5

GHG storage

Site closure

5.1 Once Greenhouse Gas injection operations cease permanently in an injection licence area, the licensee must apply for a site closing certificate. This triggers the commencement of the site closing period, during which the injection licensee will be required to carry out a work program corresponding to a petroleum decommissioning process but potentially with additional requirements.

5.2 These additional requirements may include ongoing monitoring and verification of the behaviour of the injected greenhouse gas substance, in order that reliable predictions can be made as to its potential migration and interaction with the surrounding geological structures. Additionally during this period, the licensee may be required to undertake precautionary or remedial work to prevent or mitigate harmful effects on the geotechnical integrity of the storage site.

5.3 The purpose of the site closure process is to enable the responsible Commonwealth Minister to achieve sufficient confidence about the likely fate of the injected GHG such that the Minister can grant a site closing certificate to the licensee.

5.4 WWF in its submission recommended the use of an expert committee to assist the responsible Commonwealth Minister in determining the suitability of a GHG injection and storage operation for site closure:

> The inclusion of independent expert committee [to determine suitability for site closure certificate], (WWF recommendation 17)[1]

5.5 A number of submissions have suggested that formal criteria be established and published for obtaining a site closing certificate. In its submission BP argued:

> The criteria for achieving a site closing certificate need to be clearly spelled out both to allow a proponent to have certainty of their pathway to achieving closure and to prevent inadequate meeting of site closure requirements e.g. if a proponent ceases injection for 5 years, they lose their ability to inject but this clearly does not equate to site closure. The Minister should not have discretion to deny a site closure certificate once these criteria have been met.
>
> Recommendation 1.2: Criteria by which the Minister will grant the site closure certificate should be published.[2]

5.6 In its submission APPEA recommended that criteria for both the injection and post-injection phase up to the site closure should be established in advance of commencement of injection and storage for individual projects. This would allow a potential GHG injection and storage operator to make commercial decisions on the viability of potential projects:

> With this in mind, APPEA recommends that the conditions and requirements for the injection phase and immediate post injection monitoring phase (including periods of monitoring) prior to site closure be established with certainty up-front and as long as the assumptions made as to the behaviour of the carbon dioxide plume prove to be correct, those conditions and requirements not change in any material way during the monitoring phase or at site closure time.
>
> - This will mean a ghg injection and storage proponent can, with a degree of certainty as to the costs of the project, make upfront commercial decisions as to whether the project is viable. [3]

5.7 To facilitate industry surety, once closure criteria and conditions were established, APPEA also recommended that:

> The Bill and any associated regulations should therefore require regulators to adhere to these principles, allowing no deviation from the conditions and requirements unless established criteria

1 WWF, Submission no. 21, p. 7.
2 BP, Submission no. 12, p. 4.
3 APPEA, Submission no. 29, p. 6.

> for the project are demonstrated to have changed in a material way during the project.[4]

5.8 As Woodside Energy has indicated in its submission, established closure criteria would also need to recognise the predictive nature of any assessment of the long term fate of stored CO_2:

> Predictive modelling is probabilistic by nature due to the uncertainties in subsurface parameters. Therefore the modelled plume will never exactly behave "as predicted". We recommend that a site closure certificate be issued upon satisfaction of conditions relating to plume behaviour falling within a predicted range and after a fixed time from the application for a site closing certificate.[5]

5.9 This uncertainty in the long term behaviour of stored CO_2 would make project specific criteria difficult to establish up front or indeed prior to the completion of injection activities. Only after injection has ceased could monitoring of the stored CO_2 confirm long term modelling independent of the influences created by ongoing injection.

5.10 In evidence, Mr Torkington suggested these site closure objectives and criteria could be established as possible milestones within the site closure process rather than as discrete end point criteria:

> We have suggested that the period of site closure should be marked by a set of criteria, and those criteria principally involve and demonstrate to the state that the residual risk associated with that site is said to be low. Having met those criteria, the government would agree that we have reached site closure.[6]

Committee conclusions

5.11 It is clear from the evidence presented that there is a need for potential GHG injection and storage proponents to be aware of closure expectations prior to project development.

5.12 The Committee accepts that the establishment of such closure criteria would facilitate investment decisions through allowing associated closure costs to be priced into development and investment decisions.

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4 APPEA, Submission no. 29, p. 6.

