



COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

**HOUSE OF
REPRESENTATIVES**

STANDING COMMITTEE ON PRIMARY INDUSTRIES AND
RESOURCES

**Reference: Offshore Petroleum Amendment (Greenhouse Gas Storage) Bill 2008
[Provisions]**

THURSDAY, 17 JULY 2008

CANBERRA

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON PRIMARY INDUSTRIES AND RESOURCES

Thursday, 17 July 2008

Members: Mr Adams (*Chair*), Mr Schultz (*Deputy Chair*), Mr Bidgood, Mr Champion, Mr Forrest, Mr Haase, Ms Livermore, Mr Perrett, Mr Sidebottom and Mr Windsor

Members in attendance: Mr Adams, Ms Livermore, Mr Perrett and Mr Sidebottom

Terms of reference for the inquiry:

To inquire into and report on:

The provisions of the draft Offshore Petroleum Amendment (Greenhouse Gas Storage) Bill.

Specifically, the Committee will ascertain whether the Bill:

- a) Establishes legal certainty for access and property rights for the injection and long-term storage of greenhouse gases (GHGs) in offshore Commonwealth waters;
- b) Provides a regulatory regime which will enable management of GHG injection and storage activities in a manner which responds to community and industry concerns;
- c) Provides a predictable and transparent system to manage the interaction between GHG injection and storage operators with pre-existing and co-existing rights, including, but not limited to, those of petroleum and fishing operators, should these come into conflict;
- d) Promotes certainty for investment in injection and storage activities; and
- e) Establishes a legislative framework that provides a model that could be adopted on a national basis.

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Committee met at 9.04 am**COOK, Dr Peter John, Chief Executive, Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC)****MORVELL, Mr Gerry, Policy Adviser, Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC)**

CHAIR (Mr Adams)—Welcome. I declare open this House of Representatives Standing Committee on Primary Industries and Resources and its inquiry into the future development of the draft Offshore Petroleum Amendment (Greenhouse Gas Storage) Bill 2008. This is the third public hearing of this important inquiry. Today the committee will hear from a range of witnesses representing the coal and petroleum industries as well as the Cooperative Research Centre for Greenhouse Gas Technologies in Australia.

Although the committee does not require you to give evidence under oath, I should advise you that this hearing is a formal proceeding of the parliament; therefore, it warrants the same respect as proceedings of the House. It is customary to remind witnesses that giving false or misleading evidence is a serious matter and may be regarded as a contempt of the parliament. The committee has received your submission, and thank you very much for that. Are there any corrections or amendments you would like to make before we go forward?

Dr Cook—No.

CHAIR—Would you like to make a short statement in relation to that and the committee will probably then have some questions for you.

Dr Cook—Thank you. What we have to say this morning assumes that the document has been read, and there will be opportunity for further discussion later on. I have a couple of comments: the first will be about our credentials in terms of our expertise and the basis on which we are providing this information; the second will be very briefly about CO2CRC; and the third will be about the present status of the technology.

I should make the point at the outset that I am providing an expert technical perspective. This is not being provided on the basis of a policy perspective. My credentials in this area are that I am a geologist. I have been involved in the oil and gas side of things for a number of years but I have also been involved in the area of carbon capture and storage for a great many years—probably longer than anybody else in Australia—since the early 1990s. I appear in that perspective. My colleague might like to briefly outline his credentials.

Mr Morvell—Until last year, I was a senior executive in the federal environment department and, in particular, a senior executive in the Australian Greenhouse Office looking at energy technologies. You have already had evidence in the last couple of days of work being undertaken by the two ministerial councils on the development of environmental guidelines for carbon capture and storage, and I have been engaged working with officials in that process.

CHAIR—Thank you very much.

Dr Cook—I will just say a few words about CO2CRC. We are a collaborative, cooperative research centre that is made up of members from governments, state and federal; industry; universities; Geoscience Australia; CSIRO; international organisations as well as national organisations. So in many ways we are an international R&D organisation based in Australia. We have very high international status and very high credibility, and that credibility we believe is an important component we bring to this table.

We are currently undertaking Australia's only storage project, and I should make the point contrary to perhaps what has been said earlier: it is the only operational storage project in Australia. It is the only operational storage project in the Southern Hemisphere and it is the largest R&D project in the storage area being undertaken anywhere in the world at the present time. So it is a very significant project, and we have a great many learnings coming out of that project, which we believe are relevant to some of the decision discussions that will take place around this legislation.

A few words on the status of the technology: we believe that carbon capture and storage has a fundamental role to play, along with other technologies, in the area of mitigation. We see no technology show stoppers to the deployment of the technology. 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.

This technology has to be pursued along with other initiatives by the government, such as the green paper. It is also, of course, part of the consideration in the Garnaut report. All of those sorts of things are very much dependent on taking this technology forward, so it has an absolutely crucial role to play. In terms of the crucial nature of the technology, 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 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.

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.

One of the points that I have noted that has come out in some of the discussions to date has been the issue of liability. I think that is an important issue that does need to be considered in the context of this legislation. We believe that there is considerable merit in seeing this as not just a liability but a responsibility and that that responsibility can appropriately be borne by industry and governments. It should not necessarily be seen as one or the other. There is going to be different stages in the project and I think that it is appropriate that responsibility moves from one

body to the other. But we find it very difficult to imagine how you could leave all the responsibility with the project, essentially indefinitely. In that respect, we start off with very low liability or very low risk and in fact that risk gets even lower as time goes on, for various scientific reasons that relate to the way that the CO₂ goes into solution. So it is not as if we are talking about an increasing level of risk. We are actually talking about a decreasing level of risk over time.

The other important thing that there has been some discussion on, and it is certainly alluded to in our submission, is access to data and the implications that that has. It is true that there are some data—very significant amounts of data—already available under the offshore legislation, but that legislation by and large does not allow for things such as production data and interpolative information to be made available, and that is very often the most crucial dataset. It is very difficult to see how we can ensure that that data is available to people who want to take forward a storage project. So there are some issues there, and we do discuss that in the paper.

Obviously that relates then to the whole question of the interaction between a CO₂ storage operation and a petroleum production and exploration operation. This is certainly a very important issue, and we go into that in some detail. As I have already said, it relates in part to the data but it also relates to the way that you would inject and store the CO₂ vis-a-vis the way that you produce the petroleum. Could they adversely interact? Potentially, yes, if it is done in the wrong way. Would they inevitably adversely interact? No, and we have examples already. For instance, the Sleipner operation in the North Sea is a very good example of where you have gas production going on and they are also storing CO₂ in the same area. The same thing is going to occur with the Snohvit operation, which is further north in the North Sea. In the case of the In Salah operation, again, there is storage going on in a field where there is also production of gas going on. So you can manage these things but it does require careful management. That is part of the conundrum that we face at the moment: how do we ensure that there is that careful management if we have different parties involved?

My final point is really the issue of uncertainty for investors. It is a difficult issue because oil and gas exploration is a very expensive undertaking. It can cost hundreds of millions of dollars. It is conceivable that storage exploration could also be a very expensive operation if we have to actually acquire new data. 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 CO₂ there.' It has to be an upfront decision, and that is a difficult balance to get right. Those are some of the main points I wanted to make by way of introduction.

CHAIR—Thank you. I can assure you the committee accept your knowledge base and your eminence in this field. We appreciate the time and the effort that you have gone to, both to come before us and in your submission. I think you have outlined where we have got to, the key points for moving forward and for getting the legal framework, which we are trying to do.

Ms LIVERMORE—I might start with the issue of data and the imbalance between the data that the two sets of operators would have. Can you suggest specific incentives that could be put into this regime that could actually level that playing field a bit or create the situation where the

existing petroleum operators would share that information with greenhouse gas storage operators?

Dr Cook—There are a number of issues in this area; it is one of the crucial issues in this legislation, there is no question of that. It is a matter of where to start. Part of the problem is that there is no specific financial incentive or any other incentive for the current holder of an exploration or production licence to provide that information above and beyond what they are required to provide under the current oil and gas legislation. That amounts to some of the seismic lines, the drilling information and so on. It does not amount to a lot of the production data, which is absolutely crucial in many cases to knowing whether or not you could use these areas for storage. It is very hard to see how legislation could address that, in terms of it being a commercial issue. My concern is that unless we do address it you are going to get oil and gas companies saying, ‘No, we don’t want you putting CO₂ into this area.’ So you will get a stand-off between a company that wants to use that area and a company that sees no benefit in anybody else having access to that area. It is very hard to see how you can resolve that one.

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.

CHAIR—The gas and oil industry and the petroleum industry seem to have enormous skills and knowledge in this area. They are the pre-eminent body that has the ability to do this in front of anyone else. We would be starting a new regime, wouldn’t we, if other players had to come in and drill the holes and become the injectors? Is that how you see this?

Dr Cook—That is a reasonable observation. 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.

CHAIR—Or sell the CO₂. They would stay in their core operations and sell the by-product, which is the CO₂.

Dr Cook—Yes. I think that could be so. I think you might get a sort of a secondary industry developing, in that some of the oil and gas companies may say, ‘We are still going to stay in the oil and gas business.’ You may get some sort of intermediate industry developing, but it will still be building on the oil and gas industry.

Ms LIVERMORE—Just to clarify, are you suggesting, Dr Cook, that the oil and gas companies have a one-off opportunity to convert existing licences that they have into a greenhouse gas storage licence or are you talking about a one-off opportunity with regard to new sites that are released?

Dr Cook—I think what it could amount to would be, essentially, overprinting the storage licence on top of the oil and gas licence. I do not think you would try to develop a whole new range of legislation that had combined licences. I think you could use the existing legislation and just say, ‘This is a one-off opportunity.’ How you do that legislatively, I have no idea. What I am trying to do is look at some way that we can potentially avoid what I believe could be a major impediment to the uptake of this technology. There may be better ways of doing it, but I think it is important that we start looking outside the box.

Ms LIVERMORE—We had evidence yesterday from Anglo Coal. They were taking us through their experience in Queensland with co-development agreements. I am not sure if you are familiar with those at all and if you have a view about whether that analogy is useful in addressing some of these potential interactions between the gas and oil companies and the greenhouse gas storage.

Dr Cook—What you are probably talking about is the agreement they reached on coal seam methane. For a long time the coal companies were quite opposed to coal seam methane developments because they felt it adversely impacted upon their coal resources. That was resolved. I do not know the detail of exactly how that works. What I do know is that it does work and that they have been provided with some levers that have enabled them to work. I do not see those same levers currently in the legislation as it stands. That is the difficulty that I have.

Ms LIVERMORE—I guess it is basically a mechanism for bringing the parties to the table and reaching a commercial agreement.

Dr Cook—Absolutely, and in a finite time. We do not have tens of years to tackle this issue. We have got to tackle it soon. I do not believe it can be something that one of these days will be resolved. It has to be something that can be resolved in a finite time so that we can take this forward.

Ms LIVERMORE—Thank you.

Mr PERRETT—I would like to take you to the monitoring of the release of greenhouse gases. It has been occurring for 40 or 50 years for different purposes in the oil industry. I am not sure what monitoring occurred when CO₂ was used to increase pressure in oilfields. I was wondering if you could take us through the proposed monitoring of the Otway project and how the technologies have changed, especially for a layperson who might say that you are just hiding the CO₂ briefly and then it will come bubbling up in years to come. How would it be anticipated that the monitoring would occur—even down to how often seismic or other testing would occur?

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. 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. Since then there has been some work done on monitoring in Algeria and a lot of work done in Canada. What we have assembled in the Otway Basin is the most comprehensive monitoring verification system anywhere in the world. We have spent a lot of money.

Mr PERRETT—Sorry, Dr Cook, could you just take me to the Sleipner monitoring before you go on to Otway, in terms of what they proposed at the start and what they do now?

