CO2CRC COOPERATIVE RESEARCH CENTRE FOR GREENHOUSE GAS TECHNOLOGIES

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Mr John Hawkins
Committee Secretary
Senate Economics Committee
Department of the Senate
Parliament House
Canberra ACT 2600

Dear Mr Hawkins

Thank you for agreeing to receive this submission on the Inquiry into the Offshore Petroleum Amendment (Greenhouse Gas Storage) Bill 2008 and the related Bills. I am pleased to provide the following comments and background information to assist the Committee in its consideration of these Bills.

In providing these comments I should point out that the comments are provided from a technology perspective and they may not necessarily represent the views of any individual member organization of the Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC).

The approach taken by CO2CRC to Carbon Capture and Storage (CCS) is that it is one of the key technologies in a portfolio of mitigation options that Australia will need to deploy if the Government's emission targets are to be met. These Bills are an important component of the pathway to deployment of CCS and therefore is a welcome step forward. At the same time it does raise some important technical issues that require consideration if CCS is to fully realize its potential. This submission points to those issues and makes some observations on how they might be addressed.

I would be pleased to meet with the Committee to discuss this submission and more general aspects of CCS as an important mitigation option for Australia

Yours sincerely

Peter J Cook, CBE, FTSE
Chief Executive

SENATE ECONOMICS COMMITTEE INQUIRY INTO THE OFFSHORE PETROLEUM AMENDMENT (Greenhouse Gas Storage) BILL AND RELATED BILLS

COMMENTS BY THE COOPERATIVE RESEARCH CENTRE FOR GREENHOUSE GAS TECHNOLOGY (CO2CRC) SEPTEMBER 2008

SUMMARY

Carbon capture and storage (CCS) technology is able to make deep cuts in CO_2 emissions from major stationary sources such as power stations or large industrial plants. At the present time, the cost of deploying the technology at a large scale is likely to be high, although the economies of scale that could be achieved through deployment will probably make the technology cheaper than some renewable energy generation sources currently being deployed.

The inclusion of CCS in a national portfolio of mitigation responses will decrease the overall cost of mitigation by up to 35% compared to a response that does not include CCS (IPCC special Report, 2006).

There are challenges to ensure the optimal deployment of CCS in Australia. These include:

- Decreasing costs;
- Identifying adequate geological storage sites;
- Clarifying regulatory and approval processes;
- Addressing the financial impediment to large deployment of CCS, particularly those faced by the electricity sector.

The deployment of CCS represents an exceptional opportunity for Australia in that:

- Australia's major emission sources are well positioned to exploit economics of scale as they are concentrated in relatively few localities;
- Australia's geological storage "resources" are large (though not always near the major emission sources);
- Australia has a strong technical base in the earth sciences and chemical engineering – key areas for CCS;
- The CCS industry in rapidly evolving and because of its technical base and high standing in CCS (through the effort of CO2CRC and its collaborating organisations), Australia is well positioned to benefit from this new business opportunity;
- Australia's economy and significant employment is highly dependent on its energy (coal, LNG) and energy intensive (aluminium, mineral products) exports which will be at risk in a carbon-constrained world;
- The opportunity to use CCS as a mitigation option will depend on access to underground pore space, particularly in deep saline aquifers and in the longer term depleted oil and gas fields;
- Accelerating the deployment of CCS will be important to Australia but will require Government measures to make it happen.

BACKGROUND

The CO2CRC – Cooperative Research Centre for Greenhouse Gas Technologies

CO2CRC is Australia's premier collaborative research organization focused on the development and application of technologies for the mitigation of greenhouse gases, particularly carbon dioxide.

The work of the Centre over the past decade has provided the foundation for most of the work in Australia on carbon dioxide capture and geological storage (CCS) including offshore storage. It is currently undertaking Australia's only storage project, the CO2CRC Otway Project. The work of CO2CRC is supported by Federal and State Governments, industry, universities and research organizations.

