

## Investment certainty

- 4.1 The legislation is designed as an enabling framework for carbon capture and storage (CCS) and attempts to provide GHG injection and storage proponents with the certainty in access and property rights needed to bring forward investment. In providing this investment environment for GHG storage activities, the legislation recognises the need to minimise sovereign risk to existing petroleum investment in Australia's offshore resources, and thus preserve security for future investment by the petroleum industry.

### **Gifting of GHG acreage to petroleum operators**

- 4.2 As discussed in previous chapters, perhaps the most contentious issue with regards to the establishment of a GHG storage industry is the interaction with incumbent petroleum operators. Due to their established activities, in some cases spanning several decades, these operators hold significant quantities of accumulated technical data regarding the areas that could potentially be utilised for GHG storage purposes. The availability of this data may offer considerable advantage in the competitive process for GHG acreage. Additionally, it has been suggested that should these operators object to alternative proponents operating in their area, they could block GHG storage from the outset by claiming significant adverse impact, leading to lengthy litigation.
- 4.3 The Committee received a proposal from the CO2CRC, Australia's leading collaborative research organisation focused on carbon capture and storage

for an initial 'once-off' opportunity for petroleum title holders to overlay a GHG title on their exploration or production licence area. This was discussed in its submission:

One possible option for addressing this might be for the Minister to offer holders of existing offshore E&P tenements a 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% of the storage acreage after a period of perhaps five years.<sup>1</sup>

- 4.4 Dr Peter Cook, the Chief Executive of CO2CRC, elaborated on this proposal in evidence to the Committee:

I have suggested – and it is only a suggestion – that one pragmatic option would be to say to the oil and gas companies, 'As a one-off opportunity, you have the chance to turn this into an exploration and production and storage licence.' People might say that that is going to give a free kick to the oil and gas industry. I do not see it as a free kick. What we are talking about here is taking carbon capture and storage forward so that it takes its place as a key mitigation strategy that Australia can deploy.

I think if you provide that one-off opportunity and you also have levers such as a 'use it or lose it' clause in there – in other words, over a certain number of years you have to surrender a certain percentage of it – then I believe that over the next five years that would result in a very high level of new activity actually assessing the areas. I fear that, without something like that, all that is going to happen is that in a number of areas it will be tied up in the courts for the next five years, with absolutely no forward movement. I think that will be a waste of money and a waste of time and it will not help with the government's objective of decreasing emissions.<sup>2</sup>

- 4.5 As well as potentially avoiding the problems that could arise in a competitive environment, it has also been suggested that as the majority of expertise with respect to CCS rests within the petroleum industry, they are

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1 CO2CRC, Submission no. 1, p. 7.

2 Dr Peter Cook, CO2CRC, *Transcript of Evidence*, 17 July 2008, p. 4.

in fact best placed to take up GHG storage. In evidence to the Committee, Mr Mullen (APPEA) said:

As you may be aware, the oil and gas industry has considerable expertise in utilising and developing the technologies that are required for CCS both in Australia and internationally. The oil and gas industry is the only industry undertaking commercial injection and storage activities as an integrated part of its petroleum operations. They are directly linked with our petroleum operations. We are not aspiring to, or trialling, such technology; we have been doing this for many decades.<sup>3</sup>

- 4.6 Mr Alex Zapantis, Manager of Energy and Sustainable Development at Rio Tinto, corroborated this claim in his evidence before the Committee, while also noting that any gifting of acreage would have implications for an open market for the GHG industry:

... you need to balance the opportunity which is afforded by, for example, the petroleum industry, which has the expertise, has the infrastructure, has knowledge and is already operating on the ground in these very prospective areas. That is a very significant opportunity in terms of progressing the development of carbon capture and storage. On the other hand, you need to address the risk of anticompetitive, monopoly type behaviour, where petroleum producers might seek to lock up this resource.<sup>4</sup>

- 4.7 The submission from Rio Tinto added that an unbiased competitive process is always the ideal; however, it may not lead to the desired level of uptake in GHG storage:

Rio Tinto believes that storage formations are a natural resource and should be subject to transparent, equitable, competitive processes to allocate usage rights to ensure optimal utilisation in the public interest. On that basis, it may be argued that the petroleum licence holder should always be required to win a competitive bid process for the grant of an injection licence. However, the CCS industry is immature and the environmental imperative and timeline for emissions mitigation and deployment of CCS does not respect market forces. Consequently government policy in this area need always be framed within the context of a necessity to facilitate the development of a CCS industry faster than the market would otherwise deliver, and to support the

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3 Mr Noel Mullen, APPEA, *Transcript of Evidence*, 18 July 2008, p. 19.

4 Mr Alex Zapantis, Rio Tinto, *Transcript of Evidence*, 18 July 2008, p. 11.

broader government agenda of improving carbon productivity as described by Minister Wong.<sup>5</sup>

- 4.8 Dr Cook added the point, in evidence, that the heavy emitters, such as the energy sector, are unlikely to want to bid for storage acreage, and would rather allow those proponents with the expertise, to undertake the storage on their behalf:

Most of the expertise and most of the knowledge reside in the oil and gas industry. There is no question of that. You may get some new players arising, but they would be coming from well behind in terms of the level of knowledge and the level of expertise. For the most part, companies such as power companies would probably be happy for somebody else to do it for them. I do not think the power companies would really want to get into this area. What they would like to do is have access to this expertise, access to this storage opportunity.<sup>6</sup>

- 4.9 Mr Zapantis concurred with this position during evidence before the Committee:

Rio Tinto does not really have a position on who should be doing it as long as someone is doing it. The ideal outcome would be that the companies which are best placed to do this most efficiently in fact are able to do it. But, as I said, you need to manage the risk of non-competitive behaviour.<sup>7</sup>

- 4.10 In its submission, the Australian Energy Company stated that the high emitting sectors are unlikely to want to bid for storage acreage, and also suggested that a competitive process is inappropriate for the independent petroleum operators as they do not have a CO<sub>2</sub> stream, and that a third party arrangement would be too commercially uncertain to be currently feasible:

Predominantly, the operators of ... power stations do not have any technical expertise in the transport and storage of CO<sub>2</sub>. Therefore, it would not be surprising if they were uncomfortable about having to bid for access to potential carbon storage sites. ... Equally, an independent petroleum industry operator, such as Schlumberger, or another oil and gas company, is unlikely to seek to bid as they have no greenhouse gas to store, the availability of CO<sub>2</sub> from a, yet to be developed, third party market is ill defined

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5 Rio Tinto, Submission no. 9, p. 4.

6 Dr Peter Cook, CO<sub>2</sub>CRC, *Transcript of Evidence*, 17 July 2008, p. 4.

7 Mr Alex Zapantis, Rio Tinto, *Transcript of Evidence*, 18 July 2008, p. 11.

and the price they are willing to pay is unknown. Thus, positioning to be an intermediate in some future CCS market is highly risky.<sup>8</sup>

## Committee conclusions

- 4.11 The Committee believes that the potential for conflict to occur between pre-existing petroleum title holders and new GHG operators in a purely competitive environment threatens long delays in the implementation of commercial GHG storage in Australia. These delays could significantly set back emissions reductions, and potentially threaten our energy security.
- 4.12 Creating certainty of investment and encouraging partnerships between the petroleum production and GHG storage industries is a vital first step in the development of CCS in Australia.
- 4.13 With that in mind, the Committee believes that an offer to current petroleum title holders to incorporate a GHG assessment permit over their title area, with the proviso that it must be either utilised or surrendered, is a positive suggestion that could successfully speed the process of establishing commercial GHG storage in this country.

### Recommendation 11

- 4.14 **The Committee recommends that incumbent petroleum operators be offered a one-off opportunity to incorporate a GHG assessment permit over their exploration or production licence, with the condition that they must demonstrate utilisation of this permit within five years, or surrender it.**

## Promoting uptake

- 4.15 The initial promotion of this new GHG storage industry is an essential element in ensuring it becomes a viable emissions mitigation option in Australia. The level and speed of CCS uptake is not predicted to be vast from the outset. It is a costly process with an immense amount of infrastructure, data, and specialist expertise required. As such, the Committee has heard that there should be greater incentive for early movers in the new industry.

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8 AEC, Submission no. 4, p. 4.

- 4.16 One suggestion put to the Committee is that those operators who have an available stream of CO<sub>2</sub> for injection should be given preferential treatment in the allocation of acreage. It is argued that in promoting those operators who are able to begin injection at an early date, you guard against the 'real estating' of GHG acreage, as well as hastening the development of GHG technology and expertise. In its submission, Monash Energy stated:

Monash Energy is concerned to see that the criteria should include recognition of matters peculiar to greenhouse gas, such as a party that has or is reasonably likely to have an identified greenhouse gas stream available for injection into a greenhouse gas storage formation. Monash Energy submits that such a party should be accorded priority over competing parties that base their work bid solely on levels of expenditure, which might otherwise encourage acquisition of acreage on a speculative basis.<sup>9</sup>

- 4.17 Woodside Energy, in its submission, also suggested the availability of CO<sub>2</sub> for injection should be an assessment criterion in awarding acreage:

We submit that ... guidelines should be produced in relation to greenhouse gas permits ... we offer the following suggestions for bid criteria:

- a) an existing (named) CO<sub>2</sub> stream;
- b) the required timing of the CO<sub>2</sub> sequestration (proponent of a project requiring sequestrations earlier than another project).<sup>10</sup>

- 4.18 BP concurred in its submission, stating that a source of CO<sub>2</sub> was an important factor in the allocation of acreage, and also suggested that business capability to deliver and manage the infrastructure to inject and store this CO<sub>2</sub> should be considered favourably:

Two obvious examples which would be taken into account are:

- whether a bidder has a source of CO<sub>2</sub>; and
- whether the bidder has a credible business plan across the GHGS value chain.

In the first few years of implementation of this legislation, there should be a bias towards industry development, and full support given to those players who can deliver CO<sub>2</sub> with the highest level of business and technical capability.<sup>11</sup>

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9 Monash Energy, Submission no. 13, p. 16.

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

11 BP, Submission no. 12, pp. 6-7.

- 4.19 As well as this suggestion, the Committee has received evidence that the Government should consider *financial* incentives outside of the legislation to encourage rapid uptake of GHG storage. The joint submission from the Australian Coal Association and the Minerals Council of Australia stated:

It is important that the Bill not be seen as the end solution for all requirements in relation to GHGS injection and storage. To that end, the ACA and MCA urge the Commonwealth, through the Committee, to continue to pursue the other initiatives required to ensure the successful uptake of CCS and GHGS injection and storage.<sup>12</sup>

- 4.20 In evidence, the Department of Resources, Energy and Tourism supported the need for incentives external to the legislation:

... if this new industry is to be taken up on the scale that is needed to significantly reduce our greenhouse gas emission levels, incentives to facilitate this uptake are essential. I believe the legislation is designed as an enabling framework. The drivers to take up that legislation are all available if the government chooses to work in private-public partnerships to facilitate early movers, to offer special dispensations in regard to sharing or ultimately taking over long-term liability or, as they are doing now, providing significant funding for the actual development of these projects. ... yes, I believe that there is a very strong role for the government to be involved in the rapid and early uptake through the provision of incentives. But I would say that a legislative framework to prescribe those incentives might not necessarily be the best option.<sup>13</sup>