Dr Cook—When they started Sleipner, it was the first time it had been done for storage purposes. Because it is an offshore area and because it is in waters 100 metres or so deep, there is a limit to the number of things they can do. The thing that they primarily did and that they have done very successfully is what we call 3-D seismic—actually, it is 4-D seismic, because you also have time. So you run seismic lines across the area. Carbon dioxide has a different seismic signature to normal water or normal gas. You can see it there. By running a series of these seismic profiles at intervals of several years, you can see the gradual change. You can see how the carbon dioxide is gradually moving up to what we call the seal, and the seal is the unit that overlies the reservoir. It gets to that seal and then it gradually spreads out under that seal and does not break through it. They have been able to image that very successfully at Sleipner. That has become, if you like, a gold standard in many ways. They are doing that under the oil and gas legislation. They do not have specific storage legislation for the Sleipner operation. That has been the same, as far as we know, with In Salah in Algeria, with Weyburn in Canada and also it would be the same in Snohvit.

As far as we are aware, the Otway project is the only project in the world that has actually been undertaken specifically for storage that is not under the oil and gas legislation. We are doing that under the EPA legislation in Victoria. There are some very important lessons to be learnt from that. 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.

I will very briefly explain the technologies. This is an onshore site, so you would not necessarily do all of these same things offshore, for various practical reasons; nonetheless, there are important lessons to be learnt. One of the things we have got is a monitoring well, so you can actually see when the carbon dioxide migrates from where you are injecting it as it goes through the formation, and it eventually gets to this monitoring well. We expect that to happen in something like the next six to eight weeks.

Down this monitoring well we also have various types of seismic equipment for hearing seismic waves. In other words, we put a sound source at the surface and we bounce that sound—and there are various techniques for doing that—and that sound is then picked up by the microphones in the monitoring well. In addition to that we have microphones on the surface that we deploy periodically so we are then able to pick up the reflections from the carbon dioxide

coming up to the surface. This depends on the nature of the site. Quite honestly, at the moment we are still working out the best way to get good seismic resolution. This is one of the things you do—this is a research project after all. We do not have all the answers at this stage. We are working on them.

We also have what we call U-tubes down this well. This well is two kilometres deep and we have a tube that goes down two kilometres and comes back two kilometres so we can sample the water and see what the chemical changes are that occur in the subsurface of this well. Again this is very important. People will sometimes say, ‘Don’t all sorts of terrible things happen when you start putting CO₂ in the ground?’ We are able to say: ‘No, that does not happen. It is benign. We know the chemistry of this water because we have actually sampled it after we have injected the carbon dioxide.’

In addition to that we are sampling the groundwater in wells that are used for drinking around the area to give people confidence that we are not getting any leakage. We are also measuring the carbon dioxide in the soils. And last but by no means least we have a very comprehensive monitoring program for the atmosphere so that if we do get any leakage we can detect it in the atmosphere. So it is a combination of seismic and other geophysical techniques and chemical techniques we use in the air and in the soil. It is a very comprehensive dataset. Would we use all of those techniques in the offshore area? No, we would have to modify them but a number of them we would use. Seismic would be an obvious one, but I think there would be other techniques that we would use as well.

Mr PERRETT—Would the U-tube not be an option?

Dr Cook—It may be. It would depend on the circumstances. It means you have to drill an extra well. Any well drilled offshore costs a lot of money—it costs \$50 million. It is a judgement you would have to make. If on the other hand you already had a well in the area that you could use then you may well want to use that. If you are using existing wells and you are getting CO₂ coming through the formation, one thing you have to be cautious of—and again this is not an insurmountable problem—is that the cement in that existing well is able to resist the carbon dioxide. Carbon dioxide does have a chemical reaction with conventional cement. You have to be careful of that. Again it is something you can handle. There are new types of cements you can use and so on. It is not an insurmountable problem, but you do need to be aware of it.

Mr SIDEBOTTOM—While on the risk factors and getting down to public perception as well—half of the problem is demystifying this stuff—what are the potential hazards of leaking CO₂? Can you take us through some scenarios—you just gave us one—offshore and onshore?

Dr Cook—First off we have to remember the sort of gas that carbon dioxide is. It is the sort of gas that we breathe out, trees use and is in soft drink, beer and so on. It is not something that is going to kill you if you get a small amount of it. The only time it is dangerous is if you get large concentrations of it—and I think that is above five per cent—and then you will be asphyxiated. That is a very high concentration.

As part of the scheme that we had to test the well—and this is because we were using natural gas as the source of our CO₂ and it is high in carbon dioxide—we had to let that CO₂ flow through a pipe. In other words, it was almost a simulated leakage in a way at the surface. What

happened was that we got this cloud of CO₂, which you could see because you get cooling, and then it gradually fell and we actually ended up with a pile of dry ice, solid carbon dioxide, which sat there for days and days. The main danger in that area was that you could get what they call a freeze burn because it is very cold.

That is an example where we have seen what is a pseudoleak, if you like. It was pretty easy to handle. When it comes to a natural leak, which is something you get through the rocks and so on, we have tried modelling it and it is very difficult to get a leak happening. You choose your site very carefully and you know the geology. You know the sorts of rocks that are there to hold in the CO₂ and you know the sorts of rocks that are above the reservoir that seals it in. You do what is called site characterisation and you do that very carefully. You then model to see if you can get leakage from that. If you can model leakage, then you would probably say that that site is not suitable. So you model it until you are confident you are in an area where you are not going to get leakage. It is then very difficult to get large-scale leakage.

If against all the odds you did get leakage, it would go into the sea floor and be dispersed in the seawater. There are places in the sea floor at the present time in deep water where you get natural CO₂ springs and CO₂ hydrates, which is again a form of ice that forms on the sea floor. At the sorts of depths we are talking about for this legislation, you would not get that because you are probably talking 100-200 metres maximum water depth. It would be quite rapidly dispersed in the water column. One thing you would have to do would be to monitor it.

Mr PERRETT—As a gas?

Dr Cook—As a gas, yes. It would gradually go into solution but not immediately. If you have got a large-scale emission, it would stay as gas. Again, we have modelled that. In the case of the Otway Basin, we tried modelling it so you left a borehole open and said, ‘We’ll fill the formation with CO₂ and then let’s leave the thing open’—this is computer modelling. It was very difficult to get a significant amount of CO₂ even out of that very open system. There are reasons for that.

It is also important to remember that we are not actually storing a gas down there; we are storing a liquid down there. We are storing what is called supercritical carbon dioxide down there, which is a liquid, and it stays as a liquid as long as you are below about a thousand metres. It is staying down there as a liquid, not as a gas.

CHAIR—For the record, the areas that we are talking about injecting into may have held gas and oil for thousands of years, so there is natural storage there.

Dr Cook—That is absolutely correct. We use the analog of oil and gas quite frequently to say why we believe CO₂ can be safely stored in the subsurface. In the case of the Otway Basin, there are concentrations of carbon dioxide that have been stored there for thousands and thousands of years of geological time. Oil and gas similarly are stored there. Quite honestly, if rocks were not able to hold liquids down there, we would not have any oil; we would not have any gas. It is part of what they do. It is a very well-known mechanism under which fluids are stored on the subsurface naturally, so we are doing what nature does anyway.

CHAIR—There is normally a cap which is something like a mudstone or—

Dr Cook—That is correct. The simplest model is where you have got a very nice porous, permeable rock, which is where you put your CO₂, overlaid by a thick impermeable layer. That is the sort of thing you ideally find. In the future we may develop other models that will enable us to store CO₂ in other types of geological environments, but that is the simplest one at the present time.

CHAIR—Thank you.

Mr PERRETT—Taking you back to the issue of the monitoring, what is the anticipated monitoring schedule for the Otway Basin project?

Dr Cook—The anticipated monitoring schedule is that we continue to monitor it until at least 2010. Under the current regime CO₂CRC is funded to 2010. I would be very disappointed if we were not funded beyond 2010—it would not be a good look—but that is where we are taking it to. However, what we anticipate is that we will monitor it for a number of years after that. We have to meet what are called key performance indicators that we have developed jointly with the EPA so that when we reach a certain point we are able to say, ‘We don’t need to do any more monitoring’—because, for instance, the plume of CO₂ might have stopped moving or something like that. Or we may actually move to a regime where we will monitor it just once every five years. In the case of the Otway project, it is important to point out that this is the first of its kind, so we do not actually have a monitoring regime that says exactly what we will do; it is a movable feast at the moment—and that is why we are doing it: to determine what is the best way to monitor. Perhaps my colleague would like to add something.

Mr Morvell—I would just like to add a couple of comments with regard to the issue of the way this technology is developed and the community perception issue. 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.

Mr SIDEBOTTOM—Fish and seals?

CHAIR—And penguins.

Mr Morvell—Penguins and seals, yes! Part of the other issue of community perception is the way in which the Otway project in particular is being developed with the regulators. Dr Cook has already made the observation that the Victorian EPA have had a critical role in the development of the regime over that project. The process they have gone through is looking at a risk assessment framework under their existing legislation—what is the likelihood of something happening and what are the consequences. What that has put in place is an iterative process, which means that it is continuously looked at and continuously updated. It is not, ‘Let’s set some conditions for the project and walk away from it.’ It allows that community engagement via the regulators and via that community advisory group on an ongoing basis to ensure that, whatever is going on, people understand and are given all of the information.

The sorts of problems that could occur, again, suggest very low risk. Within one kilometre of the Otway project we actually have a carbon dioxide producing well which is used for industrial purposes. So, once a day or whatever it is, one of the companies drives a truck out there, hooks up to a CO₂ well on a nearby farm, fills the truck up and takes it away. The issue of the danger of CO₂ in that circumstance is just as great as the issue of CO₂ coming out of a well at Otway, and yet the risks have already been identified as low and the local farmers and community have not expressed concerns about it. Again, they have been brought into the process. In South Australia we have a very large CO₂-producing well at Caroline, which is the same thing. The amount of CO₂ coming out of that, which is taken away for industrial purposes, most of which I suspect ends up in soft drinks, is quite significant and yet the risks are low.

The last thing I will say in relation to the way community engagement has been taken relates to the Gorgon project in Western Australia, which has in fact been through a full environmental assessment. The same issues were explored there: what are the risks and what are the consequences of something happening? All have been determined as very low. What has been put in place, though, is a management framework with the proponents—the companies involved and the regulators—to ensure that whatever new information and new activity there is will be taken into account and brought out into the public arena.

There are processes that need to draw the public in. The bill that is in front of you does not go to that. This has been drawn out in evidence in the last two days. A lot of the information that gets down to the level of there being a concern is going to be dealt with in the regulations. There will be judgements about whether some of that should be in the bill, but certainly the community engagement activity is important. To finish that off, one of the other things is that an observation was made that the bill does not preclude the environmental assessment also taking place on all of the projects.

Mr PERRETT—Could I explore that a little bit more? Can you guys give us any guidance as to whether there should be monthly seismic testing or five-yearly seismic testing or something in between? Ships at sea are obviously a little bit harder to organise. Should it be monthly to begin with?

Dr Cook—It is important to stress that this is an R&D project rather than a full commercial project. We do sampling every few weeks. That is our regime. In terms of seismic testing, we aim to do that every few months. That is the sort of time.

Mr PERRETT—So even on a scientific basis—

Dr Cook—It will depend upon the nature of the technology that you are going to use. It is important that there is a degree of flexibility built into whatever the bill finally ends up as, because we are still on a steep learning curve with this. It would be unfortunate if we were to say, 'This is the way it has to be,' and then it was that way for the next x years. We are all learning in this business. One thing that I can say is that it is low risk. The risk is very manageable. The risk has been overstated in the newspapers and in various statements made by various groups. It has been overstated; there is no question of that. 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. But you have to back that up with monitoring and verification.