The potential for offshore storage

CO2CRC has assessed the storage potential of a number of sedimentary basins including the offshore Gippsland, Otway Perth, Browse and Canarvon Basins and a number of onshore basins in Victoria, Western Australia, New South Wales and Queensland. In areas such as the Gippsland Basin and parts of the Northwest Shelf, large quantities of geological and geophysical data have been collected, but much of this information is commercial-in-confidence. In areas where there has been little or no exploration and data are sparse, no accurate assessment of storage potential can be made. In such areas, it is important that pre-competitive surveys are undertaken to fill key data gaps.

By analogy with petroleum exploration it would be appropriate for Geoscience Australia (GA), in collaboration with the States, to undertake pre-competitive surveys, which would serve to identify the regions and basins likely to be prospective for CO_2 storage. The results of such surveys should be made available to industry and interested parties as soon as possible. It should not be the role of the GA or State Surveys to carry out detailed site characterization (anymore than it is their role to carry out detailed oil or gas exploration) as this the role for industry and project proponents.

The work to date by CO2CRC indicates that some of the best opportunities for carbon dioxide storage are likely to be found offshore. Therefore the Bills are important in providing the technical and regulatory regime that will contribute to the Government's aim of decreasing greenhouse gas emissions through effective offshore storage of carbon dioxide.

The composition of the greenhouse gases that will be stored

Whilst the gas to be stored will be predominantly carbon dioxide, there are likely to be minor quantities of gases such as SO_x, NO_x, methane and nitrogen accompanying the CO_2. The Bills allow for the co-storage of these accompanying gases. This is appropriate given the technical difficulties and the high cost of attaining a very high level of purity of CO_2. Indeed given that most of the materials likely to be co-stored with the CO_2 will not have a significant environmental impact there is no justification for incurring unnecessary separation costs. Nonetheless it is important that the composition of the stored gas is documented in order to confirm that it will not impact on pipelines, boreholes, casing or cements or on the environment. Regulations regarding composition and purity of the greenhouse gas should be clear and appropriate to address potential health or safety issues, but they should not be so onerous that they would unduly inhibit the deployment of the technology. The Environment Protection and Heritage Ministerial Council and the Ministerial Council on Mineral and Petroleum Resources are jointly developing environmental guidelines for CCS that will provide further guidelines on this issue.

Can CO_2 be safely stored offshore?

CO2 is currently injected and stored offshore at two locations – Sleipner and Snovit in the North Sea. At Sleipner, approximately 1 million tonnes of the CO_2 per annum has been injected into the Utsira Formation at depth of approximately 1000m below the seafloor since 1996. There has been no escape of CO_2 during that time. Injection of CO_2 at Snovit commenced in 2007 and again, there has been no escape of CO_2.

In Australia, the only CO_2 storage operation currently underway is the onshore CO2CRC Otway Project, where a total of 100,000 tonnes of CO_2 will be injected over approximately 2 years. To date, approximately 16,000 tonnes of CO_2 has been injected. An extensive program of monitoring and verification is underway at the site.

The IPCC special Report on Carbon Dioxide Capture and Storage (IPCC-SPCCS, 2005) concluded that at a well characterized storage site, the risk of leakage was very low. A number of Australia's offshore basins are likely to have the right geological characteristics of porous and permeable reservoir rocks (such as sandstone) overlain by an impermeable seal (such as a mudstone). Where present, depleted oil and gas fields are likely to provide good storage sites and initially may be preferred storage sites. However most of the offshore storage capacity is likely to exist in deep saline aquifers rather than in depleted fields.

Is there a risk of CO_2 storage operations impacting on oil and gas exploration or production?

If injection and storage of CO2 were to be carried out in an irresponsible manner, which did not fully take into account the geology and/or petroleum production, then CO_2 storage could have an adverse impact, such as contamination of natural gas by CO_2 or leakage of CO_2 into a production well. The Bill seeks to avoid this situation. In fact, both of the existing large scale offshore storage operation – Sleipner and Snovit - have been carried out in close proximity to producing gas fields, with the same petroleum company responsible both of natural gas production and CO_2 storage.

