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CCS
INSTITUTE

SUBMISSION

NSW Proposals for a Regulatory Framework for
Greenhouse Gas Injection and Storage



INTRODUCTION

The Global CCS Institute (the Institute) welcomes the opportunity to provide input into the New South Wales (NSW) Government's *Proposal for a Regulatory Framework for Greenhouse Gas (GHG) Injection and Storage*.

The Institute is an independent body which works collaboratively with organisations and governments to accelerate the broad deployment of commercial carbon capture and storage (CCS), ensuring that the technology plays a role in responding to the world's need for a low carbon energy future. The Institute is a Member-based organisation comprising more than 35 national and sub-national governments and 225 leading corporations, non-government bodies and research organisations from around the world.

This submission contains the Institute's response to the Industry and Investment Department's position paper on *Proposals for a Regulatory Framework for Greenhouse Gas Injection and Storage*. The comments contained in this submission highlight key issues associated with the licensing arrangements, competition with other users, and assessment of eligible storage sites, environmental management and liability.



SUBMISSION

Introduction

Australia's and New South Wales' energy security has historically been enhanced by the physical availability of energy through abundant fossil fuel resources and relatively low electricity prices. Around 80 percent of Australia's electricity currently comes from coal fired power generation. Additionally, it is predicted that Australia's energy demand will grow by 34 percent between 2007-08 and 2030.¹ As such, carbon capture and storage (CCS) combined with power generation and gas processing is expected to play a significant role in Australia's energy future.

The accelerated deployment of CCS will be dependent on the development and implementation of regulatory frameworks. This is particularly the case for carbon dioxide (CO₂) storage where regulatory certainty is required for CCS projects to advance. In recognition of this requirement, there is an increasing global trend of governments introducing project specific regulation for early mover projects such as the West Australian *Barrow Island Act 2003* for the Gorgon project. This approach also allows regulators to learn by doing and will inform the development and refining of more comprehensive regulatory frameworks.

However, while project specific regulation will assist in early project development, comprehensive regulatory frameworks need to be developed either before, or in parallel with CCS demonstration projects to underpin performance associated with incentive schemes and provide developers with the certainty that they require to assess the viability of developing CCS projects.

In order to support the development and deployment of CCS, the NSW Government through the Department of Industry and Investment, has commenced a process to develop a comprehensive regulatory framework for greenhouse gas (GHG) injection and storage. This framework will be consistent with other National and State regulation in order to facilitate activity that may cross jurisdictional borders.

The establishment of consistent and transparent regulations will provide industry with the certainty required to pursue CCS development. The regulations will also ensure protection of community interests relating to the long term nature of GHG storage by providing a clear expectation on how CCS will be managed whilst ensuring that the potential risks to the environment and health and safety are minimised.

This submission contains the Global CCS Institute's (the Institute) response to the Industry and Investment Department's *Position Paper on Proposals for a Regulatory Framework for Greenhouse Gas Injection and Storage*. The comments contained in this submission highlight key issues associated with the licensing arrangements, competition with other users, and assessment of eligible storage sites, environmental management and liability.

Licensing arrangements

Integrated CCS demonstration projects cannot proceed unless project proponents can secure storage tenure. An appropriate regulatory framework for storage tenure will address the safe and secure storage of GHG in order to meet community expectations, and to provide secure GHG titles for industry with accompanying responsibly.

The proposed framework to address storage is through the provision of a system of licences and permits. These are to be conveyed by a range of authorities that will be subject to conditions considered by the responsible Minister to be necessary to regulate the activities permitted under

¹ ABARE 2010, Australian Energy Projections to 2029-30



them. This system will be similar in nature to those applied for petroleum and minerals extraction and consistent with ecologically sustainable principles.

The licensing arrangements proposed in the Position Paper are consistent with other Australian legislation which was highlighted in the Institute's 2009 Strategic Analysis report on *Policies and Legislation Framing Carbon Capture and Storage Globally* as a model for licensing regimes. As such, the proposed approach will ensure that NSW has a regulatory environment that addresses both the surface and injection rights and the subsurface reservoir rights. This will provide a clear chain of responsibility and liability in the event of possible CO₂ leakage or migration.

Competition with other users

The successful implementation of permitting for storage arrangements requires an appropriate balance between protecting the rights of existing title holders against ensuring access for potential proponents and storage activity. This balance needs to incorporate the treatment of adjacent or overlapping developments and the relationship with existing petroleum developments.

The proposed licensing arrangements place responsibility on the project proponent to provide the regulator with sufficient information on how storage activity can be carried out concurrently with all potentially affected operators. This will include evidence that the proposed exploration and appraisal activities have been discussed with all potentially affected parties and proof of technical viability that both parties can co exist without material disadvantage to activity already authorised.

Clear requirements on what is to be included in the project applications will ensure that the regulatory authority has sufficient information to make their assessment and insure that the objectives can be met. Industry and associated stakeholders could be consulted in the development of these requirements to ensure that they are not too onerous.