There are going to be various stages. You are going to do more monitoring when you are injecting the CO₂ and you are going to be doing progressively less monitoring as you close down the site, and then there will be post-closure monitoring, which will ramp down. It is very important that we do not attempt to overmonitor. It has to be fit for purpose. You could kill off this technology by putting together too rigorous a regime; an unnecessarily rigorous regime would start costing a lot of money. It has to be fit for purpose. I am not suggesting that you should skimp at any stage with this; it is a very important part of the process. The process we are going through with our work project is helping us to define what we will need to do in the future.

Mr Morvell—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. But for the first few the proponents should expect—and the community will expect—that regulators will be more intensively monitored until we have that level of confidence with the technology.

CHAIR—For the record, could you give us a quick outline of the Otway project and what its objectives were? Also, what has been the CRC's budget over the period of time that you have been operating? Dr Cook, you touched on the regime under Victorian law under which you are doing that. Is that an environmental protection agency? Could you answer those three questions for our record.

Dr Cook—The CO₂CRC commenced in 2003. We are currently funded to 2010. We commenced planning for the Otway project shortly after we opened for business. In early 2004, we developed the concept. It took us several years to pull together all the funding and so on. In total, it has cost in excess of \$30 million to get us to where we are at the present time. We have the next stage proposed, and that will add an additional \$10 million. There will be additional requirements. This is going to end up as a \$50 million project—that sort of number.

The first objective was to show that you can inject carbon dioxide under Australian conditions and do it safely and securely. Our plan is to inject somewhere between 50,000 and 100,000 tonnes of carbon dioxide over one to two years. The uncertainty is because we will inject for as long as we can get results out of it. In other words, we are not injecting just for the sake of injecting. It will be a minimum of 50,000 and could well be as much as 100,000. That is the first thing: to demonstrate to people that you can do it. We have currently injected about 12,000 tonnes of CO₂. We are injecting at a rate of 160 tonnes a day. We have been injecting now for four months. We have had no problems with the injecting. It is going along very smoothly and very effectively.

People can go there and kick the tyres and see that this can actually be done and it is not rocket science. It is something that can be done now. People who say, 'This is untried technology and it's going to be years and years before we can show that this works,' are talking nonsense,

quite frankly. It is working now in Australia. We are storing CO₂ in Australia. That is the first thing.

As part of that, community engagement was very important. We are not doing this out in the desert; we are doing this where people live. Some of the other lessons really related to how you interact with the community, and that has been very important.

The third thing we had to do was work through the legislation. Nobody had done this before in Australia, so nobody quite knew what legislation applied. It turned out that there were about six or seven different types of legislation, most of which related to the state although we did go through the EPBC Act as well to confirm that this was not going to trigger that. So there was a federal component there. For the most part, we had to deal with six or seven state instrumentalities but it was mostly the EPA. We were doing it under the EPA's R&D legislation, which allows you to inject various things as part of a research project. We were doing it under that legislation. Obviously, for a large commercial project you would not use the same legislation. Nonetheless, it provides you with some very good guides.

Last, but by no means least, the absolutely crucial component of the project was to show that you could monitor and verify the carbon dioxide and demonstrate what is happening under Australian conditions. It is one thing to be able to say, 'Well, it's been monitored in the North Sea; therefore it's all right.' Quite frankly, the geology is different in the North Sea, so we have to do it under Australian conditions. That is what we are in the process of doing now.

CHAIR—Where does the CO₂ come from?

Dr Cook—What we are doing is using what could be regarded as a surrogate power station. It would have been nice to have had a power station do the whole thing. If we had done that, it would have cost us hundreds of millions of dollars to put this project together. What we did was purchase a gas well that is very high in carbon dioxide. It has 80 per cent or more carbon dioxide. The minor component is methane. We originally intended to separate out the methane as well, but quite frankly the budget did not allow it. So we are injecting mostly carbon dioxide, but there is some methane. That is about 2½ kilometres away from where we are injecting the CO₂. What we are doing is compressing the CO₂ from the gas well, sending it down a pipeline that is about 2½ kilometres long and then injecting it two kilometres down into the ground—into the subsurface; into suitable rocks.

Ms LIVERMORE—I have two questions, which are completely unrelated to each other. Does injecting the methane mean that you have to employ different mechanisms to monitor what the methane is doing down there?

Dr Cook—No. Because of the depth and various other reasons, the methane is also in the supercritical field—the same supercritical field that the CO₂ is in. So you are able to inject the two things together. The presence of methane does complicate the monitoring. We are having to work through that at present. But there is some residual methane in the formation we are injecting it into, so it does not matter that much. What we are proposing to do in our next stage is to inject it into a slightly shallower formation that does not have any methane in it at all. But, looking at the stability fields and so on, we do not believe that it is going to make too much difference. If it were a higher percentage of methane, it would start to make a difference.

Ms LIVERMORE—I understand that the Otway project is an R&D project, so it is more about the technical aspects of it. But has the project told you anything so far about the commercial viability of this technology?

Dr Cook—The commercial viability is inextricably linked to how much CO₂ you can inject into these rocks. You start off with a hypothetical amount and you end up with an actual amount. One of the lessons that we will be learning from this exercise is how the hypothetical lines up with the actual. That is going to be a very important commercial issue, because, if you do your sums based upon being able to put in 100 million tonnes of CO₂ and you can put in only 50 million tonnes, that makes a big difference. That is the sort of lesson that we are going to be learning that is going to be very important to the commercial projects.

Working through the existing legislation has turned out to be incredibly important to some of our stakeholders. It is really important to learn these lessons from a smaller scale project rather than having to learn them in a billion dollar project. Those sorts of things are really very important on the commercial side of things.

In terms of the costings, no. We are doing a small-scale project, so the costings are much higher. You would have to say that \$50 million for 50,000 tonnes or 100,000 tonnes is a lot of money per tonne of CO₂. But once you start talking about 50 million or 100 million then that is going to change your economics completely.

CHAIR—Thank you very much for your contribution. We really appreciate your effort in coming up and giving us this evidence. It is a big issue that we are tackling. We are trying to get that legislation in place to drive this forward. Your work is certainly helping the nation. We thank you for that. If there is anything that we need to write to you about, we will do that to seek your knowledge. We will send you a copy of the transcript, which you are allowed to make editorial changes to. Thank you very much.

[10.05 am]

INGRAM, Dr Geoffrey Malcolm, Regional Manager, Australasia, Schlumberger Carbon Services

CHAIR—I now welcome the representative of Schlumberger Carbon Services. You are not required to give evidence under oath but I should advise you that this hearing is a formal proceeding of the parliament, therefore it warrants the same respect as proceedings of the House. It is customary to remind witnesses that giving false or misleading evidence is a serious matter and may be regarded as a contempt of the parliament. The committee has received your submission; are there any corrections or amendments you wish to make to it?

Dr Ingram—No.

CHAIR—Do you wish to make a brief opening statement?

Dr Ingram—Yes. Firstly, I would like to thank the committee for the opportunity to speak with you today. If I may, I would like to give you a very short overview of what Schlumberger and Schlumberger Carbon Services does. It tends to be that unless you are working in the oil and gas industry, you would not have heard of Schlumberger, so I thought I would start off by giving you a brief overview. Schlumberger is the world's leading oilfield services company, supplying technology, information solutions and integrated project management for the oil and gas industry. It was founded in 1926 and today the company employs more 80,000 people of over 140 nationalities working in approximately 80 countries. We spend heavily in research and development and last year invested US\$728 million in R&D. A significant proportion of that goes into carbon related research and development for the CO₂ storage business. I would like to emphasise that Schlumberger never has and never will take equity or production sharing contracts in oil and gas businesses. We are purely a service provider to the oil and gas industry.

I appear today on behalf of Schlumberger Carbon Services and my comments relate specifically to the carbon storage business. Schlumberger Carbon Services provides comprehensive geological storage solutions for CO₂. Technical expertise, project management and technology are leveraged from more than 80 years of proven sub-surface evaluation experience in the oil and gas industry. The philosophy behind the establishment of Schlumberger Carbon Services was to take the skills and technologies developed for the exploration and production in these industries and apply those to the new exploration and injection industry that will form the carbon storage business. We are participating in almost all of the carbon capture and storage initiatives around the world and have created this business unit to develop the capacity to design, build and operate carbon capture and storage projects.

You will know that if CCS is to have an impact on the CO₂ concentrations in the atmosphere we will need to store billions of tonnes of CO₂ underground over the next 40 to 50 years. The sheer scale of the challenge is daunting but, with the right political and economic drivers in place, eminently achievable. Mindful of the scale of the CCS challenge, we have formed a range of alliances aimed at reducing barriers to large-scale implementation of carbon capture and storage and these are with companies that include General Electric, WorleyParsons and Air

Liquide. These alliances will be able to deliver full-scale CCS projects on an industrial level sooner rather than later. You will appreciate the urgency of this inquiry as the Garnaut, the IPCC and the Stern reports have shown that the longer we delay in taking action to move to a low-carbon economy, the more expensive it becomes. Prices for materials and labour will continue to rise, and one of the items we are looking at with our partners is the actual cost today for implementing carbon capture and storage on an existing power station. A lot of the published work on CCS costs uses older data which does not take into account the rampant price inflation in the engineering, procurement and construction market that we have seen over the last couple of years.

We are in current discussions with state governments in Australia regarding industrial-scale storage sites which will have the capacity to store at least one million tonnes of CO₂ per annum. We call these sites LASSIEs, which stands for large-scale storage sites, and the groundwork of finding these appropriate sites with a proven storage capacity is being done now, parallel with carbon capture implementation, so we can get industrial-scale projects up in about 2016. For this to materialise, we believe the likes of public-private partnerships will be appropriate mechanisms to bring these projects online, and it will be a combination of state, federal and industry money that gets these projects up.

I would like to acknowledge the excellent work done to date within Australia by all the stakeholders in moving CCS closer to a commercial reality. This includes the Victorian and Queensland governments in particular, the federal government and the CO₂CRC and its industry partners, of which we are one. We have been heavily involved in the Otway Basin pilot project, which Peter Cook earlier explained to you, and we are currently managing the storage phases of the Callide Oxyfuel Project in Queensland, which is another example of how partnerships between different industries really help in bringing clean coal technologies into the mainstream.

In closing, just on a personal note, I think Australia is extremely well placed to benefit from CCS technologies—not just for our own industry but also as a new industry in Australia that has been able to design, construct, manufacture and install these technologies both locally and within Asia. I have no doubt that once CCS is available it will be taken up by the Chinese and Indian power industries.

CHAIR—Thank you very much. In your submission, you identify information issues existing between the oil and gas producers and the new storage proponents as a significant problem. What is that problem, and could you identify what data you are actually talking about that is needed to move forward?

Dr Ingram—Yes. As Dr Cook mentioned, the fact that a certain area is producing oil and gas gives you certain basic geological information that there is a suitable reservoir, there is a suitable sill, which has kept the hydrocarbons in place for millions of years. That data will have been gathered by the oil and gas industry as part of the exploration for the hydrocarbons. It would include seismic information; it would include a lot of down-hole measurements. There is almost, in certain cases, 30 or 40 years of accumulated data about an area that the oil and gas industry would have, just by virtue of being there first and producing. If you were a new entrant in the storage business and there were a means of getting access to that data, then a storage proponent could decide whether the place was suitable for a large-scale storage site. But, again, you have to recognise that much of this is confidential and is not necessarily publicly available.

I think the Coal Association submission suggested that there may be a means of making sure that the data is shared, such that if an oil and gas producer wanted to apply for a storage licence over their own existing operations then, under a confidentiality agreement, that information may be made available to any other parties that were considering applying for that acreage. So at least it would put everyone on much more of a level footing—rather than operating in a bit of a data vacuum.