Obviously it is in the best interests of the company to carry out these dual operations in such a way that they do not adversely impact on each other. This requires careful co-ordination between the two types of operation, probably using the same data sets. This could be done by two companies working independently of each other although storage and petroleum operations in the same area would require a very high level of cooperation and co-ordination. Anything less than this would carry the risk of jeopardizing one or the other (or both operations). Therefore from a technical perspective, it is difficult to contemplate having totally independent storage and petroleum operations in the same geographic/geologic area unless there is a very high level of collaboration. Whilst the Bill seeks to establish a regime that encourages collaborative behaviour between parties, it is difficult to legislate patterns of behaviour when commercial issues are at stake.

How will access and property rights including access to data impact on the permitting and approvals process for storage?

An existing holder of an Exploration & Production (E&P) licence who has undertaken an extensive program of data collection, perhaps including production data, will always be in the position of having more technical information available than an incoming storage proponent is likely to have. Petroleum exploration requires the spending of large amounts of money - perhaps hundreds of millions of dollars - in order to identify and exploit petroleum resources. It is difficult to imagine that a storage proponent would be willing to spend equally large sums of money acquiring the same (or comparable) data sets without a prior guarantee that the lease area would be available for storage. Therefore the level of

technical understanding that the "sitting" petroleum company will have, is likely to be better than that of a storage proponent that does not have access to the same level of technical data.

If a storage permit is granted, the proponent will need to obtain and interpret sufficient data to ensure that a storage site is adequately characterized and its useable storage capacity confidently predicted. It would obviously be more cost effective if this could be done in collaboration with (or by) existing E&P data holders. This would also serve to greatly accelerate assessment of storage prospectivity. Indeed, lack of access to data could greatly impede the use of CCS as a mitigation option, with negative effects on the attaining of national emission targets and/or the development of new business opportunities that rely on CCS.

Access to good geological and geophysical data in a timely and cost effective manner will be crucial to the success of offshore storage. The draft legislation offers no obvious incentive for existing data holders (usually E&P companies) to make their data available. Indeed as presently structured, it is unlikely that an E&P company will make confidential information available. There is a "public interest" clause in the legislation but it is doubtful that this could be used to make commercial-in-confidence data available to a third party. Access to data could represent a significant hurdle to the development of offshore storage. This hurdle will be exacerbated by the fact that world wide there is a shortage of people with the necessary skills to assess areas for their storage potential as well as considerable delays in drilling wells or undertaking seismic surveys

Will legal uncertainty regarding long term liability for offshore storage impact on deployment of CCS?

The experience of CO2CRC in taking forward its Otway Project is relevant here. CO2CRC was able to obtain insurance cover for the construction and operational phase of the project but was not able to obtain cover beyond 10 years after closure. Companies involved in CO2CRC were reluctant to take on long term liability despite the fact that they agreed any residual liability associated with storage of a fairly modest quantity of CO_2 was very low. As a consequence, it was necessary to enter into very extended negotiations before a structure was established which enabled us to proceed. Negotiations for handling long term liability for a large offshore storage site are likely to be even more prolonged and complex, and potentially unsuccessful.

The lack of acceptance of long term liability by Government could be a significant impediment to the deployment of CCS offshore. With the IPCC (SPCCS,2005) considering that over a period of 1000 years, 1% or less of the total amount of CO_2 stored could leak to the atmosphere, there would be a very low risk or liability in the long-term. This low risk of leakage from a storage site should be compared to the fact that 100% of all CO_2 emitted at the present day enters the atmosphere!

There is clearly a public benefit in mitigating the extent to which CO_2 enters the atmosphere and therefore it may be appropriate that the Government shares liability with industry proponents; with industry carrying liability up to closure/early post closure stage and Government beyond that point, perhaps with a bond and/or specific closure requirements to ensure that there will be no major cost on the public purse. Alternatively if the Federal Government were to offer to assume long term liability (under appropriate conditions) for the first few storage projects this could well accelerate the early uptake of the technology.

The importance of monitoring measurement and verification (MMV)

MMV is very important prior to, during and following storage operations. At the onshore CO2CRC Otway Project, an extensive program of subsurface, near surface, surface and atmospheric monitoring is underway. Together, these ensure that there is storage integrity (the CO_2 stays within the storage

reservoir) and community assurance that the CO_2 does not leak into useable groundwater, soils or the atmosphere where it might constitute a health or environmental hazard. The Otway Project activities are proving very helpful to the regulators (for the most part, the state EPA) but experience with MMV technologies is still relatively limited. At Sleipner for example the monitoring regime is limited, because of the cost and the difficulties in deploying monitoring technologies offshore.