5 Woodside Energy, Submission no. 10, p. 9.

6 Mr John Torkington, Chevron, *Transcript of Evidence,* 17 July 2008, p. 47.

5.13 The Committee also acknowledges that any established closure criteria should be objective based and capable of encompassing future changes in knowledge and practices within the CCS industry.

Recommendation 15

5.14 **The Committee recommends that general criteria for achieving a site closing certificate be established and published as part of the implementation of the legislation.**

Post-injection timeframes

5.15 Once injection activities have permanently ceased a GHG injection licensee must apply for a site closing certificate. The application for a site closing certificate is the start of the site closing process with the grant of the site closing certificate being the end of that process. During this site closing period the responsible Commonwealth Minister must be provided with information by the injection licensee that enables them to achieve the necessary state of confidence about the fate of the GHG in order to grant the site closing certificate.

5.16 This Legislation does not prescribe a fixed period in which the Minister must achieve the necessary state of confidence and the Minister may defer making a decision on the closure application for as long as is necessary in order to achieve this confidence.

5.17 Ministerial discretion in the post injection closure period may create investment uncertainty for potential GHG operators, as described in the ExxonMobil submission:

> The Bill does not provide a set timeframe for the Minister to grant a pre-certificate notice and could effectively defer this decision indefinitely (section 249 CZFA) leaving a GHG injection licensee "in limbo" in the site closing period. This significant discretion will affect the legal and investment certainty of GHG operations in relation to a site closing certificate. [7]

7 ExxonMobil, Submission no. 6, p. 16.

5.18 A number of submissions supporting fixed term closure periods recommended time frames for this pre-closure period as exemplified in the ANEDO and WWF submissions:

> ANEDO submits that the Bill should be amended to include a mandatory 60 year period of MMV to be conducted by the operator once CCS operations have ceased.[8]

> Include a mandatory MMV period [for GHG operators of 30 years prior to site closure certificate being granted][9]

5.19 Schlumberger Carbon Services, in its submission, also recommended a fixed term closure period which could be significantly shorter than recommended in other submissions, as confidence in the predicted migration of the stored CO_2 could be developed during the injection phase:

> Industry will need certainty around the closure periods of projects and the requirements of the longer term monitoring program to ensure the ongoing safe storage of C02. We suggest a limit of 5-10 years for the post injection - pre-closure/closure junction to be reached. This is not unreasonable given that during the injection phase, the migration pathway of the injected CO2 would have been shown to be predictable and conform to models.[10]

5.20 The concept of refining knowledge of the long term fate of CO_2 during the injection and storage phase is consistent with the intent of the proposed legislation as discussed by the Department of Resources, Energy and Tourism during evidence:

> The other thing that I just want to quickly stress is that, by not having a fixed term closure period, you are encouraging proponents to commence their closure planning right at the grant of the injection licence or even prior to that in some cases. [11]

5.21 The Department of Resources, Energy and Tourism went on to suggest that by encouraging early refinement of closure planning, post-injection timeframes may be significantly shorter than if arbitrary fixed term periods were established:

> So, if this collaboration is ongoing and if the long-term fate is known, the tail on the closure period should not be that great. The perception that seems to have come out here is that this will be as

8 ANEDO, Submission no. 14, p. 11.

9 WWF, Submission no. 21, p. 7.

10 Schlumberger Carbon Services, Submission no. 11, p. 3.

11 Mr John Miller, DRET, *Transcript of Evidence,* 18 July 2008, p. 35.

> long as a piece of string. I would argue that, in most of the early movers, particularly in nice constrained reservoirs, we are probably shortening the post-injection closure period by having this process in place rather than setting an arbitrary period.[12]

5.22 Countering this argument of fixed term closure periods, Mr Torkington submitted that due to the unique nature of each injection and storage site it might not be practical or appropriate for a one size fits all approach to closure timeframes:

> It needs to be recognised that each sequestration site will be quite unique and therefore it is probably not practical to set a definitive timetable on how long the site should continue to be monitored.[13]

5.23 In its submission, APPEA acknowledged that the primary intent of the closure period is to demonstrate that residual risks are acceptably low:

> Since 2005, APPEA has suggested an appropriate starting point for the development of legislative provisions to deal with post closure responsibilities is for the project proponent to demonstrate to the regulator that the residual risk associated with the project is acceptably low.[14]