## Committee conclusions

- 4.21 The Committee believes that due to the very large theoretical capacity of Australia's basins and reservoirs, GHG injection and storage offers significant opportunities in the near to mid term to dramatically reduce CO<sub>2</sub> emissions, and, as such, early implementation should be encouraged. Those potential GHG operators who can demonstrate the availability of a CO<sub>2</sub> stream for imminent injection are likely to begin the injection process swiftly. Rapid uptake of the technology also advances aggregate knowledge of this new industry. As such, the Committee feels that allowing these operators preferential consideration in the course of acreage

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12 ACA/MCA, Submission no. 27, p. 48.

13 Mr John Miller, DRET, *Transcript of Evidence*, 18 July 2008, p. 29.

allocation would advance the burgeoning GHG injection and storage industry.

- 4.22 It is also deemed that the defence of an open market should be a priority, and as such the consideration of readily available CO<sub>2</sub> streams should be incorporated into the transparent bidding process for acreage, with 'available CO<sub>2</sub> stream' as one *highly ranked* criterion among many.
- 4.23 The Committee also believes that in order to encourage uptake of CCS at levels which could make significant reductions in Australia's greenhouse gas emissions, it is likely that further incentives will be required. It is believed therefore, that the Government should consider ongoing financial incentives for the earliest movers in this new industry.

### **Recommendation 12**

- 4.24 **The Committee recommends that those proponents who can demonstrate a readily available CO<sub>2</sub> stream for imminent injection receive preferential consideration when assessing bids for GHG acreage allocation.**

### **Recommendation 13**

- 4.25 **The Committee recommends that the Government consider further financial incentives for the earliest movers in this new industry, and that these incentives be made public at the earliest opportunity.**

## **Long term liability**

- 4.26 The proposed legislation, like the arrangements in the OPA relating to petroleum, is silent on the question of long term liability, thus leaving it to common law. That is, once the licensee's statutory obligations cease when the site closing certificate is issued, future issues of liability would be in the domain of common law.
- 4.27 There are no provisions within the proposed legislation for the Government to 'take over' long-term liability from project participants or provide indemnity to project participants in respect of any liability they might incur. This is the product of a deliberate decision.



- 4.28 In evidence before the Committee, the Department of Resources, Energy and Tourism explained that ‘the main concern with accepting liability or explicitly putting limitations on common law post closure liability was the inheritance of this [liability] by the Australian people.’<sup>14</sup>
- 4.29 Additionally, the Department believed there may be ramifications for other industry sectors from Government assuming long term liability:
- To extend that to making greenhouse gas storage proponents immune from common law liability would be setting precedents which we think do have serious consequences for government regimes going forward.<sup>15</sup>
- 4.30 There was significant disagreement about the propriety of this position in the evidence received by the Committee.
- 4.31 In its submission ANEDO suggested that liability transfer to the Government could be a disincentive for ensuring adequate long term management of stored GHG:
- ANEDO is of the view that by providing industry such assurances, the Bill establishes a framework that operates counter to the public interest of ongoing monitoring and site stability to ensure effective long-term GHG storage. ANEDO is also concerned that following the issuing of an SCC, the immediate transfer to the Commonwealth of responsibility for long term site MMV may reduce incentives for project operators to design and implement projects in a safe and reliable manner.<sup>16</sup>
- 4.32 In evidence Ms Kellie Caught, Climate Change Policy Manager for WWF, argued that common law liability should remain with the proponent to ensure there was recompense in cases of operator negligence:
- On the issue of liability, we still think that common-law liability remains, so that if in 50 or 60 years time there is proven negligence on the part of the operator, the Commonwealth or someone else can still sue for negligence.<sup>17</sup>
- 4.33 The sharing of liability, whereby the proponent was not indemnified from common law actions resulting from negligence, was potential middle ground explored in evidence by Mr Simon Daddo, Special Council for Woodside Energy:
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14 Mr John Miller, DRET, *Transcript of Evidence*, 15 July 2008, p. 14.

15 Mr John Hartwell, DRET, *Transcript of Evidence*, 15 July 2008, p. 14.

16 ANEDO, Submission no. 14, pp. 6–7.

17 Ms Kellie Caught, WWF, *Transcript of Evidence*, 16 July 2008, p. 60.

We have gone to what could be described as a middle ground, saying that if the injector has done everything it can and mitigated its issues, and the government is accepting of that through the acceptance of a site plan and the monitoring and whatnot, then it is probably reasonable at that time for the Commonwealth to assume some liability for it, except for occasions where there is obvious negligence or deliberate misconduct.<sup>18</sup>

- 4.34 In evidence before the Committee, Dr Geoffrey Ingram, Regional Manager, Schlumberger Carbon Services agreed that handover of long term liability would not preclude the ability to seek recompense for acts of negligence or misconduct. He further suggested that the handover of liability from the GHG operator to the Government should occur through collaborative dialogue between parties whereby the proponent demonstrates through established milestones that residual risk has been reduced to as low as possible:

It was Peter Cook who said that the Otway project is a model for the next big projects because there is a very close relationship between the government, the regulatory agencies and the operators, so they are setting all the data and all the parameters. There is very much an ongoing dialogue between them; it is not something that is dumped all at once 10 years after closure – ‘Here you go, thanks very much.’ I would imagine maybe six-monthly meetings after you close your site to say, ‘This is the latest data we have. This is how it’s behaving according to the models. This is what we predicted.’ By the time the handover comes the residual liability is very, very small, so the government has confidence.<sup>19</sup>

- 4.35 A number of potential GHG industry proponents endorsed the Government’s acceptance of long term liability after a certain period of time. Mr Bounds (Monash Energy) stated:

We feel that the presentations by the department and the discussions we have had among the industry all seem to align around the idea that, after a certain period of time and with appropriate monitoring and verification, the long-term liability transfers back to the Crown.<sup>20</sup>

- 4.36 Given that CO<sub>2</sub> would be stored in the subsurface for periods significantly longer than the existence of associated companies, Mr Dominic Brennan,

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18 Mr Simon Daddo, Woodside Energy, *Transcript of Evidence*, 16 July 2008, p. 22.

