs for community

Compared to option 2, the existence of a greenhouse injection and storage industry may present some potential, but unlikely, risks to health.

Option 3: Costs for environment

Exploration and injection site activity impacts

Injection site activity will impact on the environment, through surface impacts and the drilling of wells. This cost would be avoided under option 2 and could potentially be greater than the base case.

Option 3: Benefits for Business

Opportunities for businesses

The proposed legislation will provide a framework for opportunities for industry to develop injection and storage businesses compared to the base case and Option 2.

Business certainty

The proposed legislative framework will provide businesses with certainty in carrying out greenhouse gas injection and storage in NSW compared to the base case and Option 2. Importantly it will provide certainty of tenure over title areas for exploration and injection.

Compensation for farmers

Under the proposed legislation, farmers with storage reservoirs under their land who are affected by exploration and injection activities will be compensated by a greenhouse gas titleholder. This would provide a benefit to farmers compared to the base case.

Streamlined approvals process for exploration

Applications and approvals for exploration will be simpler, less costly and take a shorter time compared to the base case.

Option 3: Benefits for Government

Reduced burdens of the exploration process for GHG storage sites

Compared to the base case there is less cost to Government by having a streamlined exploration process for GHG storage sites. Instead of having to receive approval for exploration through a development consent under Part 3A of the *Environmental Planning and Assessment Act 1979*, legislative arrangements would encompass amendments to SEPP (Major Projects) 2005 allowing for simpler Part 5 approvals for exploration.

Government does not bear the cost of titles administration

Government will charge for the application and grant of titles under the proposed legislation to cover the costs of administering them. This revenue would not be available under the base case.

Government does not bear the financial cost of remediating potential future issues that arise

In contrast to the base case, under the proposed legislation Government will impose a levy on the volume of gases injected to ensure that the potential costs of any future event requiring remediation do not have to be met by the Government of the time.

Option 3: Benefits for community

Assurance of health and safety

The community can be reassured that every effort has been made to ensure injection and storage activities and storage sites themselves are safe under the proposed legislation. The proposed legislation also delivers much greater protection to the community through requirements for monitoring and verification compared to the base case.

Reliability and costs of electricity

The community will benefit from relatively lower costs of electricity supply resulting from the reduced costs of greenhouse gas abatement compared to Option 2 as well as a greater likelihood of maintaining reliability of electricity supply.

Option 3: Benefits for environment

Assurance of environmental protection

The proposed legislative framework will ensure high standards of environmental management around greenhouse gas injection and storage operations. The risks of adverse impacts on the environment will be lower under the proposed legislation than under the base case.

Increased abatement of greenhouse gas emissions

The proposed legislative framework will facilitate greenhouse gas injection and storage in NSW to a greater extent than the base case potentially reducing both the costs of abatement and amounts of greenhouse gas emissions.

6 Preferred Option

In section 4, three options were identified around mitigation of greenhouse gas emissions through injection and underground storage. The costs and benefits of each of the options were identified in section 5.

6.1 Multi-criteria analysis

Given the difficulty in providing quantified estimates of the costs and benefits for the options to assist in their comparison and assessment, the options are compared using a multi-criteria analysis (MCA) (see MCA table overleaf). The MCA assigns a weighting to each objective or criterion out of 100. Each criterion is assigned a score out of 10 which is multiplied by the weighting to produce a weighted score.

- Potential impacts on the environment were given the highest weighting of 30 percent. Environmental impacts can arise from all stages of the greenhouse capture and storage process, including from drilling of wells, and there may be potential for the escape of gases to the atmosphere from storage sites. On the other hand, in the absence of injection and storage as a key mitigation strategy, gas emissions are predicted to increase substantially, affecting both the local and global environments.
- The impact on public health and safety was given a weighting of 25 per cent. Again, if exploration and injection at storage sites was not adequately regulated, the impact on public health and safety could be significantly negative.
- The impact on economy and employment was given the next highest weighting, of 20 per cent. If exploration and injection of greenhouse gases

were not regulated, and the industry not encouraged in NSW, mitigation of greenhouse gas emissions through injection and storage would not be able to provide the benefits possible. This would have particular negative impacts if a carbon price were imposed.

The cost of coal-based power generation would rise to meet greenhouse gas emission costs with the setting of a carbon price. The cost could be met by either paying the carbon price, or paying to transport the gases interstate, or reducing energy production from coal and developing other lower emission, but potentially more costly, energy resources. At least in the short to medium term these changes would negatively affect productivity, output and employment in many parts of the economy.

- Compliance costs for business under a regulatory scheme were weighted at 15 per cent. Compliance costs of using alternative mitigation strategies if greenhouse gas injection and storage was not allowed were not considered.
- Costs for Government were weighted at 10 per cent to cover development of a regulatory framework, ongoing administration and compliance activities.

Multi-criteria table

	Weight %	Option 1 no change		Option 2 prohibition		Option 3 proposed act	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Impact on natural environment	30	0	0.00	-2	-0.6	6	1.80
Impact on public health	25	0	0.00	-2	-0.5	5	1.25
Impact on economy and employment	20	0	0.00	-3	-0.6	2	0.40
Compliance cost for business	15	0	0.00	3	0.5	-4	-0.60
Compliance cost for Government	10	0	0.00	3	0.3	-3	-0.30
Total	100		0.00		-0.95		2.55

6.2 Discussion

Option 1 was selected as the base case as it is the current situation. To allow a relative comparison with the other options, the costs and benefits attributable to the base case have been given a value of zero. This is not to say the base case does not provide a net benefit to Government, business, the community and the environment, but rather that these values are “taken as a given” to provide a benchmark through which to compare the other options.