5.24 The use of an objectives based closure process is more suited to a variable term closure period, rather than a fixed term period. The Department of Resources, Energy and Tourism argued that for a fixed term period to be established that satisfies objective based closure expectation across the full spectrum of potential GHG injection and storage activities, a conservative timeframe would need to be established:

> For that reason, the establishment of a fixed term closure period would have to be quite extensive—let us start at 50 years—to reflect our uncertainty. If it were any shorter than an extensive period, we would basically be saying, 'If there is still a large degree of uncertainty at that closure point, is the government going to accept that risk?' Each site will be different. So for some there might not be any uncertainty at a fixed point closure period; for others, there might still be a large amount of uncertainty and potentially a large amount of risk though [15]

12 Mr John Miller, DRET, *Transcript of Evidence,* 18 July 2008, p. 35.

13 Mr John Torkington, Chevron, *Transcript of Evidence,* 17 July 2008, p. 47.

14 APPEA, Submission no. 29, p. 21.

15 Mr John Miller, DRET, *Transcript of Evidence,* 18 July 2008, p. 34.

Committee conclusions

5.25 The Committee acknowledges that the use of variable post-injection timeframes to achieve closure may create additional business and investment uncertainty.

5.26 However, the Committee feels that objective based closure expectations will encourage early development and ongoing refinement of closure strategies and storage knowledge in an attempt to minimise this variable timeframe.

5.27 Additionally, any prescribed fixed term closure periods would need to be sufficiently long to demonstrate in all project cases awareness of the long term fate of stored CO_2 and that residual risks are as low as reasonably practicable.

Recommendation 16

5.28 **The Committee recommends that non-fixed closure timeframes as currently prescribed within the proposed legislation be used in preference to alternative models such as fixed term closure periods.**

Post-Closure Monitoring and Verification

5.29 When applying for a site closing certificate, a GHG injection licensee must supply amongst other things a recommended work program of post-closure monitoring and verification requirements for the storage site.

5.30 As part of the process for issuing a site closure certificate, the responsible Commonwealth Minister will consider the submitted post-closure work program and give a notice to the injection licensee specifying a finalised program of monitoring and verification operations that the Commonwealth proposes to carry out.

5.31 This notice of proposed work program includes an estimate of the costs associated with undertaking the work program. The proposed legislation requires that the injection licensee provide a security for payment of those costs before the site closing certificate can be given.

5.32 The CO2CRC in its submission warns of unrealistic expectations with regards to monitoring and verification requirements within the post closure phases of operations:

> 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. [16]

5.33 For major CCS projects, Dr Ingram suggested in evidence that the cost of monitoring may be minor compared to overall project cost, and that could encourage more thorough monitoring of stored CO_2:

> Monitoring is not going to be a big cost in the project. There is no reason to cut corners with the monitoring, because it is a relatively minor cost in the project.[17]

5.34 The monitoring costs, however, may be difficult to quantify up front or even after injection has ceased, given the potential large post-closure monitoring and verification timeframes that may be required. In its submission CO2CRC noted:

> 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. [18]

5.35 The uncertainty in monitoring and verification costs is exemplified by experiences at the Otway project by CO2CRC:

> 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.[19]

5.36 To manage the costs associated with post-closure monitoring a possible option, suggested by WWF in its submission, was industry funded schemes:

> WWF proposes that once certain validation criteria are met, the Government would then assume financial responsibility, funded by industry insurance mechanisms and perhaps reserves of carbon

16 CO2CRC, Submission no. 1, p. 6.

17 Dr Geoffrey Ingram, Schlumberger Carbon Services, *Transcript of Evidence,* 17 July 2008, p. 19.

18 CO2CRC, Submission no. 1, p. 6.

19 CO2CRC, Submission no. 1, p. 6.

> credits equal to a percentage of the amount of CO2 stored in the geological formation.[20]

5.37 However, in evidence before the Committee, the Department of Resources, Energy and Tourism suggested that, as a relatively small number of proponents were anticipated initially in the GHG storage industry, very large contributions would be required from early projects to ensure the fund was reasonably capable of handling any liabilities.