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

20 Mr Roger Bounds, Monash Energy, *Transcript of Evidence*, 15 July 2008, p. 52.

Senior Council for Monash Energy questioned the appropriateness of companies maintaining this extreme long term liability:

I think the real crux of this is the intergenerational aspect. We are talking here about potential liabilities which could go out centuries, if not millennia. Here we are; we have World Youth Day and we have the oldest corporation in the world, basically – it is the only one that can go back for 2,000 years. We could be talking about future time frames longer than that and, however strong Shell is, however strong Anglo Coal is, the real prospect of them being around in that sort of time frame is very small.<sup>21</sup>

- 4.37 While agreeing that common law liability should not generally be assumed by governments, Rio Tinto suggested in its submission that given the immature status of the GHG storage industry, lack of common law precedents may create investment uncertainty and impede commercial development:

CCS however is not a mature industry. Potential investors can not achieve the level of confidence in strategies to mitigate risks from common law liability for CCS projects that are routinely achieved for investments in mature industries.<sup>22</sup>

- 4.38 The lack of maturity within the GHG industry and associated risk uncertainty through lack of precedents was also considered a serious impediment to obtaining insurance to underwrite long term liability in Shell's submission:

Shell has learned, through discussions with leading international insurance brokers and carriers, that the long-term liabilities around CO<sub>2</sub> storage would not be insurable, due to such factors as a lack of actuarial data and the long-term nature of the risk (most policies are annual but environmental liability insurances would stretch to a 10 year period at most).<sup>23</sup>

- 4.39 Using the development of the Otway Project in Victoria as an example, this concern over insuring against long term liability was also conveyed by CO2CRC in its submission:

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

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21 Mr Dominic Brennan, Monash Energy, *Transcript of Evidence*, 15 July 2008, p. 58.

22 Rio Tinto, Submission no. 9, p. 11.

23 Shell, Submission no. 30, p. 2.

to obtain cover beyond 10 years after closure. Companies involved in CO2CRC were reluctant to take on long term liability.<sup>24</sup>

- 4.40 In its submission Rio Tinto suggested that a means of facilitating the initial development of the GHG storage industry would be for the Government to limit or share common law liability to allow familiarity with the technology and risks to be established.

One option that could be considered would be for the Commonwealth to assume, share or limit the long term liability for the first Australian commercial scale projects where the storage of greenhouse gases was undertaken under the amended OPA.<sup>25</sup>

## Committee conclusions

- 4.41 The Committee has reservations about indemnifying CCS proponents from common law liability under the proposed legislation. This may act as a disincentive to the design and implementation of strategies to effectively manage long term liability.
- 4.42 The Committee, however, is also of the opinion that long term common law liability associated with a GHG storage activity may be minimised during post closure timeframes through the development of a robust site closure regime.
- 4.43 The Committee acknowledges that the issue of long term liability is complex and that there are many valid arguments as to why the Government should take over long term liability including:
- To provide investment surety within the CCS industry by establishing clear timeframes on potential liability;
  - To promote and facilitate initial uptake of CCS technology where obtaining insurance may be problematic given the immaturity of the industry;
  - To ensure that the potentially extreme long term liabilities associated with GHG storage are formally transferred to an appropriate long term entity such as the Government rather than through de facto inheritance by the passage of time.
- 4.44 On the balance of arguments the Committee believes that the formal transfer of long term liability from the GHG operator to the Government, under strict conditions, could provide an incentive for the proper

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

25 Rio Tinto, Submission no. 9, p. 11.

management of GHG storage and strict adherence to site closure responsibilities. Nor would it prevent parties from pursuing damages on the grounds of deliberate misconduct or negligence by the operator.

- 4.45 The Committee encourages the collaborative development between the regulator and the GHG proponent of appropriate liability transfer criteria, preferably on a project by project basis.

#### **Recommendation 14**

- 4.46 **The Committee recommends that a process for the formal transfer of long term liability from a GHG operator to the Government be established within the proposed legislation, such transfer to be conditional upon strict adherence to prescribed site closure criteria.**

### **Commercial viability of GHG storage**

- 4.47 Carbon capture and storage must be commercially viable in order to attract investment and become a feasible and effective mitigation method for GHG emissions in Australia.
- 4.48 The success or failure of CCS commercially may also have significant influence on our coal-fired energy generation industry, and therefore potentially our energy security.
- 4.49 The Committee has received evidence regarding the commercial viability of carbon capture and storage today and into the future. The three main influential factors which have emerged through the evidence are:
- the level of **access** to suitable storage locations;
  - the level of development and cost for the **technology** involved; and
  - the **incentives** driving investment in GHG storage.

### **Need**

- 4.50 Australia is overwhelmingly dependent on coal for electricity generation, with coal providing over 75% of electricity generated in the year 2005-06.<sup>26</sup> While the transition to renewable energy sources has begun, this will be a long and costly process. It is accepted, therefore, that in order to begin

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26 ABARE, *Energy in Australia 2008*, ABARE, Canberra, February 2008, p. 40.

making considerable reductions to Australia's CO<sub>2</sub> emissions in the near term, abatement strategies will have to be employed.