Therefore it is appropriate that the Bill does not seek to be prescriptive about the types of MMV that should be carried out. However there is a requirement that the licensee must outline the post closure program of MMV and estimate the cost of that program. In the case of the Otway Project, due to cost increase totally outside the control of the Project, the cost of MMV has more than doubled over the past four years. It could be argued that by the end of a large scale storage project the operator will have a good idea of what MMV does and does not work and of the cost of undertaking the MMV. This may be true to some extent, but it will not remove many of the uncertainties: and realistically it would be impossible to foreshadow what the cost of MMV would be in 20, 30 or 40 years time. Again, using the example of the Otway Project, a number of Key Performance Indicators have been agreed with the Victorian EPA and it may be appropriate to consider specifying KPI's for offshore storage projects rather than requiring that methodologies be specified.

The term for which MMV should be undertaken must be adequate to meet the requirements of the regulator but should not be unduly onerous. Unrealistic MMV requirements could be impossible to meet and/or could be so expensive that they might undermine the financial viability of the storage project. In this regard best practice must be borne in mind, including consideration of whether (as proposed) the Commonwealth undertakes the post closure MMV or whether this can be done more cost effectively by the States or the private sector. Further, the implementation of an emissions trading scheme would obviously require MMV to confirm carbon credits.

Providing legal certainty and meeting the needs of existing E&P Licence holders and future storage licence holders

The Bill seeks to be even handed in dealing with the current and future needs of all stakeholders but in attempting to do so, it may inadvertently impede the uptake of CCS. This arises from a technical perspective because the areas currently held as offshore E&P licences are also the areas with the greatest potential for storage of CO_2.

As pointed out earlier, the Bill offers no incentives for E&P companies to provide their commercial-in-confidence data to a company that wishes to undertake CO_2 storage in the same area. Also, whilst storage of CO_2 can potentially be undertaken in a manner that minimizes the possibility of impacting on current or future petroleum exploration or production, it would be difficult to totally eliminate the possibility of adverse impacts.

In such circumstances it is likely that many holders of an existing E&P licence would oppose any move to undertake storage activities in their E&P area, thereby effectively blocking CO_2 storage. The Minister could use the "public interest" clause to over-ride the objection of existing E&P holders, but this is unlikely to make the commercial-in-confidence data available that would be useful to an incoming storage project. If a storage project were to proceed over the objections of an existing E&P licence holder, it would almost certainly have to embark on a new (and very expensive) phase of geological and geophysical surveying to explore for storage sites, with the possibility of conflict and legal proceedings if the E&P company (the holders of extensive data sets) were to disagree with the technical interpretation of the storage project regarding the potential impacts. The net result might be the storage project not getting underway for many years if at all, which clearly is not in the public interest, or the government aim of making deep cuts in emissions.

What then are the options for avoiding this "stand off"? Perhaps incentives for existing E&P holders could be more explicit? Whatever is put in place should also recognize that most of the technical competence for taking offshore storage forward rests with the petroleum industry.

A pragmatic way of addressing this might be for the Minister to offer holders of existing offshore E&P tenements the once-off opportunity to also have a storage tenement over their existing E&P area. A fee would be payable and to avoid the prospect of the tenement holders just "warehousing" the storage tenement and doing no assessment of storage prospectivity, consideration should be given to a "use it or lose it" clause and/or a requirement to surrender say 50% pf the storage acreage after a period of perhaps five years.

From a technical perspective the advantage of such an approach is that companies would use that time and their existing data holdings (supplemented by additional data collection) to undertake a comprehensive technical assessment of the storage potential of most of the Australian Continental Shelf. This would provide the technical basis for a storage project – or the basis for negotiation with a storage project proponent. In turn, this would greatly accelerate the uptake of CCS in Australia and if accompanied by effective arrangements to handle long term liability could make Australia into the world leader in the large scale use of geological storage as a key greenhouse mitigation strategy.

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