CHAIR—Okay. You mentioned that you think that government-industry partnerships might be a starting point to kick off the storage of CO₂.

Dr Ingram—Yes, certainly for the capture and storage of CO₂. You would have heard yesterday from the Woodside representatives that when they process the gas from the Browse development they end up with a relatively pure CO₂ stream that can be injected. That is not the case with heavy industry or power users, where the CO₂ often needs to be purified, captured, compressed and then transported. So I would imagine, for the likes of heavy industry and power users, it will develop on a model that we have seen with the Callide project, where we have the generators and we have the federal and the state government and, indeed, we have got the Japanese government and some of the Japanese power producers in the consortium along with the Coal Association, Xstrata and us.

So you have a range of partners, each with their own little area of expertise, that is capable of putting it all together and doing it on scale. The risk is that, because the economics are rather ugly at the moment, if everyone is working on their own little bit there will not be the tweaking that you need in an engineering sense where the capture guys need to talk to the transport guys who need to talk to the storage guys to make sure that you are not inadvertently raising costs by doing or not doing something. In order to find the lowest common denominator between the parties, you need to put them all in a consortium to get on with it.

Mr PERRETT—Can you tell us why the Callide Oxyfuel Project is 30 megawatts compared with some of the other operations you have commenced around the world? What is the status of the first stage and the second stage? And do you have an idea as to where the saline aquifers or the depleted oil or gas fields would be?

Dr Ingram—The 30-megawatt scale was more to do with the fact that the Callide A unit, where it is going to be put, is mothballed and it happens to be 30 megawatts.

Mr PERRETT—So that was the determinant for scale?

Dr Ingram—Yes, it was. It had been shown on a much smaller scale—I think a couple of megawatts. It is a nice step in engineering terms: pretty much the rule of thumb is that if you go for a 10-fold increase, that is nice; it is manageable. If it works on 30—

Mr PERRETT—So the next one is going to be really big?

Dr Ingram—At 300 it will be. This is an oxyfiring: essentially you are burning coal in oxygen, rather than in air. So the CO₂ is much more concentrated because you do not have the nitrogen that you have in regular air which composes 70 per cent of your flue gases. Essentially, the design of the boiler is to make it cope with pure oxygen being fed in. So you have an air

separation unit in front of the boiler that strips the nitrogen out and feeds the pure oxygen into the boiler, it burns the coal and it recycles a little bit. You then end up with a relatively pure stream of CO₂, which can then be compressed, transported and injected. At the moment, we are looking at the Northern Denison Trough in inland Queensland for the storage. We are talking with the existing operators there about using one of their depleted fields as—

Mr PERRETT—Is it a depleted oil and gas field?

Dr Ingram—It is a depleted gas field just around there. Again, this will help the existing operators learn how to deal with CO₂. I think a lot of them are working up to the fact that if you have these oil and gas reservoirs, once they are depleted they could be used for storage.

CHAIR—Would the transport distance there be 200 kilometres?

Dr Ingram—It is about that. Again, we are going through a number of internal processes. It is just like an exploration program where you start with a few candidates and then you knock them out. Essentially, you want to shake the bag very quickly and find a few good candidates; it is almost like short-listing for an interview process. You go through the candidates and find out which ones are good and then focus more of your efforts on them.

Mr PERRETT—So you do not have any property or tenement interests at the moment?

Dr Ingram—No.

Mr PERRETT—If you did have them, what would they be? Would you go under the minerals act?

Dr Ingram—I think a lot of the states are lining up behind Queensland's legislation for the property rights. Queensland has the expertise in the overlapping coal seam and the coal tenements. You may ask why we are going onshore. The fact is that it is a hell of a lot cheaper to do stuff onshore than offshore at the moment. It is access to people and technology as much as to money that gets these projects up and running, because in the oil and gas market miners or people with any set of skill level are in such short supply these days. You have to remember that in a lot of cases we are operating in a global market, so the competition for projects is international.

Mr SIDEBOTTOM—I am just interested in the project which you people are signed up with. Can you tell us how that is going to advance this whole question of capture and storage technology, and particularly what you anticipate from that?

Dr Ingram—Sorry, are you referring to the—

Mr SIDEBOTTOM—The Illinois scheme.

Dr Ingram—The Illinois one, yes. Again, that is an example of how you get a CO₂ producer working with the US Department of Energy involved—the local Illinois geological survey. In a way it is very much another look-and-learn thing; to get the right parties in the room. That one is going to capture CO₂ off an ethanol plant. It is a bioethanol production plant, owned by the

Archer Daniels Midland Company, so it is a fairly concentrated stream of CO₂ again. It is going to be injected into a large underground saline aquifer that pretty much sits under about four states in the US. This could potentially store hundreds of millions of tonnes of CO₂ longer term. It is actually very well situated because most of the US coal fired plants are in the Pennsylvania and Virginia area, so it is definitely well within the realm of turning into a much larger storage site. That project I think was awarded about US\$60 or US\$70 million from the US Department of Energy, and that is only one of six or seven projects that the federal government in the US is funding, so they really do put the money behind the—

CHAIR—What was that number you just mentioned?

Dr Ingram—US\$60 or US\$70 million for that one project, and that is matched with industry money.

CHAIR—Is this Illinois project taking CO₂ from the power stations in that area?

Dr Ingram—Not at the moment. It is purely from the bioethanol plant, but because the storage site looks to—

CHAIR—It has got the potential.

Dr Ingram—It has the potential. You could imagine that once the power generators start to capture, that would be a logical place to store.

Ms LIVERMORE—On that subject, that is not being set up as an R&D or pilot plan. It is setting up as a commercial operation.

Dr Ingram—Almost. The problem is that, if you need to develop storage, the process you would go through for developing a small-scale site is essentially the same as for a large-scale site, so arguably you are better off going for the larger sites earlier, because the time and skills required are exactly the same. That is the approach we have taken with the LASSIE onshore, particularly in Victoria. They say, 'Look, it will take two years to prove up a site, but rather than look for a fit-for-purpose site we are going to look for something that can store tens or hundreds of millions of tonnes of CO₂ over the lifetime of the project.' Again, with these economies of scale that we had for a larger site—whereby, even if you are only receiving a million tonnes a year, you can sequence the wells as more CO₂ will allow—you would sink another well that can inject more CO₂. So you can defer the capital expenditure much like you develop an oilfield, in the sense that you do not sink all the wells immediately; you bring them online once you get the processing facilities for that. For a long time there should have been a concept that we cannot do capture because we do not know whether there would be storage. It is the whole chicken and egg scenario. The Otway project has shown that storage does exist and you cannot really use the fact that we do not know where we are going to store it as an excuse not to get on and do the capture. The philosophy we have taken behind the LASSIE is that we will build a storage site, capture the CO₂ and rest assured that there will be a site available for the storage.

Ms LIVERMORE—You obviously have a lot of experience with these sorts of collaborative projects. In your submission you suggest that the bill could build in a mechanism to put more

onus on the parties to come to commercial agreements and reach partnerships. Can you expand on that and suggest how the bill could be improved and build in that mechanism?

Dr Ingram—On Anglo Coal's submission and the experience, I think Queensland has a very good mechanism—there is a time limit and there is negotiation in good faith between both parties. There is technically no reason why, provided all care is taken, you cannot have storage and production happening in the same area. As Dr Cook mentioned, this is happening around the world. It is the same operator, so you do not have that commercial conflict, although I dare say there may be conflicts internally between the production and the carbon teams: 'Why are you even thinking about going there?' You could have a time limit with the ministerial veto and equal wording in the bill that says it is not only the Offshore Petroleum Act but also the greenhouse gas storage act.

The other thing to realise is that over the next 20 or 30 years there may be only 20 big storage sites. There are not going to be 100 little ones like there are 100 little oil rigs that are producing. The ministerial veto or public interest test may be used only once or twice if you really cannot come to a commercial agreement.

Mr PERRETT—You were here during Dr Cook's presentation. Can you add anything in terms of monitoring technologies and the challenges there are with monitoring that you have learnt from your projects?

Dr Ingram—Certainly we would agree with what Dr Cook said. We are heavily involved in the Otway project both as a technology and services provider and as a member of the CPPL, which is the operating company for the Otway project. 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.

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. Therefore, as long as it is safe, a lot of the monitoring will be down hole and remote. 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.

Mr PERRETT—We have had evidence about how remediation could occur if something were discovered. With your background, could you explore what you can do if you find something is going wrong—it is migrating through the cap or something. What can you do to mitigate, mediate or prevent that?

Dr Ingram—There are a lot of well interventions you can do. You can unseal the well. You can go back down and re-cement, if your sealing has not been done properly or if you are finding corrosion in the pipes. But, again, remediation is something you really do not want to do. Ultimately, if you have closed a site, having to go back is going to be expensive. So the more

work you do up-front—to make sure that you know exactly where the CO₂ is going to go and how it is going to behave down the well, and to make sure that your well construction, your site and your monitoring tools are the best you can get at that time—the better. Prevention is better than cure—that is a philosophy that is going to have to be employed with this storage. Get it right first time; you do not want to go back and remediate later unless you have to.

That is interesting because, if you are using a depleted oil and gas field as a storage reservoir, logically the easiest pathway for the CO₂ to leak back to the surface is up through an old well. That is why, if you are considering using a depleted field, you really have to know everything about the condition of those wells: where they are, how they were closed off and how they were capped. It is likely that, if they are more than five or 10 years old, they were not capped with CO₂ resistant cement or something.

So it is not necessarily a no-brainer to use a depleted oil and gas field. It is really going to depend on the condition of the well and where the CO₂ is going to migrate to. Often it may be cheaper to develop an entirely new greenfield site, because the risk profile of that is so much lower than that of using an old oil and gas reservoir. So, again, it comes down to the fact that it is data-intensive in the first couple of years, but that should ensure that you know exactly where the CO₂ is going to go, so you can design a cost-optimised field development program.

Mr SIDEBOTTOM—Can I take you back to the Illinois project and also ask you to reflect on page 4 of your submission. What is driving the Illinois project? Obviously there is interest in the technology to abate the creation of carbon or to capture it. Are the states involved in a carbon emission trading scheme?

Dr Ingram—It is really a delineation between the federal politics and the state politics. The states are really quite committed to reducing their emissions. California is perhaps the best example; they have quite stringent state laws that say emissions must be reduced by so much by 2020.

CHAIR—They are ‘terminating’, aren’t they!

Dr Ingram—It is sort of like, ‘We will terminate these CO₂ emissions’!

CHAIR—It is their environmental dictates or policy.

Dr Ingram—It is. But also you have a lot of projects in the US where energy security is a massive thing. There are a lot of coal-to-liquid projects that are being considered in the US. The US Department of Defense has given assurances that if you can produce diesel from coal they will buy the lot of it. So there are a lot of geopolitical concerns that mean they are putting the investment in. But, at the same time, there is a lot of public concern. And there are even investor concerns. You have had a few of the large investor groups that have taken over TXU, and they pulled back plans to develop new coal fired power stations as an investor response against climate change. So it is just really to keep a lot of your existing industries and business. If you cannot offer a lower carbon footprint than you have already got, it will be difficult to get finance and it will be difficult to get public approvals to continue.

Mr SIDEBOTTOM—Moving on from that to the comment on page 4 of your submission: the existence of a carbon emissions-trading scheme of some description would be a major impetus for this, apart from the social responsibility and the environmental concerns and so forth?

Dr Ingram—Yes, it would be. 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?

CHAIR—I have one last question. You are a service company.

Dr Ingram—Yes.

CHAIR—Would you see opportunities to become a monitor of CO2 storage, post closure, or during the operation and then post closure as a monitor? Would you see that emerging as an industry?