4.51 CCS, should it be commercially viable, is likely to make up one of those abatement strategies, while also allowing the continued utilisation of Australia's exceptional black and brown coal reserves.

4.52 Dr Cook explained the vital need for GHG storage in evidence to the Committee:

There are obviously economic considerations that could have a very significant impact on whether or not this technology is used but, quite frankly, our view is that, for as long as we use fossil fuels, we have no alternative but to use this technology. There is no other option that we have at the present time, so it is very important that we pursue this technology.<sup>27</sup>

4.53 Mr Page (ESAA) outlined the possible implications for Australia's economy should CCS not become commercially viable, and therefore a limit be put on low-cost coal fired generation:

...there are potential impacts on the economy...of not being able to cost-effectively sequester carbon emissions, therefore potentially limiting into the future the role for low-cost, coal fired generation. It could result in very substantial increases in the cost of supplying the nation with electricity, for example, because you automatically have to turn back to more expensive, lower emission technologies. There will also, naturally, be a limit to how much natural gas we are going to choose to burn in generators here rather than sell to other countries that will pay very high prices for it.<sup>28</sup>

4.54 He explained further that the quantity of coal in Australia is vast, and could continue to be utilised at low cost for a significant period – if we manage to economically mitigate the resultant emissions:

The electricity industry has goodness only knows how much brown coal – some people say about 800 years worth on current usage rates – and in excess of 250 years worth of black coal. That is an accessible, low-cost, relatively high-quality resource if only we can capture the CO<sub>2</sub>, and we are trying to do something substantial about climate change. If that is not given the appropriate priority and balanced against the undoubtedly important economic issue of gas and liquid fuels for transport and

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27 Dr Peter Cook, CO<sub>2</sub>CRC, *Transcript of Evidence*, 17 July 2008, p. 2.

28 Mr Bradley Page, ESAA, *Transcript of Evidence*, 16 July 2008, p. 32.

other purposes, we really will not be looking after the national interest at the end of the day.<sup>29</sup>

## Access

4.55 In order for it to become commercially viable, potential GHG storage operators must have access to suitable storage sites. Without this guarantee that proponents will have a destination for any captured CO<sub>2</sub>, investment into the other elements of the CCS chain will not eventuate.

4.56 Dr Cook explained the situation to the Committee:

It is very difficult to see how you could persuade investors to spend those very large amounts of money if there is not a degree of certainty about them having the area for storage. So again that is something that needs to be resolved at a fairly early stage; it cannot be done on the basis of saying, 'Well, you do lots and lots of work and spend lots and lots of money and then we will decide eventually whether or not you will be able to store CO<sub>2</sub> there.' It has to be an upfront decision, and that is a difficult balance to get right.<sup>30</sup>

4.57 Mr Ralph Hillman, Executive Director of the Australian Coal Association, explained that further studies are required to establish the best storage sites, but that attaining access to those sites through effective legislation is the key requirement:

We do need to do further mapping to prove up this potential and identify sites. But, ultimately, getting access to those storage sites in an economic way and calling forth the investment in those storage sites will require us to establish the right legal and regulatory framework, and that is what this legislation is about. We think it goes some of the way, but it does, to our mind, need quite a bit of work and we have made suggestions in our submission which go to the specifics of that.<sup>31</sup>

4.58 Dr Cook also pointed out that offshore storage locations, as established by the legislation, are particularly important:

... it is also crucial that there is access for the offshore area for the deployment of this technology. Why is that? Well, we have done a number of studies both onshore and offshore looking at storage

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29 Mr Bradley Page, ESAA, *Transcript of Evidence*, 16 July 2008, p. 33.

30 Dr Peter Cook, CO2CRC, *Transcript of Evidence*, 17 July 2008, p. 3.

31 Mr Ralph Hillman, ACA, *Transcript of Evidence*, 17 July 2008, p. 25.

opportunities and there is no question that in a number of areas some of the best storage opportunities will be found offshore. That does not mean to say that there will not be some good ones onshore. It is also important, though, to point out that there is still quite a lot more work needed. We are at the stage of having determined, in a broad way, that there is a storage resource there. What we have to do is look at that in a great deal more detail in the future.<sup>32</sup>

- 4.59 In their joint submission, the Australian Coal Association and the Minerals Council of Australia, concurred, explaining that the investments made by the coal industry and the government so far must not be frustrated by potential conflict with respect to gaining access to offshore storage:

... it is imperative that the provisions of the Bill not be counter-productive to other government and industry initiatives. The Federal Government has committed \$500 million to fund clean coal technologies, with the intent that clean coal will contribute to Australia's energy mix in a carbon constrained future. That investment, and the coal industry's investment of \$1 billion on research, development and demonstration of low emissions coal technology through the COAL21 Fund, is based upon the assumption that suitable injection and storage sites will be located and available for use. To the extent that power stations are unable to access suitable injection and storage locations, that assumption will not be realised.<sup>33</sup>

- 4.60 Mr Bounds explained Monash's belief that access to offshore acreage should be unproblematic, as it is possible to proceed with GHG injection without any interaction with petroleum operations:

We believe that there are completely and sustainably separate structures – in particular, the saline aquifers which underlie most hydrocarbon-producing basins – where you can sequester CO<sub>2</sub> without there being any interference with existing oil and gas production. ... We do not believe that you need to or are likely to interfere with the existing oil and gas production, sour their gas fields or introduce a corrosive CO<sub>2</sub> stream into existing facilities.