Thus, if the value any of the other options achieves a value greater than zero, it represents an improvement on the current circumstances. If the value of any of the options achieves a value of less than zero, it represents a less desirable outcome than the current arrangements. If all of the options have negative values, the base case would be the preferred option. If more than one of the options has a positive value, the option with the highest value would be chosen (all other distributional issues being equal).

Option 1 (base case)

Compared to Option 3, there are potential risks of adverse impacts on the environment, and possibly on public health and safety under Option 1. While industry would be subject to existing regulation, this may be insufficient to address such risks.

Without being required to do so, industry is also unlikely to take into account broader Government policies such as the overarching Australian regulatory guiding principles developed by the Australian Ministerial Council on Mineral and Petroleum Resources. An example would be the principle that regulation should recognise the potential for post-closure liabilities and consider appropriate financial instruments to assist in the management of such risk. It would be unlikely that industry would opt to impose this liability on itself.

Further, self-regulation in NSW would be inconsistent with the regulatory approach taken in other jurisdictions. The regulatory guiding principles seek consistency of regulation across jurisdictions. Another area where self-regulation could differ from the guiding principles is in not providing for monitoring and verification.

Option 2

Option 2, not allowing greenhouse gas injection and storage activity in NSW, resulted in a weighted score of -0.95, the lower score of Options 2 and 3. By excluding greenhouse gas injection and storage as a means of mitigating the gases, the costs of abatement are likely to be higher than for options 1 and 3. Higher costs of energy may result from other low-carbon sources of energy being used, and there may be a further cost in this situation as these sources of energy would be unable to provide base load energy for some time. Costs would at least partly be passed on to consumers in higher electricity charges.

This option would limit NSW acting competitively to mitigate greenhouse gas emissions compared to other jurisdictions and there is no strong rationale for pursuing it.

The coal mining and electricity generation sectors would be more exposed to rapid structural change and consequent adjustment costs, with cuts in output, employment and economic activity. Government would also be under pressure to intervene in support of other more expensive abatement options, requiring expensive subsidies and other incentives.

If greenhouse gas injection and storage was able to be arranged with other jurisdictions, greenhouse gas emissions might be effectively mitigated, but the cost of building and maintaining pipelines over very long distances, the potential charges levied by the interstate industry, and the uncertainty of being able to obtain storage could impose costs for NSW that could make interstate transporting of the gases prohibitively expensive.

Option 3

Option 3, the proposed legislative framework, scored a weighted total of 2.55, the higher score. The proposed legislative framework addresses concerns that might arise if either of the two other options were adopted, as well as providing other advantages.

A transparent management framework for greenhouse gas injection and storage in NSW provides the community and investors in geosequestration technology with more certainty than using only existing legislation.

It overcomes the economic and environmental difficulties of prohibiting greenhouse gas injection and storage in NSW, and the potential costs, uncertainties and difficulties of arranging for interstate storage.

The proposed legislation provides for more streamlined approvals for exploration, and thorough assessment of proposed storage sites to ensure integrity for storage. Legislation will provide the community with the confidence that potential impacts on the environment will be managed and if necessary, overcome. It also contains more effective measures to ensure the protection of public health and safety.

By having a robust legislative framework, business certainty is provided for exploration and injection of greenhouse gases. This is likely to attract further investment in carbon capture and storage projects, leading to potential benefits to the economy and employment.

Compliance costs for business and costs for government in developing the proposed legislative framework are more than under the base case. However, these costs are more than offset by the potential benefits, particularly in terms of public health and the environment.

6.3 Conclusion

Under the base case, there could be higher risks to the community and environment, as the industry would not be required to comply with regulation that specifically addresses the unique safety and environmental risks of greenhouse gas injection and storage activities. This could lead to adverse impacts on the health and safety of the community and the environment. It is unlikely that the community would find this acceptable. The base case is therefore not considered the preferred option.

Option 2 would mean NSW does not make use of a technology that has the potential to significantly mitigate greenhouse gas emissions in NSW. This would result in higher costs of abatement and the NSW economy could suffer as a consequence. A further outcome would be reduced impact on global warming. It would also mean NSW is at a competitive disadvantage in comparison to other jurisdictions that facilitate greenhouse gas injection and storage activities. If the gases were transported interstate as a result, the costs and uncertainties associated with the transport could impose costs that make this alternative unacceptable and uneconomic.

The proposed legislation (Option 3) facilitates greenhouse gas injection and storage and provides for effective management of potential risks to the community and the environment that might be associated with the industry. The proposed legislation is the most effective and efficient means of delivering the objectives of developing a regulatory framework to enable GHG exploration, injection and safe storage.

Although the proposed legislative framework imposes relatively minor costs on the community in terms of administrative costs on businesses and costs to government, it provides the greatest net benefit to the environment and community and is therefore the preferred option.

7 Consultation

A position paper was developed reflecting Government's preferred position with regard to injection and storage of greenhouse gases emitted from stationary sources. The paper, *Position paper: Proposals for a regulatory framework for greenhouse gas injection and storage*, was released for public consultation between 18 August and 15 September 2010.

The paper was advertised in *The Sydney Morning Herald* and *The Daily Telegraph*, and key stakeholders were advised by email that the paper had been released and where it was available. Seven submissions were received, none of which objected to the legislative proposals, but several offering ideas to make the legislation operate effectively. Some of these were already planned for inclusion, and some others were subsequently included in the legislation.

Government agencies were also extensively consulted throughout the development of the paper.

8 Evaluation and Review

If the proposed legislation is passed by Parliament, it will be subject to a statutory review five years from assent.

As well, regulations made under the legislation will be subject to the *Subordinate Legislation Act 1989*, which requires that regulations be reviewed every five years. Most regulations are subject to requirements for public consultation during the five-yearly review.