Dr Ingram—That is an interesting question. Again, we are a service company in the oil and gas industry and, because carbon is essentially a new business, we have ended up with very small equity stakes in the Otway and the Callide projects. With the rationale behind the LASSIEs, the large-scale storage projects, we are in a position where, if we do not put money up to develop these projects ourselves in partnerships with other agencies, it is hard to see who else could do it because often the power companies do not have the capital required to develop these. It is more a philosophy of: ‘This is a new business; therefore let’s look at all the different models we can so as to see whether we can make a return on investment.’ It may well be the partnership model, where you end up with us and a bank et cetera, that develops the large-scale storage projects.

CHAIR—For public confidence—and government may not have the expertise or whatever—it might be best to have some body that is appointed to do the monitoring and produce the data from the monitoring post closure of storage sites.

Dr Ingram—I think so. 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 you would need to have trust on both sides so they can be seen as genuinely independent and therefore giving an unbiased tick.

CHAIR—The public interest as such.

Dr Ingram—Yes.

Mr PERRETT—In talking about monitoring and the like, you seem to indicate that it is more important to get the ducks lined up early because, by getting the data right upfront, that is where the savings are later. So in terms of the options of the government and using the carrot or the stick in making sure the greenhouse storage gas operators get it right, it would seem that the carrot is much more favourable than the stick in terms of trying to hit someone around the head after the fact and saying, ‘You should have done this and now you need to remedy it.’

Dr Ingram—I think it is, and 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.

Mr PERRETT—Unfortunately, there are shonky operators out there, and obviously with your company's long record that is not the case. In terms of the role of the state, if there were some incentives and some sort of tax relief to reward companies for getting it right early—you are saying there are also financial incentives to get it right early, to do the hard yards early. I am just kicking around some ideas from your comments on that.

Dr Ingram—I think so. Again, it would be in the states' interest or the federal interest to get these projects up sooner rather than later. If you see the emissions reduction that is required to meet the 60 per cent by 2050, CCS is going to play almost a dominant role in that. We hear a lot of the negatives of how it is going to be extremely difficult. It will be extremely difficult, but look at the opportunities you will get by being the first to do this. You can install it in China, India—the rest of the world. These are highly skilled jobs that would be pretty much kept here.

Ms LIVERMORE—Going back to where we started, regarding the importance of sharing data between the existing operators and prospective greenhouse gas storage operators, and your suggestion about the open release of data, I am trying to gauge how radical that requirement would be for oil and gas producers.

Dr Ingram—I think the time period is much shorter. I think after about five years all your data has to be released publicly. We could almost give you a list now of what is the most critical data. It is often flow rates and pressures—a lot of the down-hole stuff that you can only really get once you are producing from the reservoir. That gives you an awful lot of insight into the real nature of the reservoir, which helps you decide fairly quickly if it would be suitable for storage.

Ms LIVERMORE—So right now that data would normally be publicly available five years after it is produced.

Dr Ingram—Yes, pretty much. But even then it can be in different formats and it may not be continuous.

CHAIR—I think that is a little commercially sensitive.

Dr Ingram—Yes, it is.

CHAIR—What one company is producing et cetera fits into its overall commercial interests, I guess.

Ms LIVERMORE—I have one final question. Going to the issue of liability, your position on that is quite different to so much of the evidence that we have heard in terms of the fact that the bill currently leaves common-law liability where it falls, and you are agreeing with that in your submission. Would you explain why you take that position?

Dr Ingram—Again, this comes down to the earlier question about getting it right from the start. It is one of those things where I think you would be rewriting English law if you tried to get away from the common-law liabilities. If someone does something shonky, you always have the right to go after them. There will need to be some kind of handover of liability from the operator to the state. Again, this is something that should be negotiated perhaps on a project basis, provided you have been doing everything to world standards and been taking a lot of data.

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. As a taxpayer, not a company representative, you want to make sure that the government is not taking on this steaming pile of manure that is going to blow up at some stage. We say that, if the companies know what they are doing and have confidence in what they are doing, then what they are handing back to the government five or 10 years after closure is something that is behaving exactly as planned and you have a lot of confidence that it will continue to behave exactly as you predicted from the modelling. We see that there will be a transfer of ownership, or a transfer of residual liabilities, but as long as a site is operating it is the project operator’s responsibility.

CHAIR—There must be a date of closure. We are talking about many years maybe. There must be some sort of closure, I think.

Dr Ingram—We suggested maybe five or 10 years. As Peter Cook said, if something is going to go wrong—if there is something unexpected—it will go wrong early. Even when you are drilling or injecting, you are always taking in new, real-time data, so you know exactly what is happening underground. If that is corresponding to your models then that should give you confidence in your computer modelling of what the CO₂ is doing. Therefore, if it is behaving exactly as planned, then the government should say, ‘Okay, five or 10 years—fine. It is behaving exactly as planned; there are no surprises. We’ll take it.’ If something starts to go wrong, the government should implement a review to say, ‘Okay, there’s now a clock-stop on it. It has to stabilise and come back to a state that will give us confidence that what has happened can be managed.’

CHAIR—Thank you very much for your time and for your submission. If there are any other matters, we will write to you.

Dr Ingram—Thank you.

Proceedings suspended from 10.45 am to 11.12 am

HILLMAN, Mr Ralph, Executive Director, Australian Coal Association

SINGLETON, Mr Scott, External Legal Adviser, Australian Coal Association

DAVISON, Ms Megan, Assistant Director, Victoria, Minerals Council of Australia

FRASER, Mr Chris, Executive Director, Minerals Council of Australia

CHAIR—Welcome. Do you have any comments to make on the capacity in which you appear?

Mr Hillman—I am the Executive Director of the ACA.

Mr Fraser—Chair, I am the Executive Director of the Victorian Division of the Minerals Council of Australia and I appear here to replace Mr Mitch Hooke, who is unavoidably elsewhere today.

Mr Singleton—I am from Minter Ellison and I am the external legal adviser to the Australian Coal Association.

CHAIR—Although the committee does not require you to give evidence under oath, I should advise you that this hearing is a formal proceeding of the parliament, therefore it warrants the same respect as proceedings of the House. It is customary to remind witnesses that giving false or misleading evidence is a serious matter and may be regarded as a contempt of the parliament. The committee has received your submission and we thank you very much for that and for appearing today. Are there any corrections or amendments you would like to make to the submission before we start?

Mr Fraser—Not at this stage, Chair.

CHAIR—I invite you to make a brief statement and then you can take some questions from us.

Mr Hillman—Thank you very much, Chair; we would like to make some brief remarks. Thank you for having us here today to speak to our submission and thank you very much for agreeing to move our timeslot because one of our members was unavoidably delayed by fog.

First, let me say that the Australian Coal Association and the Minerals Council of Australia welcome the government's initiative in developing this legislation to permit the storage of CO₂. It is an objective of the ACA and the MCA that Australia move in the direction of a nationally consistent legislative and regulatory framework to allow the storage of carbon dioxide. So this legislation we have before us today is important in itself but it is also important as a precedent for state legislation currently being developed and as an international precedent.

The ACA and the MCA represent Australia's black and brown coalmining industries. Those industries together fuel 84 per cent of Australia's electricity generation, which underpins

Australia's energy security and also underpins our economic prosperity. Electricity demand in Australia is expected to double by 2030, and I think it is now widely accepted that coal is going to continue to play an important part in the generation of that electric power. If that is to happen, however, we must at the same time address our climate change obligations and address the emissions from coal-fired power, and this legislation, which will allow the storage of CO₂ captured from coal-fired power generation, is of central importance.

So carbon capture and storage is going to be central to Australia's continued energy security and central to meeting its climate change obligations. At the global level you could say it is even more important. I think it is also widely accepted that a very large proportion of future global energy generation is going to be done burning coal, and that is particularly true in some of the emerging dynamic economies such as China and India, who have made it clear that their priority is to raise the living standards of their people and to rely on coal in pursuing that objective. It is really important, therefore, that we have available for them the technology to capture and store CO₂ that they generate. I think Australia has a potential leadership role in this field, in developing the technology, demonstrating it in Australia and helping to disseminate it globally.

The black coal industry in Australia, represented by the Australian Coal Association here, has been proactive in thinking strategically about the technology solutions to the emissions from coal-fired power generation. It established the Coal21 initiative in about 2002, which brought together government, industry and researchers and put in place an action plan to demonstrate the key carbon capture and storage technologies by 2015. It subsequently put in place a \$1 billion fund to contribute to the financing of those demonstration projects. We currently are working on demonstration projects in the three principal capture technologies: post-combustion capture, where we are going to work with the New South Wales government and the Commonwealth on a demonstration project; oxyfiring, where we are just about to begin construction of the Callide A oxyfuel project in Queensland; and integrated gasification combined cycle technology, where we are working with the Queensland government and other partners in Queensland on ZeroGen.

The objective is to deploy these technologies at industrial scale, still as demonstrations but at commercial scale, by 2017. If we are going to do that, if that is going to be effective and meaningful, we must have in place appropriate storage. 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. 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. I will now pass over to Chris Fraser, who will speak on behalf of the MCA.

Mr Fraser—The MCA shares a common black coal membership with the Australian Coal Association but we also include the brown coal mining companies of Victoria in our membership. We are very pleased to partner with our colleagues in the Australian Coal Association in presenting our submission and speaking to you today. The MCA strongly believes that there will be no global solution to climate change without a clean coal solution. As Ralph has said, fossil fuels will continue to be the predominant source of energy for the foreseeable

future. In fact, with all the best opportunities for substitution with energy from other sources, we will still rely on coal to maintain our standard of living going forward. As I said, the climate change challenge really needs the new clean coal technologies to succeed.

As I think you are well aware, clean coal refers to a whole suite of technologies, of which CCS is just one of the critical components. As Ralph has also said, the actual transport and storage of CO₂ is not new technology but its key to success is the legislative framework that enables access, operation and closure along with the very important technologies of carbon capture at the source. It is for those reasons that we are very intensely interested in this bill.

In considering the issues associated with establishing commercial CO₂ storage operations, I would like to make a few points. Establishing a full-scale, viable and effective CCS operation will only proceed, in the early phases, through a partnership between government and industry—in particular, the identification of suitable storage sites, data availability and licensing along with the development of the pre-competitive carbon capture technologies which have also been discussed here today.

Australian clean coal technology leadership will have a significant role in cleaning up or retrofitting our stationary energy sector in Australia and will also have a significant influence on world emission reductions. China is installing 1,000 megawatts worth of power stations every nine days, and all of that is going to need retrofitting in the future. We believe we can play a part in that if we get the CCS technologies right. We will only get it right if we get the enabling legislation right. If we do not, we can wave goodbye to addressing climate change effectively in the foreseeable future.

The national interest must be considered along with the sovereign risk of each business and the extent of property rights. If power to effectively veto is left with the individual petroleum company, they will always claim an adverse impact and there will be no transparency or accountability in the manner in which they reach the determination and, therefore, no option for dispute resolution.

We also need to consider the bill in the context of the overarching competition policy. Barriers to entry where there is a natural monopoly on a national resource must be balanced. There should be no assumption of sole, unencumbered ownership of specific strata which are in fact the property of the Crown. It should only be the Crown that holds the veto.

There is critical complementarity between the proposed emissions-trading scheme announced yesterday and progress with the development of clean coal technologies. Without viable solutions to the technological hurdles, we will create a self-induced market failure. Creating the correct legislative framework for CCS to succeed is one of those critical hurdles.

We do not wish to raise a range of concerns regarding the bill without offering solutions, and I refer you to the detailed legislative recommendations contained in our submission. I would like to highlight a few of those recommendations. Firstly, we believe the development of an objects clause which reflects the new national interest in reducing greenhouse gases should be included in the bill. Section 15F needs to be amended, including the definitions of ‘significant risk’ and ‘significant adverse impact’. Section 442C needs to include the national interest in the definition of ‘public interest’. Section 79 on access to data and section 249 on acreage release need to be

amended. There are also various sections that need to be amended in relation to the interaction with the emissions-trading scheme, including the need to recognise that CCS is an offset to emissions.