...So the opportunity to sequester into unrelated structures which happen to be geographically in the same area as oil and gas production is technically possible and, we would argue,

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32 Dr Peter Cook, CO<sub>2</sub>CRC, *Transcript of Evidence*, 17 July 2008, p. 2.

33 ACA/MCA, Submission no. 27, p. 21.



commercially possible. The impediment that exists as a result of linking those other structures to existing oil and gas production licences is creating a barrier to entry, effectively, in terms of being able to get in and do the sequestration work that is necessary.<sup>34</sup>

## Technology

4.61 The commercial viability of the geological storage of CO<sub>2</sub> will inevitably be reliant on the technology involved.

4.62 There is some contention as to the level of development of CCS technology. Mr Hillman told the Committee that the technology involved was at a high level of development, saying:

We know that storage technology is already established and proven; you will have heard, I think, from a number of witnesses to the committee that that is more or less an accepted fact. We also know that Australia is well endowed with potential storage areas.<sup>35</sup>

4.63 He later qualified his statement, explaining that the technology is proven in laboratory conditions. However it is unlikely that capture technology will be demonstrated at commercial scale for some time:

Carbon capture technologies are technically proven in the laboratory and in some cases at pilot scale. The objective of the Coal21 program and the Coal21 Fund is to demonstrate those capture technologies at a larger scale by 2015. We would like to be ready by 2015 to see those technologies demonstrated at full commercial industrial scale by 2017.<sup>36</sup>

4.64 Ms Walmsley (ANEDO) suggested that the technology is still untested, and therefore unproven. She said:

I think that is yet to be proven. We have had a look at the pilot projects that are up and running in various states and some of the developments overseas, and there seems to be consensus that the technology is new and is yet to be proven. For that reason, certain safeguards should be put in legislation now. It is untested technology. The technology will not be ready for some time — estimates are around for 2015 for projects. As we have seen in Australia, the Western Australian Rio Tinto-BP project has ceased operations. Even though that was a \$2 billion joint venture, it has

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34 Mr Roger Bounds, Monash Energy, *Transcript of Evidence*, 15 July 2008, p. 54.

35 Mr Ralph Hillman, ACA, *Transcript of Evidence*, 17 July 2008, p. 25.

36 Mr Ralph Hillman, ACA, *Transcript of Evidence*, 17 July 2008, p. 27.

ceased because of the instability in the site. There is a lot of money involved. This is an untested area. Without that certainty, you need to make sure you have the regulatory safeguards in place.<sup>37</sup>

- 4.65 Dr Wild (BP) outlined the details of their failed Kwinana project in Western Australia, arguing that while the storage formation in that instance was unsuitable, this doesn't undermine the success of GHG storage technology more generally:

We announced in May 2007 that we were going to undertake a pre-feasibility study to look at the project in Kwinana. I think it was 500 megawatts of clean coal power generation, using coal from the local area and then taking the CO<sub>2</sub> offshore into the couple of opportunities for storage relatively near inshore. I think it was about 200 kilometres offshore. So we carried on that work. It went over about 2½ years. Through the geological studies that we did, it became obvious that the sink – the storage location – actually would not give us the level of security that we would need for a first-of-a-kind project. I do not know who gave you the evidence that this would suggest that CCS does not work. I think that is an extraordinarily long bow to draw. What this suggests is that this particular project, now, is not going to work for us, but it does not mean it is not going to work for somebody else. In terms of giving us the level of security we would need around storage for a major first-of-a-kind project in Australia, it does not quite stack up now for us, but certainly the work that we did was incredibly useful just to see how all the building blocks of a project like this might fit together for Australia.<sup>38</sup>

- 4.66 Mr Page concurred with Mr Hillman's point that the capture technology in particular will take time to become commercially viable:

Based on the studies that we have done over the last few years – and those studies have involved us getting quite close to researchers and best information domestically and world wide – the association's view is that the period from here to 2020 will actually be a very difficult period for the industry from a technology perspective. We have very few choices. ... Included in that, from our perspective, is carbon capture and storage, whether it is so-called post-combustion capture, which may be viable for retrofitting to existing plants, or whether it is brand new pre-combustion technology. ... I would expect over the course of the

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37 Ms Rachel Walmsley, ANEDO, *Transcript of Evidence*, 16 July 2008, p. 45.

38 Dr Fiona Wild, BP, *Transcript of Evidence*, 18 July 2008, p. 8.

period to 2020 that we will see an increasing amount, but it will remain a minor amount compared to the total potential emissions from the existing fleet of generation. ... I think it is reasonable to expect that compared to what our sector emits today, which is around 190 megatons, we are not going to start seeing a substantial proportion sequestered from pilot and demonstration programs. Our expectation is, post 2020, that that is likely to move up quite quickly, but again it will depend upon the economics, what the alternative technologies are, what the price of carbon is and how commercially viable carbon capture and storage becomes.<sup>39</sup>

- 4.67 Mr Torkington (Chevron) explained that there will need to be a breakthrough in the technology in order for it to become commercially viable:

I guess it is our view that those costs are currently very high. The technology is possible, but current technology is very difficult. You really need to see a technological breakthrough around capture to bring those costs to the capture component in those sorts of sectors down significantly to make it worthwhile. Again, we would see the economics around the price under emissions trading as being the motivation.<sup>40</sup>

## Incentives

- 4.68 In order for GHG storage to ever become commercially viable, due to the level of expenditure on the technology and infrastructure required, financial incentives will be essential.
- 4.69 Mr Zapantis (Rio Tinto) outlined the requirement for incentives from government to ensure the commercial viability of CCS, saying:

... the factor which is holding back deployment of CCS most significantly is simply the commercial viability of CCS. It is much more expensive to produce low-emission electricity than it is to produce electricity using conventional means. That, added to the fact that there is still some uncertainty around the final costs because an integrated plant has not yet been built, means that the commercial risks are much greater than the rewards, so there needs to be some sort of support from government that enables industry to invest. Industry has enormous resources that it can invest in this technology, but industry can only do so on a

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39 Mr Bradley Page, ESAA, *Transcript of Evidence*, 16 July 2008, p. 31.