> You mentioned the industry funded concept with long-term liability. In the longer term, that might have merits but, when you look at the anticipated number of early proponents within this industry, there will not be a huge number. Therefore, distributing responsibilities in such a fund would probably create a higher burden on the initial movers than later on when there is a much more mature industry and lots of players and contributors. It is food for thought looking forward, but it would seem to be a disincentive in itself in the early days.[21]

5.38 In addition to the size of potential contributions, concern was raised over the long term management of such funds in evidence by Mr Ian Briggs, General Manager, Strategic Policy, Environment Division, Department of Industry and Resources, Western Australia:

> I suppose that, when we were looking at the Gorgon one, it opened our minds a little bit more, because usually the liability for mine sites and other projects is fairly short term, and that is, perhaps, less complex than looking out to hundreds of years. I guess that one of the potential issues regarding liability is the fact that records could be lost. Even if you do set up a trust fund, are you confident that that trust will be managed decades ahead?[22]

5.39 In evidence before the Committee, Dr Ingram recommended that it may be more suitable for independent bodies to undertake the post closure monitoring and verification requirements:

> There would need to be some independent monitoring organisation—it might even be the likes of, say, the CRCs or the CSIRO that have an independence from the project upwards but

20 WWF, Submission no. 21, p. 5.

21 Mr John Miller, DRET, *Transcript of Evidence,* 15 July 2008, p. 15.

22 Mr Ian Briggs, Department of Industry and Resources, Western Australia, *Transcript of Evidence,* 16 July 2008, p. 11.

> you would need to have trust on both sides so they can be seen as genuinely independent and therefore giving an unbiased tick.[23]

Committee conclusions

5.40 The Committee recognises that the costs associated with long term post-closure monitoring and verification may be difficult to quantify given the potentially significant periods of time over which monitoring and verification may be undertaken.

5.41 In determining appropriate terms and costs for post-closure monitoring and verification, the Committee believes a balance must be found between ensuring ongoing public confidence in the long term fate of the stored CO_2 and establishing financial values that do not undermine the viability of greenhouse gas storage projects.

5.42 While possibly a future option, the Committee does not currently support the use of an industry fund to finance long term monitoring and verification during the initial stages of GHG Injection and Storage development.

Monitoring and verification technology

5.43 The monitoring of stored CO_2, to verify that its behaviour is as per expectations and that no unforseen negative consequences are occurring, is essential from both a regulatory management perspective and to ensure public confidence in greenhouse gas storage activities. In its submission CO2CRC noted:

> 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 CO2 stays within the storage reservoir) and community assurance that the CO2 does not leak into useable groundwater, soils or the atmosphere where, if in high concentrations, it might constitute a health or environmental hazard.[24]

23 Dr Geoffrey Ingram, Schlumberger Carbon Services, *Transcript of Evidence,* 17 July 2008, p. 21.

24 CO2CRC, Submission no. 1, p. 5.

5.44 The oil and gas industries have been undertaking the injection of CO_2 within depleting oil reservoirs as part of enhanced oil recovery for at least 30 years. As suggested in evidence by Mr Torkington, this activity has provided an understanding of monitoring and verification techniques applicable to CO_2 in petroleum reservoirs:

> I think the oil and gas industry has some advantages here. It is our technology. We understand the exploration technologies and techniques. We understand the drilling technologies and, importantly, the monitoring and reservoir management components of it as well. [25]

5.45 While these enhanced oil recovery operations have contributed to the knowledge of CO_2 reservoir behaviour, Dr Cook, in evidence, suggested that the historical focus on monitoring CO_2 behaviour was in fact limited:

> You mentioned enhanced oil recovery. The fact of the matter is that for the last 30 or 40 years that they have been pumping CO2 in the ground they did not do much in the way of monitoring. Really, the monitoring started—and again it was fairly limited—with the Sleipner project in 1996 in the North Sea. [26]

5.46 More recently, international collaboration on monitoring and verification technologies associated with enhanced oil recovery includes the Weyburn-Midale project in Canada. As described in evidence by the Department of Resources, Energy and Tourism:

> That site is actually an international R&D operation. So the results from all aspects of the CO2 injection, including things like the integrity of the well linings as they are going down, through to the monitoring and verification processes that are in place there, are made available through the International Energy Agency's greenhouse gas R&D program not only to financial backers of that project but, more generally, to the scientific community around the world.[27]

5.47 The Otway Project in Victoria is currently the only operational CO_2 storage project in Australia. As suggested in evidence by Dr Cook, the Otway Project has a significant focus on the assessment of monitoring and verification technology associate with the storage of CO_2. 'What we have