We believe that these and other recommended amendments will deliver a level playing field for all parties. With your indulgence, I would now ask Ralph Hillman to summarise the key points we would like to leave you with.

Mr Hillman—I would briefly like to touch on four key messages. We have a very extensive submission with a lot of detail. The first point is that we need a level playing field for greenhouse gas storage and a level playing field for the national interest. Australia is about to embark on a major change in its economic life and a major change in structural reform. Priorities are going to shift enormously. All of a sudden climate change and addressing greenhouse gas emissions has become a national priority. The original OPA legislation was drafted with one or two things in mind. In a way, the idea of amending it to take in this massive new set of interests only partly works. We believe we can work with it, but there is a lot of rebalancing to be done. The importance of carbon capture and storage interests is not yet fully recognised.

Our second theme is about facilitating cooperation and negotiated outcomes. We recognise that the oil and gas industries are going to have a very important role in the successful implementation of carbon capture and storage in Australia both as participants and also because of the enormous knowledge and data they hold in this field. A lot of the act will be about dealing with conflicts of interest between petroleum people and storage people. We would like to see a process that allows negotiated outcomes. That would lead to many of the potential problems identified being resolved between parties rather than always having to be referred to the minister.

A third theme is that we would like to see a transparent process for acreage release. We would like to know the basis for the decisions the government takes on releasing acreage for petroleum or carbon storage. At the moment there is no transparency around that process. Finally, there is a general set of issues under the theme of removing uncertainties in the act. We need to tidy up or create definitions of concepts such as public interest and significant risk, and our submission goes into some detail on those issues.

CHAIR—You have highlighted several issues for the committee. First of all, let us look at how advanced we are and how far we go with the capture of CO₂, because that technology is vital to the coal industry continuing as an energy source. You spoke about old power stations versus new power stations. Mr Fraser spoke about China and retrofitting. Could you outline how far away that technology is so that we can get that on the record.

Mr Hillman—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. We are aiming to do that for the three technologies. For post-combustion capture there is a pilot plant operating in Victoria and there is one about to start operating at Munmorah in New South Wales. Oxyfuel is a world-leading project that the Coal21 Fund, the Commonwealth government and other participants are about to demonstrate at Callide in Queensland, and that should be up and running by 2012. Of course, we have the ZeroGen project, which is an integrated gasification

combined cycle. The Coal21 Fund and the Queensland government are currently funding a feasibility study for a new concept for ZeroGen which aims to have that technology running at commercial-scale demonstration by 2017.

CHAIR—How much money is there in the Coal21 Fund? Is that coming from industry?

Mr Hillman—It is a billion-dollar fund, over 10 years, raised by a 20c per tonne levy on coal production. People often say, ‘Is it enough?’ I should point out that it is adequate for current purposes. It does make a very substantial contribution to individual projects. I mentioned the Callide project. That is a \$205 million project. The Coal21 Fund is contributing \$68 million, which is more than a third of the total. In the case of the New South Wales post-combustion capture project, we are contributing \$50 million out of \$159 million. This is a very substantial proportion of project costs.

CHAIR—We are dealing with big figures and we are dealing with new technology and new ways. I take it the industry’s main concern is to have access to storage at a reasonable price. The coal industry will have CO₂, post capture, to sell or put into storage. Your concern there is that you have a viable economic regime to store that at the best price possible. Is that correct?

Mr Hillman—In the case of the black coal industry, it will not be the industry’s CO₂; it will be the power sector’s CO₂. But the coal industry have taken a strategic view both nationally and globally that we want to make this work for the power sector. That is why we have put in the intellectual effort and the financial effort. On the storage side we are very concerned that there should be a national strategic approach to legislation and regulation so that we do not run into cross-border inconsistencies between the states and the Commonwealth. Above all, we want a regime that is predictable and transparent and lets investors comfortably invest in storage facilities in a timely fashion. As I said, we want to see our first industrial-scale demos going by 2017, so it has to be well before that. The demonstrations we are doing at the moment, some of which will be up and running by 2012, will need to have access to storage of some type.

Mr Fraser—Chair, if I could add to that: you asked if our interest in gaining access was on an economic basis. Our interest is in gaining access at all. We would see the bill as providing an implied veto to the current petroleum licence holders; so it is more than just an economic argument.

CHAIR—I understand that. The point I was trying to make there was that you will need to have the most economic regime possible.

Mr Fraser—Most definitely.

CHAIR—That is what you are looking for, I guess, to take CO₂. And there is some implication that there are other interests, maybe in the petroleum industry, that would want to pursue their own interests. It is finding the pathway through that process which we would like to see happen, with corporations working together to solve a public interest good for our nation and for the world. This committee is getting different views presented to it, which is probably understandable, as we try to sort out this very important issue.

Ms Davison—Chair, if I could just add one point.

CHAIR—Please.

Ms Davison—As Mr Hillman and Mr Fraser have also mentioned, there is a lot of effort going into pre- and post-combustion capture of carbon dioxide, but that research and that significant investment will lead nowhere if we cannot actually store the product of that pre-combustion and post-combustion capture. You have heard from various witnesses that Australia has some of the best sink-source matches in the world and the transport costs will not be as exorbitant as in other locations. Storage is proven. The capture is the expensive part and, the closer the source to the sink, the more desirable it will make the location—and in the interests of Australia.

CHAIR—Sure. I think the committee has already established the fact that the petroleum industry is pretty good in that it has the technology and knowledge for injection and storage, and has had it for a long time. So we basically know that. That is why I was trying to establish where the capture side is at, your points of timing. There are several pieces of the jigsaw we have to get.

Mr PERRETT—Yesterday we heard from the Australian Network of Environmental Defenders Offices. It was not an area of expertise for them, but they said that they thought that, in New South Wales, the property in the CO₂ was going to reside with the state, with the Crown—with the New South Wales government. You have just made it very clear that the property in the CO₂ will definitely not rest with the miners. Do you have any knowledge of that suggestion by ANEDO that the property would revert back to the Crown? I think it was irrespective of whether or not it was a state owned electricity generator or a privately owned generator.

Mr Singleton—The first point is that there is still a lot of uncertainty in terms of what is going to happen in New South Wales. Together with Western Australia, it is a jurisdiction that said it would wait and see what the Commonwealth does before it releases a lot more detail. In terms of the general law position, under general law the property in the CO₂, once it is stored, does not stay with the entity that put the CO₂ underground. Once it commingles and attaches, the doctrine of fixtures will apply and the CO₂ will become owned by the owner of the land. So, depending on the individual property law in application, that may very well be the Crown, if there are depth limitations. Here, given it is off shore, it is even more uncertain who the owner is. So the short answer is: I do not think there is clarity in terms of what New South Wales will do, but the common-law position is such that the entities that stored the CO₂ will not be its long-term owners in any event.

Mr PERRETT—So the electricity generator would own it until the transfer of ownership occurs with the coal—

Mr Singleton—In transport.

Mr PERRETT—Okay. They then strip it out of the flue or whatever, they own the CO₂ and then, subject to—

Mr Singleton—Yes, once it commingles and affixes, the doctrine of fixtures would apply and the owner of the land would become the owner of the CO₂.

Mr PERRETT—Which, for all intents and purposes, is going to be the Crown.

Mr Singleton—Potentially, yes.

Mr PERRETT—Subject to a petroleum lease or whatever.

CHAIR—Subject to the legal position that is laid down in legislation by the state and the Commonwealth to find the solutions that we need.

Mr PERRETT—I am sorry, Chair. Could I just go back to that?

CHAIR—Please do.

Mr PERRETT—According to that notion, in terms of the doctrine of fixtures, if the CO₂ escaped and was not a fixture it would belong to the person who put it there, I guess.

Mr Singleton—No. Once it becomes a fixture it is a fixture and the problem is—

Mr PERRETT—So the ownership transfers?

Mr Singleton—Yes, but bear in mind that ownership is not the be-all and end-all when we are talking about issues like liability.

Mr PERRETT—It is just a legal concept that was kicking around yesterday.

CHAIR—We will try to keep it away from the legal people and get definitions so that we keep it away from the High Court.

Mr PERRETT—They have to make a living too, Chair!

Mr SIDEBOTTOM—You will never keep it away from them. I have a question in relation to comments you make about the provision of objectives in the draft which you believe are probably minimal. You also make an interesting point in relation to storage. I refer to 2.2 of your submission. Perhaps I could just give it a bit of substance. This is probably outside the limits of what we are discussing at the moment, but you say:

However 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).

Would you like to elaborate a little more on this?

Mr Fraser—When we looked at the bill we saw that there was no linkage to the emissions-trading scheme that is to be developed. It seemed to us that there was a hole in the legislation. Whilst the bill that we are discussing today hopefully would enable carbon dioxide storage, there is no connection back to the market for the trading of credits, and so there is no commercial link

to a reason for doing it other than to sequester the carbon dioxide. There was no link back to the emissions-trading scheme. There was no measure of the carbon that is taken out of the atmosphere as being an offset for the carbon that is produced by the production entity. It could be implied that it does not enter the atmosphere and therefore it does not need to be included in the emissions-trading scheme, but the bill is silent in that regard. We raise that point because we believe that there is a need to recognise that the carbon that is sequestered is actually an offset.

Mr SIDEBOTTOM—I will come back to that. I was just interested in that comment. That is where I was going; that is all.

Mr PERRETT—When Australia gets a carbon-trading scheme up and running and a miner fills their ship with coal and sends it off to country X that has its own trading scheme, should the carbon in that ship be counted as part of the Australian trading scheme? I know what your answer is going to be, but I wonder if you could expand on why.

Mr Hillman—Why the carbon in that shipload of coal should be counted against, say, the Japanese emissions target? They have a Kyoto target.

Mr PERRETT—Yes.

Mr Hillman—These issues were thrashed out at enormous length and with enormous difficulty in the 1990s in the negotiation of the Kyoto protocol, and that is pretty much accepted now as the accounting procedure. The whole Kyoto protocol and the likely post-2012 framework are based on that assumption. Actually, that assumption is probably not a bad one from the perspective of Australia as a major energy exporter.

CHAIR—Thank you, Mr Hillman. We will stay post Kyoto?

Ms LIVERMORE—You made four key points in your concluding comments, Mr Hillman. One of them was that you wanted to see the bill, or the regime for greenhouse gas storage, facilitate cooperation between those operators and the oil and gas industries. Can you give us a practical sense of how it would operate and, I guess, how the bill can best facilitate that process taking place?

Mr Hillman—The instances we had in mind were where there is a contest between the CO₂ storage proponent and a petroleum and gas lease nearby or abutting or overlapping the storage lease in some way. There is provision in here for the petroleum leaseholder to essentially block or veto a proposal to store CO₂ on the basis of SROSAI. The minister, in making a decision on the proposed blockage, in some cases is obliged to accept the proposal of the petroleum proponent and simply prevent the storage procedure from going ahead. In others, he has the right to make the decision on whether or not it should go ahead on the basis of the public interest. It is provided in the act that he can take account of any agreement between the two sides in making his decision, but we feel that there are precedents in other legislation, particularly in Queensland and to some extent in New South Wales, where some of these potential conflicts or contests can actually be best sorted out by getting the two parties together at the table, thrashing it out and coming to a commercial arrangement which suits them both. We propose that that sort of arrangement should be mandated in the legislation and that the minister should be able to direct that that sort of negotiation take place.

CHAIR—So a ‘bargaining in good faith’ clause. You must not nod here, because the *Hansard*—

Mr Hillman—Sorry. I suppose you could call it bargaining in good faith but with a presumption that you are going to get to an outcome and that, if necessary, the minister might impose that outcome. Do you want to add anything from the legal perspective, Mr Singleton?