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

commercial basis; that is the role of industry. So, somehow, government policy needs to unlock those enormous resources and bring that investment forwards. Part of that equation is going to be support of these sorts of projects with public funds. At a philosophical level, the role of government is not necessarily to make commercial investments; that is the role of industry. The role of government is to make investments where it is not commercial, in the public interest.<sup>41</sup>

4.70 This point was corroborated by Shell in its submission to the inquiry, which stated:

Shell is a strong advocate for CCS, but we stress that CCS is not currently commercially viable, while carbon markets do not deliver sufficient incentives to make long-term private investment in CCS attractive. Although Shell supports the Commonwealth's efforts to put in place a regulatory framework to facilitate CCS, it is highly likely a range of other measures will be required to ensure widespread uptake, and use of, CCS, including :

- recognition of CCS as a form of abatement under the proposed Australian Emissions Trading Scheme (on a like for like basis);
- funding assistance (e.g. bolstered Low Emissions Technology Demonstration Fund);
- public education, particularly raising community understanding of CCS and dispelling some of the negative perceptions about the technology;
- robust tax incentives, including PRRT deductibility where CCS costs form part of upstream development costs and R&D tax benefits; and
- further funding of public /private research initiatives (i.e. CO2CRC).

We encourage the Commonwealth to consider such measures and consult with the petroleum sector and CCS stakeholders on how best they might be implemented.<sup>42</sup>

4.71 Dr Ingram (Schlumberger) stated that political as well as economic drivers will fuel the commercial viability of CCS:

You will know that if CCS is to have an impact on the CO<sub>2</sub> concentrations in the atmosphere we will need to store billions of tonnes of CO<sub>2</sub> underground over the next 40 to 50 years. The sheer

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41 Mr Alex Zapantis, Rio Tinto, *Transcript of Evidence*, 18 July 2008, p. 16.

42 Shell, Submission no. 30, pp. 3–4.

scale of the challenge is daunting but, with the right political and economic drivers in place, eminently achievable.<sup>43</sup>

- 4.72 Dr Ingram continued, stressing that with a price on carbon emissions in an emissions trading scheme, investment in GHG storage should take off:

You can see in Australia that there will be a price on carbon. And then it comes down to: 'Let's get on and do it,' instead of, 'What else do you need?' The legislation will be coming through. The economics will come through. The technology is already there. What more do we want?<sup>44</sup>

- 4.73 Another factor in the uptake of CCS, however, is the regulation of emissions. The need to abate emissions or face legal penalties is a strong incentive to pursue CCS, as is illustrated by the Gorgon project in Western Australia. Mr Torkington explained to the Committee the impact of environmental assessments on the development of the Gorgon project:

The authorisation for the underground disposal of carbon dioxide will be undertaken in accordance with the Barrow Island Act, which enables the minister to place conditions on that project. Importantly, as I indicated in our opening remarks, these projects will still be subject to a range of existing laws – in this case, environmental protection laws. The project has been through an exhaustive environmental impact assessment and approval process under both state legislation and Commonwealth legislation. During that process the state EPA recommended that, if the Gorgon project were to proceed, this component of the project must go forward.<sup>45</sup>

## Committee conclusions

- 4.74 The Committee notes that the commercial viability of carbon capture and storage will constitute the main influencing factor on the level of investment in this new industry.
- 4.75 The Committee believes that CCS should be promoted as a potential strategy for the mitigation of Australia's CO<sub>2</sub> emissions which allows the continued utilisation of our extensive coal reserves.
- 4.76 The evidence suggests that at present carbon capture and storage is not commercially viable, as the technology is still in the development stages

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43 Dr Geoffrey Ingram, Schlumberger Carbon Services, *Transcript of Evidence*, 17 July 2008, p. 14.

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

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

and remains exceptionally expensive. The lack of genuine incentives to encourage greater uptake, means that a breakthrough in technology which could potentially lead to a reduction in cost is at the present time unlikely.

- 4.77 The Committee believes that the current proposed legislation, with the amendments recommended in this report, goes some way to assuaging the problems regarding access to suitable storage locations.
- 4.78 In order to further promote the commercial viability of GHG storage, the Committee concludes that firm environmental regulations will be required to abate the atmospheric emission of CO<sub>2</sub>, and greater external incentives will be required.

## External drivers—ETS

- 4.79 In order for CCS to become a financially viable option for the mitigation of GHG emissions, the cost of emitting CO<sub>2</sub> must be high enough such that it is more economical to inject than to emit. It is therefore likely that the principal driver for investment into, and uptake of, GHG storage in Australia, will be the implementation of an emissions trading scheme.
- 4.80 In evidence to the Committee, Mr Zapantis outlined the dependency of a successful GHG storage industry on the introduction of an emission trading scheme:

The only reason you are going to inject CO<sub>2</sub> into geological formations, which is an added cost to business, is in order to realise the commercial benefit that the reduced liability for emissions, via the ETS, delivers.<sup>46</sup>

- 4.81 Mr Torkington concurred, stating:

Currently, today, these sorts of projects are not commercial. ...the commercial motivation is going to come from a different area. In Australia it is going to come from the implementation of a price on carbon emissions.<sup>47</sup>

- 4.82 Mr Davies (AEC) explained to the Committee that not only is a trading scheme necessary, but that the price of CO<sub>2</sub> emissions must be high enough to justify GHG storage as an option:

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46 Mr Alex Zapantis, Rio Tinto, *Transcript of Evidence*, 18 July 2008, p. 15.