25 Mr John Torkington, Chevron, *Transcript of Evidence,* 17 July 2008, p. 51.

26 Dr Peter Cook, CO2CRC, *Transcript of Evidence,* 17 July 2008, p. 6.

27 Ms Margaret Sewell, DRET, *Transcript of Evidence,* 15 July 2008, p. 4.

assembled in the Otway Basin is the most comprehensive monitoring verification system anywhere in the world.'[28]

5.48 It is anticipated that early greenhouse gas storage projects will be subject to extensive monitoring and verification requirements as suitable techniques are identified and refined. Mr Gerry Morvell, Policy Advisor of the CO2CRC, stated:

> What that means is that for the first few projects—whatever scale they are—the proponents can expect that they will have a more intensive monitoring regime imposed on them, and they will want to do that. As you get past the first half-dozen projects and people gain an understanding that, for example, they can use seismic monitoring only and not have to worry about the other things, you will see a decline in the level of requirements for monitoring.[29]

5.49 The role of government in facilitating the development of appropriate monitoring and verification techniques may also be significant, particularly with initial projects. In its submission, WWF observed that:

> … in the case of demonstration projects, the Government jointly with the other project proponents accept the primary obligation to monitor and verify injection and retention operations from the commencement of operations to avoid delaying demonstration projects and to gather and place in the public domain learnings from the project.[30]

5.50 The CO2CRC submission, on the other hand, suggested that that the actual monitoring and verification activities could be more effectively undertaken on behalf of the government by other parties such as States or the private sector:

> 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.[31]

5.51 In evidence before the Committee, Dr Cook drew upon its experience in developing monitoring regimes for the Otway Project to suggest that the development of optimal monitoring and verification processes may

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28 Dr Peter Cook, CO2CRC, *Transcript of Evidence,* 17 July 2008, p. 6.

29 Mr Gerry Morvell, CO2CRC, *Transcript of Evidence,* 17 July 2008, p. 11.

30 WWF, Submission no. 21, p. 4.

31 CO2CRC, Submission no. 1, p. 6.

require significant collaboration between the Government and industry, given the limited knowledge currently available:

> What we have done is developed a monitoring regime by taking the EPA along with us. The EPA started out by saying quite openly, 'We know nothing about this.' We have worked very closely with them to develop the key performance indicators and the technologies we can use for taking this forward.[32]

5.52 This need for a collaborative approach between industry and Government to ensure that any monitoring and verification was fit for purpose was also raised in evidence by Dr Ingram:

> Again, we would say that, because the onus is on the project to prove to the government that what they are going to do is safe and efficient, you really need a collaborative approach for the early projects. Rather than saying it must be monitored with A, B, C and D, the onus is on the project to say: 'No. Because of X, Y and Z we recommend doing it this way.' Ultimately because the liability while the project is still in operation is with the project operator they are going to have to do something that is fit for purpose.[33]

Committee conclusions

5.53 The Committee recognises that monitoring and verification is an essential element of any proposed greenhouse gas storage activities. Best practice monitoring and verification techniques associated with the permanent storage of CO_2 will continue to evolve through lessons learnt from current and future GHG storage activities.

5.54 The Committee believes that the Australian Government should continue to facilitate the development of monitoring and verification technology associated with CCS.

5.55 The Committee is of the view that no amendments to the draft Bill are required in relation to monitoring and verification.

32 Dr Peter Cook, CO2CRC, *Transcript of Evidence,* 17 July 2008, p. 6.

33 Dr Geoffrey Ingram, Schlumberger Carbon Services, *Transcript of Evidence,* 17 July 2008, p. 19.

Managing public perception

5.56 To ensure the long term viability of CCS it is essential that there is acceptance of the activity within the wider community. The 'social licence to operate' for this industry must include a regulatory framework that responds to stakeholders' concerns, is transparent in its application, and ensures that the storage of greenhouses gases is safe and secure and does not impact on the wider environment. This need for wider community acceptance was described in evidence before the Committee by Dr Cook:

> It is an absolutely crucial question that you ask, if we are going to take the community along with us. They are going to want that assurance, so we are going to have to have a social licence to do this.[34]