As with the permitting requirements, the proposed impacts test builds on existing regulatory principles. This is a productive approach to addressing potential conflicts and provides a way for conflict resolution and is consistent with both Australian and other State government approaches.

Assessment of eligible storage sites

Storage site assessment and appropriate site selection is critical for ensuring that CO₂ storage is done safely and effectively over the long term, without significant leakage or other migration from the targeted storage formation. Specific information and the steps needed to undertake this assessment should reflect the best available technologies and practices.

Regulatory frameworks should outline clear objectives that storage assessments will need to meet, including that a thorough characterisation of the targeted storage formation and surrounding area demonstrates:

- Sufficient storage capacity for intended quantity of CO₂;
- Sufficient injectivity for the intended rate of CO₂ injection;
- Free of known faults or fracture that could allow unintended migration or leakage of CO₂;
- No significant risks of unintended or adverse impacts on the environment, human health, or other resource values;
- Any potential interaction with other CO₂ storage sites must be such that all sites meet these requirements.

It should also be recognised that storage assessments need to reflect an overall regulatory system for storage based on risk identification and assessment, and subsequently the development of risk management frameworks. Projects which cannot satisfactorily show they are managing risks and



have the potential for secure long term storage cannot be considered viable until further information is collected and assessed to provide such assurance.

Given that a good understanding of CO₂ storage characteristics and behaviour is evolving as the number of research and pilot projects around the world increases, and will continue to evolve as more large scale demonstrations of CO₂ injection and geological storage get underway, we recommend that frameworks outline an approach where regulations and requirements for risk management frameworks are less technically prescriptive, and instead should be implemented according to 'guidelines' which can evolve efficiently unlike primary legal instruments. It is recommended that CO₂ storage project proponents and the relevant regulators in NSW be informed by fairly recent storage assessment and selection guidelines that have been developed by organisations such as the [European Union](#)² and [Det Norske Veritas \(DNV\)](#)³.

Environmental Management

At the core of a site plan is a monitoring plan for verifying that injected CO₂ has not leaked or migrated from the intended storage formation; that the actual behaviour of injected CO₂ conforms to expectations built into risk management strategies; and for the requirement to report any CO₂ that does leak into the atmosphere.

It is recommended that a regulatory framework for storage stipulates that site plans include an overall monitoring plan informed by the results of the site assessment. The monitoring plan should be designed and approved by the relevant authority pursuant to specific requirements, which similar to site assessments should also be informed by guidelines that can evolve over time. Again, the European Union (see reference 2 below) and others have also published fairly recent guidelines that could help to inform the NSW Government.

The objectives of a monitoring plan within the relevant regulations should delineate that the operator carry out the monitoring of injection facilities, the storage complex, including the where possible the CO₂ plume, and the surrounding area for the purpose of:

- comparing between the actual and modelled behaviour of the CO₂ and formation water in the storage site;
- detecting significant irregularities;
- detecting both leakage and migration of the CO₂ from the intended confines of the storage site;
- detecting adverse effects on the surrounding environment, including on underground sources of drinking water;
- Updating the modelling and risk assessments of the injected CO₂.

CCS Liability issues

CCS injection activities combine a number of factors into a unique set of risks due to:

- The requirement to store large quantities of CO₂ from electricity generating stations and other industrial facilities;
- The long time frame over which risk events may occur – from the initial injection period to an indefinite storage lifetime – which will exceed the financial life of any licence holder authorised to inject CO₂;

² Guidance Document under EC Directive 2009/31, "Specific approaches to key stages of the CO₂ storage life-cycle", http://ec.europa.eu/environment/climat/ccs/dir_2009_31_en.htm

³ "CO2QUALSTORE Guideline for Selection, Characterisation and Qualification of Sites and Projects for Geological Storage of CO₂", http://www.dnv.com/industry/energy/rules_standards/qualstore_guideline_co2/index.asp



- Storage sites may be sited near population centres, groundwater sources and/or sensitive habitats;
- The inherent uncertainty of the geological properties of the storage system.

The interaction of the scale of CO₂ stored, the indefinite timeframe for safe and secure storage, the location and the geological properties of the storage system creates an interacting range of risks regarding potential injury or damage to private and public interests.

The requirement to manage for unanticipated events and potential damage creates the need to prepare for the associated financial consequences of remediation or compensation.

The challenge in designing a liability framework that manages and mitigates these physical and financial risks over any timeframe is to find the balance in deploying CCS in a cost effective manner, and at the same time ensuring it is both safe and environmentally sound in order to achieve economically efficient outcomes for the community.

The liability approach must provide for the potential financial exposure of both the licence holder and the community (collectively through the State of NSW). It must also minimise the potential for adverse site selection due to moral hazard - that is, manage against the changes in the level of precaution taken if licence holders no longer bear the full costs of liability, potentially leading to an increased probability of an unplanned event.