47 Mr John Torkington, Chevron, *Transcript of Evidence*, 17 July 2008, pp. 50–51.

We do not know what an emissions trading scheme is going to generate ultimately in terms of a price to emit. I would like to think there are two objectives here. The ultimate objective is to drive the value of the CO<sub>2</sub> permits to zero because nobody needs them – the technology has moved on. But we are a long way from that, so we will have to go through a transitional period. I think of this in the context of what the value is for AEC in injecting CO<sub>2</sub> into the ground, and the first commercial consideration for us is: what is the price of a permit? Can we acquire a permit? What will the future value of that permit be? And what does that mean for me when I talk to shareholders about investing \$2 billion in this plant? I do not know what the price of a CO<sub>2</sub> permit is going to be. I hope it will be zero one day, but for the time being it is going to go nowhere but higher. What that says is: what will the cost be to inject CO<sub>2</sub> into the ground? What is my decision point here? If I can emit for \$40 and inject for \$60 I suspect I am going to be an emitter.<sup>48</sup>

- 4.83 In addition to the financial incentives an emissions trading scheme will provide for investment into GHG storage, the Committee also received evidence as to how this new industry could be incorporated into the scheme, utilising the new legislation as an enabling framework.
- 4.84 In its submission, Rio Tinto suggested that the new emissions trading scheme should acknowledge the permanent geological storage of CO<sub>2</sub>, provided the scrupulous monitoring and verification assessments required by the legislation have been met:

The ETS should recognise a reduced carbon liability or a credit (depending on whether CCS is within scope or out of scope of the ETS) for greenhouse gases that have been permanently geologically stored. To be recognised under the ETS as permanently geologically stored, the injection of the greenhouse gas must have been undertaken in a manner that has been subject to rigorous assessment and which meets all of the Government's requirements relevant to ensuring the long term integrity of the geological storage formation. Thus injection must be undertaken under an Injection Licence into an Identified Greenhouse Gas Storage Formation in order for the ETS to recognise a reduced carbon liability or a carbon credit.<sup>49</sup>

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48 Mr Bob Davies, AEC, *Transcript of Evidence*, 15 July 2008, p. 36.

49 Rio Tinto, Submission no. 9, p. 4.

- 4.85 The CO2CRC also commented in its submission that, subject to satisfactory monitoring results, the trading scheme should recognise injected CO<sub>2</sub> as mitigated emissions:

Further, the implementation of an ETS, which could be expected to encompass CCS as a tradeable credit, would obviously require MMV, to confirm carbon credits.<sup>50</sup>

- 4.86 The joint submission from The Australian Coal Association and the Minerals Council of Australia agreed, pointing out that a standardized definition for 'permanency' within the new legislation would assist this process:

...the ACA wishes to place on record its concern that the issue of what constitutes permanent storage under the Bill, and that the mechanisms by which the Bill seeks to establish a regime for permanent storage must correlate with the requirements of the forthcoming AETS in relation to the conditions upon which GHGS injection and storage will be recognised as a deduction from an emitter's liable emissions, or as an offset (whichever is the position under the AETS).<sup>51</sup>

- 4.87 It continued:

The ACA and the MCA submit that in the interests of certainty, if the issue of a site closing certificate, the successful undertaking of MMV, and the current or former GHGS IL holder's compliance with serious situation and remedial directions are carried out in accordance with the Bill, this should constitute permanent storage for both GHGS purposes and AETS purposes<sup>52</sup>

- 4.88 In its submission, ExxonMobil stated that the Bill, as an enabling framework for a mitigation option, is consistent with its view that an emissions trading scheme should allow industry the choice to adopt the most economical option for mitigating their emissions; carbon capture and storage being but one:

ExxonMobil favours approaches to the valuation of carbon that create a basis for market principles to drive investment decisions for all forms of GHG mitigation, including CCS. The financial basis for greenhouse gas (GHG) mitigation, including CCS, should be driven by a GHG policy that provides a value for carbon that is

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

51 ACA/MCA, Submission no. 27, p. 40.

52 ACA/MCA, Submission no. 27, p. 41.



implemented as widely across the economy as practical. The value of carbon should be the basis for selecting the most appropriate method of GHG mitigation without dictating or prohibiting a sound management approaches. In this context the Bill is seemingly compatible with the future development of an Emissions Trading System (ETS).<sup>53</sup>

## Committee conclusions

- 4.89 The Committee notes that the implementation of an emissions trading scheme in Australia is likely to constitute the main driver for investment in to carbon capture and storage. GHG injection adds considerable expense to business and, as such, will only begin to become commercially viable with a combination of both a reduction in the costs of the technology and a sufficiently high price on emitted CO<sub>2</sub>.
- 4.90 The Committee believes that the injection and geological storage of greenhouse gases should be recognised by an emissions trading scheme as mitigated emissions. It is believed that the Bill's requirements with respect to the measurement and verification of injected GHG substances will translate appropriately to the assessment of permanently abated emissions within the new trading scheme.
- 4.91 The Committee therefore concludes that the Bill provides a successful enabling framework for one method of CO<sub>2</sub> abatement, which should be recognised by any future emissions trading scheme.

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53 ExxonMobil, Submission no. 6, p. 18.