5.57 As described in evidence by Dr Ingram, there is recognition that there may be significant reputation impacts to organisations that do not perform to the highest standards and the effect of any poor performance may have industry-wide impacts on public confidence in GHG storage activities:

> …the risk of these projects from a large company's point of view is not financial; it is a reputation risk. We could not stand behind a project if there was any reputation risk in it. That is something that I think everybody is acutely aware of within carbon capture and storage. Public confidence must be built project by project, and it only takes one shonky operator to put it off the table entirely.[35]

5.58 The need to engage and consult with the wider community was considered critical in the development of the Otway Project, as conveyed in evidence by Dr Cook:

> But you have to work through that with the communities, as Mr Morvell has said. It is important to point out that you can persuade people that this is an appropriate thing to do. We are working in the Moyne Shire in western Victoria. The Moyne Shire had a vote on this project within the council and they unanimously supported this project going ahead. They thought that it was an important project. We were pleased that we were able to get that level of community support from them.[36]

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34 Dr Peter Cook, CO2CRC, *Transcript of Evidence,* 17 July 2008, p. 6.

35 Dr Geoffrey Ingram, Schlumberger Carbon Services, *Transcript of Evidence,* 17 July 2008, p. 22.

36 Dr Peter Cook, CO2CRC, *Transcript of Evidence,* 17 July 2008, pp. 10–11.

5.59 In evidence before the Committee, Ms Walmsley (ANEDO) recommended that consideration of community concerns was of such importance as to warrant a delay in the implementation of legislation:

> I think that, with an untested area such as CCS, a moratorium would give a bit of scope for states to gauge public interest and do a bit more consultation on community concerns than has been done with this bill. So the moratorium option could just be an interim measure while states look into this.[37]

5.60 Several submissions expressed concerns that the discretionary decision making powers provided to the Minister within the proposed legislation did not effectively respond to potential community concerns. This position was exemplified in the WWF submission:

> WWF does not believe that the Bill as it is currently drafted will enable management of GHG injection and storage in a manner that would respond to community concerns. WWF believes that the Bill's environmental impacts, risk assessment, risk management and monitoring activities are too uncertain and rely too heavily on Ministerial discretion.[38]

5.61 In its submission, ANEDO argued that transparency in the ministerial decision making processes contained within the legislation could be improved by the development of an independent expert committee:

> As demonstrated above, there is an enormous focus on Ministerial discretion throughout the entire CCS decision making process. The incorporation of an independent expert committee, with the directive to collect, assess and advise on the data relating to this relatively new CCS concept, would increase the likelihood of appropriate decisions being made that more comprehensively take into account environmental and community concerns.[39]

5.62 In the Victorian Government submission, the role of a possible committee informing the responsible Commonwealth Minister could include formal consultation with relevant industry and community groups. Through pubic availability of any advice from the committee, transparency of ministerial decision making process could be improved:

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37 Ms Rachel Walmsley, ANEDO, *Transcript of Evidence,* 16 July 2008, pp. 51–2.

38 WWF, Submission no. 21, p. 6.

39 ANEDO, Submission no. 14, p. 15.

> An expert 'panel' would be formed, with State and Territory representation, to advise the Minister, including in relation to the application of the 'impact test'.
>
> In other words, the responsible Minister should be obliged to take appropriate advice in the process of making key CCS decisions.
>
> This expert panel would have a formal process of taking submissions from government, industry and community groups.
>
> This will regime will assist in achieving transparency in the decision making process (in particular if the panel's advice is made public), and in achieving a level of predictability in the decisions themselves.[40]

5.63 In evidence before the Committee, Mr Morvell suggested that the establishment of a community based committee provided a mechanism for managing community awareness by making monitoring data available to the public and facilitating positive community perception of CO_2 storage at the Otway Project:

> It goes to the monitoring. In relation to the Otway project, as part of that monitoring regime we actually have a stakeholder committee of community representatives and local landholders so that they have access to all of the data that is coming out. They can make their own informed judgement about what is going on. For a land based project, such a stakeholder committee is essential to that community perception. There is no reason why you could not do something of a similar nature offshore, although the nature of communities offshore is somewhat different. It is more likely to involve users of the environment offshore and interested parties.[41]

5.64 Public disclosure of monitoring information was also highlighted in APPEA's submission as a key factor in addressing public acceptance of the Gorgon Gas Project in Western Australia:

> The joint venturers have committed to publicly disclose monitoring data from the Project, which will assist Australia in the ongoing application of ghg injection and storage technology.[42]

5.65 In ANEDO's submission, concern was raised over the lack of specific objects within the proposed legislation which recognised community concerns:

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40 Victorian Government, Submission no. 16, p. 10.