There is a need to consider the interaction between the short, medium and long term nature of the risks being managed. Too much focus on the challenges of managing the long term care and site stewardship at the expense of managing risks during the design and operational parts of the injection operations may miss the strong interaction between the risk management systems put in place during these initial phases of the site selection and operation that directly determine the residual risk profile of the long term post-closure obligations.

To manage the long tail risk it is necessary to require proper siting, immediate corrective action and early shut down of emergent risky operations. As noted in the environmental management section, this requires ensuring sufficient monitoring, measuring and verification activities in order to detect problems early. This also requires on-going demonstration that the operator is able to financially support the continual MMV activities and preparedness for remediation or compensation over the remaining life of the storage operation..

The above discussion on an appropriate liability framework can be summarised as:

- Ensuring sufficient funds are available to pay for the activities necessary to:
 - Minimise the potential for releases of the CO₂ from the storage site over the short, medium and long term;
 - Detect problems before they adversely impact public and private welfare;
 - Finance remediation as necessary; and
 - Pay compensation to the extent required.
- That liability is clearly allocated in a manner to the party that is best able to manage the risk in the appropriate timeframe.

Liability framework in the Position Paper

The liability framework put forward in Position Paper seeks to manage and mitigate the risks through several means:

- An appropriate approval process for storage sites;

- A requirement to hold securities to cover the rehabilitation of surface areas and the sealing of injection and other wells;
- A requirement to hold a security to cover monitoring of the storage site during the closure period;
- A requirement for a levy to be paid to provide a statutory fund to finance damages or costs as a result of the State's assumption of liability post closure as well as ongoing site monitoring;
 - The nature and level of the levy will be determined following finalisation of the proposed legislative framework.
- A requirement for a site plan that identifies approved criteria that must be met before a storage site closure certificate can be issued, and long term liability passed to the State.
 - The licence holder retains liability until a site closure certificate is issued.
 - The approved criteria are to be determined in a manner that presents a low liability risk for the State of NSW.

Issues for further consideration

The framework in the Position Paper establishes a basis for appropriate financial risk management. However, the addition of several elements would enhance the framework.

The framework focuses primarily on managing the risks associated with physical characteristics of the site and the financial risks for short and long term remediation and compensation. Little attention is provided to managing the risks regarding the financial assurance of the licence holder as an on-going entity for the life of the operation. In the event of the licence holder becoming insolvent during the life of the operation, have sufficient considerations been given to ensuring all future liabilities are managed?

Another way of noting this is that the framework does not appear to recognise that the NSW State is the default holder of risk. The paper is silent on the outcome of where a site closure certificate has not been issued, but the licence holder no longer is able to continue with either monitoring operations or fund future potential liabilities – whether or not a liability has already been incurred.

The framework could be informed by Canada's Acid Gas Injection framework which requires on-going demonstration of financial assurance of the injecting party.

Consideration should be given to the need for financing abandoned or orphaned storage sites prior to closure. As with the principles laid out in the above liability framework, aligning incentives appropriately for this possible outcome can be managed effectively through a levy on other licence holders.

The Position Paper notes that the levy will create an additional cost for GHG injection licence holders, couching the discussion in terms of ensuring that NSW taxpayers are not subsidising the long term expected liability costs. Whilst this is important there are two other key reasons to ensure that the licence holder faces the full cost of their activities here:

- Avoiding the increased probability of an unplanned event through lowering the potential cost to licence holders if they no longer bear the full price of risk for their actions– thereby potentially increasing the total cost borne by both NSW taxpayers and the community; and
- Ensuring that within the suite of technologies that can be brought forward to mitigate greenhouse gas emissions, that CCS is not unfavourably advantaged relative to other technologies. To do so would potentially result in inefficient use of economic resources through not using the least cost suite of technologies.

An issue in establishing the size of the levy is ensuring sufficient funds are available to finance remedial action if required and to pay compensatory damages to the extent appropriate. This



exercise will be present significant challenges in determining the appropriate value of the levy to be set and to match it to site specific characteristics. There are limited examples or analyses of operating large scale integrated CCS projects worldwide from which to undertake an appropriate actuarial analysis of the nature of the financial risks that may be incurred.

The Institute has agreed to provide anchor funding support to a public study to provide information on both the nature of the risks and the magnitude of funds that might be required. The study, to be completed in early 2011 will prepare case studies on a small number of sites in the United States, assessing potential risks – current and future – and seeking to monetise those risks. In doing so, it will provide a catalogue of risks that can be associated with CCS and also establish methodologies for measuring those risks and assigning monetary values to them.

Whilst focused on storage sites in the United States, a robust and peer reviewed model will be developed that can be used to assess multiple geologic settings in different countries and regions. The study will provide:

- An analytic framework for monetising CCS risk that can be applied to any CCS project adjusted for fuel source, technology and geographic location;
- Point and range estimates of potential liability in the plant, pipeline and storage components of each CCS site; and
- Methodologies that maximise use of existing data but also have the capacity to incorporate new risk assessment material as it becomes available.

The Institute will make this study, model and results available to NSW Industry and Investment when it is available.