Mr Singleton—To take the analogy that we have used in the submission for the ACA and the MCA, of the Queensland coal seam gas regime, there is provision there where it is mandatory for a competing interest to serve a coal seam gas statement on the other interest. That sets off a series of negotiation requirements which, if unsuccessful, in some circumstances can result in the minister being able to receive further submissions and make a preference decision.

CHAIR—What penalties do we use if it does not occur?

Mr Singleton—In a sense, the minister has the final say in that regime in some circumstances. There are no penalties per se; it is just that the merits will be decided by an intermediary.

CHAIR—It comes back to the minister’s decision.

Ms LIVERMORE—In the legislation, there is a series of different activities that the greenhouse gas operator applies for. Would you imagine that sort of requirement for parties to come together happening at the first step, where you are applying for an assessment permit—I think that is what it is called?

Mr Fraser—Yes. It is at that stage that the access to the data is critical.

Mr Hillman—Access to the data is part of that process. It is a sort of parallel, isn’t it?

Mr Singleton—Yes.

Mr Hillman—If you are going to have that sort of serious negotiation, and if the storage proponent is going to be able to marshal his or her arguments in favour of their case, access to the data that is also available to the petroleum proponent is essential.

Ms LIVERMORE—I guess when you talk about bargaining in good faith that is what is implied in that, isn’t it?

Mr PERRETT—The Coal21 Fund has been around for a few years now?

Mr Hillman—Yes, since 2006.

Mr PERRETT—There has been the odd tonne of coal sold since then, so there is a fair bit of money in there. I note that the MCA people heard from Dr Ingram from Schlumberger earlier. I was wondering how much other investment had come into any of the projects, or were you bolting onto projects? What has been the atmosphere, I guess, around sending the money towards clean coal projects?

Ms Davison—For the brown coal industry there is a half-billion-dollar fund provided by the Victorian government, which has a requirement for the industry to provide double that amount, so it is a one-in-three process. So the industry is spending near on a billion dollars and utilising state government funding to actually prove up some of these capture technologies. Also, the industry has provided funding through the CO2CRC, as you heard from Dr Peter Cook. That is in the order of millions of dollars also. We are talking large numbers in demonstrations in particular. As we discussed earlier, storage is a better known technology. It is the capture technology that is the most expensive technology. There are in the order of billions of dollars in Australia being spent by the black and brown coal industries, with some seed funding or start-up funding from governments around the country for the pre-competitive technology development.

Mr Hillman—In the case of the Coal21 Fund, I mentioned, for example, the Callide Oxyfuel Project, where the coal industry is in for \$68 million against a total project cost of \$205 million. Other significant players there are the Commonwealth with \$50 million, the Queensland government, CS Energy itself and a range of equipment providers. I will not say it is easy to put these things together. In fact, it takes time to negotiate these financial packages before you actually turn a sod. In terms of demonstration projects at that sort of scale, the funding is there at state, Commonwealth and industry level to demonstrate those three technologies, with perhaps a question over ZeroGen and IGCC, because it is particularly expensive.

I think the big funding question comes up down the track, and this is something that Garnaut has addressed extensively and that I know the government is thinking about—that is: how do you fund the first of a kind commercial-scale demonstrations? You are obviously going to have a power generator in there, but the risks are enormous—first-mover risks. There is obviously going to have to be some matching finance, probably from the Commonwealth government, to get those first of a kind projects over the line. There is going to be a need for an ongoing financial contribution from the Commonwealth and states and the industry to run the current set of demonstrations and also to run the R&D programs necessary to support those demonstrations and identify new opportunities. There are other technologies out there that we are not yet ready to demonstrate but that may be prospective as the years pass.

CHAIR—In looking at two different industries in this inquiry—the coal industry and the petroleum industry—the petroleum industry seems to have shown a great deal of capacity to work collaboratively and to share commercial interests and achieve things, especially in the North West Shelf area, where there are a lot of operations. The coal industry seems to be a bit slower in getting there. I think they are starting to get there by being able to come together. How do you suggest that government push that in the public interest? It just has to happen from industries working together, does it not?

Mr Hillman—Collaboration is very important. I would not say the coal industry has been slow getting there. The Coal21 initiative began in 2002 to bring the power generators, the coal industry, researchers, state and federal governments and others together to try and work together to get a strategy to address emissions from coal-fired power. I think that collaboration was very strong and very successful and led to these very substantial funding flows from the coal industry itself, from state and federal governments and also from participation by the generating companies in individual projects.

The generators have not yet set up a fund to contribute to this technology. We would like them and others to participate. For that matter, we would like to see the oil and gas industries participate financially in some of the funding of carbon capture and storage technology. Ultimately they will benefit from it commercially in their oil and gas recovery but they will also benefit because ultimately gas-fired electricity will require carbon capture and storage if it is to survive in a carbon-constrained world.

CHAIR—This is going to be one of the commercial interests, isn't it? I mean brown coal especially; the cost of producing energy from brown coal with carbon capture could increase to an extent where gas will become more of a player in that field, but they still have to have a CO₂ component which will have to be stored. With all of those issues, you would think that that might be driving people to try and come together commercially more than what we are currently seeing.

Mr Hillman—Can I also add—and I may have missed part of the point of your question—that the coal industry and the power-generating industry are cooperating in these projects. Projects such as Callide, ZeroGen and some of the projects down in Victoria do involve the oil and gas industry; they are participants, including, at the project level, financial contributors. Shell is involved in ZeroGen, for example.

Mr Fraser—And in the Monash project.

Ms Davison—You heard from Monash Energy previously. That is a joint venture between a petroleum company and a coalmining company.

Ms LIVERMORE—I want to put to you something that Dr Cook stated in the CRC submission, and I think that Mr Fraser and Ms Davison were here for part of Dr Cook's evidence so hopefully it is not coming completely out of the blue. One of the things that Dr Cook suggested was that the minister could offer existing oil and gas lease holders a one-off opportunity to develop storage sites within their lease area, I guess as a way of as quickly as possible driving forward this sector of the industry—driving forward the storage of CO₂. Do you have any thoughts about that proposal?

Ms Davison—As you have heard from Dr Cook, the critical nature of the storage formation is the fundamental component. The type of cement that is used to actually line the well and the type and style of drilling can actually have some impact on the potential for that well to be used as a storage facility down the track. So a one-off opportunity, as I see it, would be for the coal and petroleum industry to work together to determine the best way of actually sinking a well for the initial petroleum recovery without compromising that well's use for further CO₂ sequestration.

CHAIR—So the petroleum industry could become the storage operators as well, and the generators of energy from coal, gas or whatever could concentrate on the capture of the CO₂ and then work out a transport system. Then, if the expertise lies with the petroleum industry, as long as the commercial liability and the costings et cetera were agreed to, they could be the storage operator.

Mr Fraser—In an ideal world I think that scenario could work, but I am not certain that the commercial interests of all of the different parties that would have an interest in such a venture would be aligned. We would need to be very mindful of that. It would be a terrible shame if the storage sites were offered up to a petroleum producer and then locked up for 25 years, in which time we would have an end to a coal industry that would never restart. Their commercial interests would be to promote the use of gas. When the gas has run out we will use the coal. We would have to make sure that the commercial interests and endeavours were aligned, and that is not necessarily the case.

CHAIR—There is a public interest that we have in front of us.

Mr Hillman—In a new industry like this, and in a country like Australia where competition is a key part of our economic success, I think you want this industry to be open to competition and not necessarily to hand out any particular privileges to those who may, at the moment, have an advantage in terms of information, knowledge or property. If we want this to be an efficient industry—and it needs to be efficient and cost effective—then it has to be open to everyone. I think that is a fundamental principle that underlies the amendments we have suggested be made to the act before us.

Mr PERRETT—This might be a question to be answered in the break, off the record, but, since we have the Victorian MCA here and the ACA, I wonder why the Victorian coal producers are not in the ACA? Is it because it is not really coal?

CHAIR—That is from a Queenslander!

Mr Fraser—I spent the large part of my career in the brown coal industry, and I do not agree with you.

Mr Hillman—They are fundamentally differently structured industries. I think that goes a long way to explaining it. But we cooperate very closely together, as you can see.

CHAIR—Sure. And there is a common interest in the CO₂ issue and in working towards finding the solutions to it on the economic level that we need to.

Mr SIDEBOTTOM—I note your concern that long-term liability will remain a significant or potentially significant impediment to investment in this area. But you cite 2015 as a significant date in terms of the Commonwealth taking up indemnity, if you like, for demonstration and commercial projects commencing before then from long-term common-law liability. Would you explain that a little more for the record—particularly the 2015 benchmark date?

Mr Hillman—As I mentioned before, it is the objective of the Coal 21 action plan to have demonstrated the key low emissions coal technologies by 2015, and I have mentioned the projects that we are putting in place to achieve that demonstration. These are costly projects. We believe we should be doing everything we can to facilitate their implementation and their success. That is why we suggested that the state take on the long-term liability for those projects, especially given that they are the first of their kind and there are a lot of legal and other, practical, uncertainties—Dr Cook described some of his experiences in setting up Otway—just to help facilitate the successful demonstration.

I should add, though, that we may wish to extend that beyond 2015. I mentioned first-of-a-kind, commercial-scale demonstrations, and we are probably looking at three of those in Australia between 2015 and 2020. I think we may need to look at the same sort of arrangement for those, because they will be first movers at commercial scale.

CHAIR—We are talking about a very low risk in the longer-term outlook. I think the evidence we have received from Dr Cook and others has been that it is a low risk the longer you get out, and we need to be doing things properly in the beginning. I do not think we need cowboys to be involved in this new situation of storing CO₂.

I want to thank you very much for your contribution and your very detailed submission. I apologise for our slight delay at the start.

Mr Hillman—Thank you very much.

CHAIR—We might need additional information as we work through the report and, if we do, we will certainly write to you.

[12.11 pm]

BOSHIER, Mr John, Executive Director, National Generators Forum

SCHAAP, Dr Harry Anthony, Policy Adviser, National Generators Forum

CHAIR—Welcome, and thank you for appearing before us. Although the committee does not require you to give evidence under oath, I should advise you that this hearing is a formal proceeding of the parliament; therefore, it warrants the same respect as proceedings of the House. It is customary to remind witnesses that giving false or misleading evidence is a serious matter and may be regarded as a contempt of the parliament. We have received your submission; thank you very much for that. Are there any corrections or amendments you would like to make to that submission?

Mr Boshier—No.

CHAIR—Would you like to make a brief statement?

Mr Boshier—Yes, Chair. Thank you for your welcome. We would just like to say, firstly, that the National Generators Forum is the industry body which directly represents the 21 major power generators in Australia's national electricity market. Verve Energy and Griffin Energy in Western Australia are associate members. As the peak industry body for Australia's electricity generators the NGF has a strong interest in the development of energy and climate change policies which impact on our sector.

Given that more than 90 per cent of Australia's electricity generation is fossil fuel based—and that means black coal, brown coal and natural gas—the NGF is vitally interested in ensuring viable, long-term, carbon dioxide storage facilities, including offshore areas. Indeed, without carbon capture and storage, transforming Australia's electricity supply from one with high emissions to one with low emissions whilst retaining Australia's competitive advantage would be an impossible task.

I would now like to make some summary points before answering your questions. Although limited to offshore waters, the bill is likely to provide a template for similar legislation by the states and territories for onshore storage. As such, this legislation takes on wider national significance. The NGF supports the federal government in drafting this far-reaching legislation well in advance of major carbon dioxide storage proposals. In particular, the NGF supports the amendments to the Offshore Petroleum Act aimed at providing equal standing, particularly for new petroleum and greenhouse gas storage proposals, in terms of exploration and assessment, production and injection, and special authorities and consents. However, in our view, the bill fails to establish sufficient legal certainty for access and property rights for the injection and permanent storage of carbon dioxide, particularly in relation to the various levels of agreements needed from existing petroleum licence holders.