41 Mr Gerry Morvell, CO2CRC, *Transcript of Evidence,* 17 July 2008, p. 9.

42 APPEA, Submission no. 29, p. 8.

> The Bill contains no specified additional objects. There is no requirement for GHG injection and storage operations to be consistent with the principles of ecologically sustainable development (ESD), or recognise community concerns. [43]

5.66 WWF elaborated on ANEDO's concerns, stressing the importance of clear frameworks within the legislation to assist in demonstrating that CCS is safe and ecologically sustainable, and thus, in turn, ensure public acceptance of associated technology:

> However, equally important is the creation of a clear framework for risk reduction, monitoring and verification and point of liability for stored carbon dioxide. Certainty in relation to these issues are essential to provide confidence that CCS is safe and ecologically sustainable, and these in turn are prerequisites to ensure broad public acceptance and support of the technology.[44]

5.67 AMPTO, in its submission, expressed concern that the proposed legislation did not specifically exclude future drilling and greenhouse gas storage within the Great Barrier Reef Marine Park. Due to the importance of the Marine Park to the wider community its submission recommended that legislation specifically exclude this park from any future greenhouse gas or petroleum activities:

> We would recommend and support an amendment to the Bill which incorporates an appropriate exclusion clause for the Great Barrier Reef Marine Park.[45]

5.68 This principle of formal exclusion of environmentally sensitive areas within legislation was reinforced in ANEDO's submission:

> Additionally, due to the infancy of the technology and lack of understanding of the environmental impacts associated with CCS operations, ANEDO submits that [the] Bill implement extensive buffer zones around marine protected areas, as identified in state or Commonwealth legislation. The Bill should be amended to additionally prohibit CCS operations from occurring in, or in close proximity to, offshore islands.[46]

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43 ANEDO, Submission no. 14, p. 10.

44 WWF, Submission no. 21, p. 3.

45 AMPTO, Submission no. 23, p. 1.

46 ANEDO, Submission no. 14, p. 18.

Committee conclusions

5.69 To facilitate acceptance, the Committee recognises it is important that relevant communities, stakeholders and the wider public be consulted as broadly as possible on GHG activities.

5.70 The use of formal consultation pathways such as stakeholder committees and other consultative forums should be encouraged as part of operational management strategies for GHG injection and storage operations.

5.71 Building public confidence in CCS will require the utmost regulatory integrity and vigilance in the assessment of both potential industry participants and their proposed activities.

5.72 The incorporation of community concerns and opinions in ministerial decision making may be augmented through formal consultations pathways with stakeholders including state governments, industry and environmental organisations.

Recommendation 17

5.73 **The Committee recommends that community and stakeholder engagement strategies be considered as part of any GHG storage activity.**

Recommendation 18

5.74 **The Committee recommends consideration be given to making monitoring data associated with GHG storage project publicly available.**

Recommendation 19

5.75 **The Committee recommends the use of consultative pathways to provide feedback on the wider community's concerns to the responsible Commonwealth Minister.**

5.76 It is the Committee's view that these consultation recommendations be developed through appropriate regulations and guidelines rather than amendments to the draft Bill.

Managing serious situations

5.77 Given the large quantities of CO_2 that may in future be geologically stored, there is a need for an effective regulatory framework to both pre-emptively and reactively manage unintended events that could impact on the environment, or health and safety, or activities of other users of the area. This requirement was detailed in ANEDO's submission:

> It is important therefore that the regulatory regime proposed by the Bill contain rigorous safeguards to manage the unknown impacts associated with CCS.[47]

5.78 The proposed legislation confers on the responsible Commonwealth Minister a range of powers for dealing with situations where injection and storage operations do not go as planned. Unplanned activities include:

- leakage of a greenhouse gas substance from an identified GHG storage formation; or
- an injected greenhouse gas substance behaving otherwise than as predicted in the site plan; or
- injection or storage of a greenhouse gas substance compromising the geotechnical integrity of a geological formation; or
- the identified greenhouse gas storage formation not being suitable for the permanent storage of greenhouse gas.

5.79 If the responsible Commonwealth Minister is satisfied that a 'serious situation' exists, the Minister has power to direct the injection licensee:

- to carry on operations in a manner specified in the direction;
- to cease or suspend injection at one or more, or all, sites;
- to inject GHG at one or more sites;
- to undertake such activities as are specified in the direction for the purpose of eliminating, mitigating, managing or remediating the serious situation.

5.80 A number of submission have suggested that while greenhouse storage activities are still relatively new, the general risks associated with CO_2 geological storage are relatively low. The CO2CRC submission stated:

47 ANEDO, Submission no. 14, p. 10.

> The IPCC Special Report on Carbon Dioxide Capture and Storage (IPCC-SRCCS, 2005) concluded that at a well characterized storage site, the risk of leakage was very low.[48]

5.81 In evidence bore the committee, Dr Cook highlighted low level of risk associated with GHG storage, stating:

> It is sometimes said, and I have certainly seen this in the press, that we are talking about risky technology. I think it is important to address that issue because this is not risky technology; this is technology which, along with all other technologies, carries a component of risk. But we have to manage that risk, and the level of risk in this technology is low. It is the sort of risk that we commonly manage in oil, gas and industrial operations, for example. So there is nothing significant on the risk side of things.[49]

5.82 Likewise, in discussing ExxonMobil's experience with GHG storage at Sleipner, in the North Sea, the representatives of ExxonMobil emphasised that operations had been underway for a decade and that in that time no leakage had been observed.[50]

5.83 As described in evidence by Dr Ingram, the critical elements in managing a serious situation is the development of appropriate detection and trigger mechanisms to ensure intervention occurs as early as possible and thus minimises potential impacts and associated costs:

> It will be done almost in some cases on a trigger mechanism. If something starts to go wrong, you will pick it up very early so you can do the remediation earlier. It is one of these intervention things. The earlier you detect it, the earlier you can do something about it, and often it is a lot cheaper to do it that way.[51]

5.84 In evidence before the Committee, Mr Daniel Van Nispen, Head of Carbon Capture and Storage and Enhanced Oil Recovery at Monash Energy, described possible intervention techniques in managing a serious situation such as unplanned migration:

> No, there are mitigation technologies possible. It is possible to drill wells, for instance, and either produce fluid or inject fluent to

48 CO2CRC, Submission no. 1, p. 3.

49 Dr Peter Cook, CO2CRC, *Transcript of Evidence*, 17 July 2008, p. 2.

50 Mr Mark Nolan & Mr Rob Young, ExxonMobil, *Transcript of Evidence*, 15 July 2008, p. 47.

51 Dr Geoffrey Ingram, Schlumberger Carbon Services, *Transcript of Evidence,* 17 July 2008, p. 19.

> change the pressure field and the direction that the plume is migrating.[52]

5.85 In evidence before the Committee, the Department of Resources, Energy and Tourism indicated that any management actions that may be required in dealing with serious situations should be proportional to potential impacts and include evaluation of root causes of why an unplanned event occurred:

> If there were no tenure there or there were no impacts on any other users, our management strategy would probably be a lot more benign than if there were an adjacent activity that is going to be impacted. We may ask them to look at varying their injection profile, understanding, critically and first of all, the questions: 'Why did that migrate to a location you did not think it was going to migrate to? What does this tell us about your management systems? Why aren't you aware of what's going on here?' [53]

Committee conclusions

5.86 The Committee is of the view that the regulatory powers to deal with serious situations both proactively and reactively should be sufficiently broad to manage the full spectrum of potential issues that may arise when undertaking GHG storage activities.

5.87 In managing serious situations, any directions given by the regulator should be proportional to the nature and scale of risks associated with the event.

5.88 Risk management strategies should include identification of all potential unplanned events, the establishment of appropriate monitoring regimes and associated trigger criteria to undertake specific activities to mitigate unplanned outcomes

5.89 It is the Committee's opinion that the Bill as drafted contains appropriate and sufficient powers to manage serious situations.

52 Mr Daniel Van Nispen, Monash Energy, *Transcript of Evidence*, 15 July 2008, p. 60.

53 Mr John Miller, DRET, *Transcript of Evidence,* 15 July 2008, p. 16.

The Hon Dick Adams MP

Committee Chair

12 August 2008