The NGF is concerned that the principle of equal standing will not be applied effectively to areas of current petroleum exploration and production acreages or areas in close proximity to

such fields. Excessive levels of protection to pre-existing petroleum operators are likely to discourage investment in carbon dioxide storage exploration and potential commercial injection and storage. So NGF members have expressed concern that carbon dioxide storage rights may be less secure than petroleum title rights, and it is essential that the legislation be modified to provide greater regulatory certainty. The regulatory regime set out in the bill is unlikely to satisfy the requisite level of certainty required for investment in carbon dioxide injection and storage operations.

The above issues are particularly important for brown coal based electricity production due to the close location of potential storage areas in Bass Strait. Exploiting the synergy between advanced brown coal based electricity production and cost-effective carbon dioxide capture, transport and storage involving Bass Strait storage areas is an issue of national significance, and the legislation should be better framed to advance and not hinder such opportunities.

The launch yesterday of the government's green paper on an emissions-trading scheme will dramatically raise the stakes for this storage of carbon dioxide. Moving to a lower emissions profile will require investment of tens of billions of dollars as well as the commercialisation of low-emissions technology, and all of this will take time. The NGF, therefore, welcomes the statement on page 369 of the green paper, which says:

The Government will seek to ensure a gradual industry transition, avoiding the need for sudden, large-scale retirements of capacity before sufficient replacement capacity can be installed.

Importantly, Australian consumers expect that the reliability of supply will be maintained. This will be at risk if appropriate transitional measures are not implemented. For these reasons, the NGF has consistently advocated a smooth transition from where we are now to where we need to be.

NGF welcomes the green paper and is keen to work cooperatively with government to achieve this mutual goal. We intend to conduct a detailed analysis of the paper's policy options before providing our response. That ends our preliminary remarks. Thank you.

CHAIR—Thank you very much. This is a big issue, and it will take time to get on top of it. Do you believe that, in the future, generators of energy which use carbon capture technology will become sellers of CO₂ and require somebody else to store the CO₂? How do you see that industry developing: will generators be part of the storage industry or will new commercial identities emerge?

Mr Boshier—Of course, this is one of the big unknowns at the moment. A personal view, not necessarily a NGF view, is that any one generator is most unlikely to be able to afford a carbon capture and storage facility on their own, so it will be common property of some sort. It will be rather similar to the situation, I think, where a city council, on your behalf, collects and disposes of your refuse—refuse of all types via pipes, trucks and so on. A fee is paid by the person who puts out that refuse and the local government, in this case, takes the responsibility for taking it away and storing it.

Something like that is going to happen with carbon dioxide capture and storage. There will need to be extensive common infrastructure. For example, throughout the Latrobe Valley, I think

a consortium will be formed. The generators may or may not participate in equity ownership of that, but certainly they will pay a usage fee. That consortium will collect carbon dioxide at the point of the power station, once the CO₂ becomes pressurised and maybe liquefied. Then it will be piped to a common injection area, maybe in the Bass Strait or in the Otway Basin, and will be stored. Governments, as I understand it, will take the risk—because, let us face it, government owns everything deep under the surface of the earth—but there will be probably commercial firms acting for governments to collect and sequester that CO₂. There will be consortia, for sure, doing this kind of work. None of this yet has been even formally discussed.

CHAIR—Do you think that, in the initial stage, private-government partnerships might be necessary to help drive that forward?

Mr Boshier—That is a highly likely way to proceed. I do not think any one commercial company, particularly a generator, would want to take on their own the risk of a project like this. To help lower risk, it being done with government is a good idea. Certainly I think generators are facing enough risk in the future in just dealing with carbon dioxide reduction. Dealing with sequestration is actually not our business and we would want to pay somebody else to do it.

CHAIR—What is emerging is that those in the petroleum industry have indicated that, for their own situations, they would like to take CO₂ from gas at source or whatever, but they get worried about somebody else drilling holes in or near their reservoirs. Is there any reason why the petroleum industry could not emerge as the storers and injectors of CO₂ and that that be done on a commercial basis costing 10 per cent or whatever? Could that emerge as a scenario for generators?

Mr Boshier—Absolutely, it could. There is an issue of fair treatment and equal access, which is what our submission and our remarks went through. Provided there was very clear equal treatment between, say, coal people and gas and petroleum people, and there was no unfair treatment, such as denial of access, that scenario would be contemplated. Indeed, it could be argued that the petroleum producers have all the knowledge of the reservoirs; they know what is there better than any of us do. So, in terms of the safe sequestration of CO₂, they are in a good position to know all that. For a generator though to enter such a relationship, as I said, we would need to have a long-term price for the sequestration of that CO₂ and be assured of contractual rights.

CHAIR—Of course, you would want a fair and just commercial arrangement to apply.

Mr Boshier—We would. That was, I guess, the thrust of our submission to you and our concern about this draft legislation. The kind of scenario that you are talking about could well happen, so it has to be addressed and provided for so that we can invest in future into carbon capture facilities to enable the CO₂ to be stored safely.

Mr SIDEBOTTOM—That was my question. Of course, it is at the heart of your whole submission, in several different ways. The term ‘equal standing’ and how you are going to apply that under this act is a difficulty.

Dr Schaap—The NGF’s position is that this is a very good bill. It is a pioneering bill and one that is going to be very important, particularly when state jurisdictions institute their own

arrangements. We think it could be strengthened through two or three key points. Firstly, in the objectives, list the significance of carbon capture and storage in terms of environmental outcomes—the whole climate change dimension—

CHAIR—The public interest?

Dr Schaap—The second one relates to the risk of significant adverse impacts, the risk assessment. We believe it would be helpful if the issue of risk were set out very clearly in the act—what the risks are, how they will be assessed and the minister's functions with respect to these risk assessments. And, finally, there is the overlapping theme of the ministerial discretion with respect to the public interest test. Again, the bill could be strengthened in these areas by inserting some clear clauses as to what the parameters are, what the functions are and the ways of looking at this risk issue. The whole fact of risk will dominate the debate on pre-commencement activities, particularly with respect to Bass Strait.

Ms LIVERMORE—We have had evidence from other witnesses over the last couple of days proposing that the bill include some kind of independent assessment panel to operate alongside the minister or to provide advice to the minister on those questions of significant risk. Do you have a view on that suggestion? I know your submission talks about tightening up the minister's discretionary powers. Would the involvement of an independent assessment panel help?

Dr Schaap—We have not thought about this in detail, and we are happy to respond to it separately. It is always much more useful to proponents and users to have the bill, and therefore the act, very clear about these issues rather than leaving it up to separate functions of advisory bodies, although they can be very valuable, particularly at times of review and so on. We cannot dismiss that issue, but I think it is important to get these key factors put more clearly into the bill.

CHAIR—I know we are politicians and we should know all, but we are not quite that clever.

Ms LIVERMORE—Can you explain for the record and for my benefit—I come from Queensland and do not have any knowledge or experience of the brown coal industry—why it is so important to have this great effort put into the future viability of the brown coal industry.

Mr Boshier—That is a good question. You need to visit the brown coal mines to understand this answer. Brown coal in Australia is a unique worldwide resource. It has a very low overburden and very deep seams. It is a very low-ash coal—less than two per cent. It is a pure coal and it burns cleanly. The problem is it is 60 per cent water—and that is wet. As a result, when brown coal burns it emits a lot of CO₂ because of the vaporisation of that water.

There is an enormous amount of brown coal and it is concentrated in a small area. The power stations are mine-mouth stations—the coal comes out of the mine directly into a conveyor directly into the power station. It is very cheap coal to mine: the lowest cost in Australia. So it is a unique resource, and a method has to be found to burn that resource with low emissions. The other important thing—and this bears on a question from the chair earlier—is that these power stations are all in quite close proximity to each other; they are not spread out all over the place—you can almost see one from the other. As a result, collecting CO₂ from each of them and sending it to either the Otway Basin or the Bass Strait Basin is a long-term vision of the

generators. It is because these power stations are the highest emitters and because this is such a unique resource that there is so much interest in carbon capture and storage in Victoria, more so than in other parts of Australia.

In Queensland the generators are more modern. They are increasingly what is called supercritical: they operate at high temperatures and pressures. They will be viable for quite some time, until the emissions reduction caps really begin to bite—and then the Queensland generators will need to take drastic action to reduce their emissions. But early on in the history of the emissions-trading scheme it will be the brown coal generators that are most interested in this technology.

CHAIR—Are you confident that there is some good technology coming that will help dry brown coal before it goes into generating energy?

Dr Schaap—I think the answer is yes. The question is: will it be commercially viable vis-à-vis black coal? There are advantages to brown coal which you may have heard about. It is very active, therefore it can be readily gasified and therefore it can be readily put through a combined cycle. This can be done integrating the drying process at the same time through that IDGCC process, and then, ultimately, the gas stream or the concentrated CO₂ stream can be captured and stored with high levels of purity. The gas stream contains fewer impurities compared to that from black coal, which tends to be much higher in sulphur and certain other components. So it has those sorts of advantages.

The disadvantage, as John pointed out, relates to its wetness. Brown coal produces currently from this sector about 40 per cent of emissions, yet it only produces 25 per cent of electricity. And yet it is the cheapest fuel: nominally 30c or 40c a gigajoule in energy terms compared to other coal, up to \$2, and gas, above \$3. So you can see the strategic advantage of that fuel, but it has a very high carbon footprint. Hence, its link and its synergy with the offshore facilities in Bass Strait is so vital. That is the connection that has to be established in the new world order, otherwise brown coal, in our view, does not have a future.

CHAIR—There is a chemical change within the coal when you dry it, or there is a process that allows that to happen. Am I correct in that?

Dr Schaap—Sorry, what is the significance of the chemical change?

CHAIR—That it dries it, it changes chemically.

Dr Schaap—It largely changes it physically. It means that you cannot reabsorb the moisture. The pore size is destroyed and therefore you do not hold that moisture. But normally, with respect to these new technologies, that is not all that relevant. The relevant factors are it being able to be easily gasified and then used in the combined cycle mode, so you get the advantage of the efficiency of the combined cycle mode and then you have the advantage of having a fairly pure product for capture, transport and storage.

CHAIR—Would you be able to retrofit?

Dr Schaap—That is a good point. The issue of retrofitting or, as we call it, post-combustion capture is in some ways quite a different field. At the moment we are dealing with power stations where the CO₂ content of the exhaust gas is somewhere up to 15 or 16 per cent. The challenge is that that is expensive to capture because the other 85 or so per cent is products you do not want to capture. The whole process with post-combustion capture and storage is that you have to find a very, very efficient and cheap way of capturing the CO₂ out of that gas stream. Once you have captured it, the transport and storage side is the same as if you started with a concentrated stream, but it is vitally important to find cheap technology, such as ammonia or beta-amines or whatever, to work through that particular capture step.

CHAIR—You mentioned a couple of figures there on the cost of the energy from coal and gas. Could you repeat those.

Dr Schaap—Sure. The cost of brown coal into a power station is about 30c a gigajoule. For black coal it is around \$2. For gas it is normally over \$3—\$3 to \$5 or \$3 to \$4, depending on which state you are in and on what the added value of natural gas is in terms of price.

Mr Boshier—Chair, regarding your question about the chemistry of the water, certainly Dr Schaap is the chemist here, but as I understand it the water is embodied into the brown coal. It is not like a sponge where it is just soaked up; the water is embodied, so drying it out does involve a chemical change, but it is the change of trying to take out that water embodied into the structure of the coal itself.

Mr SIDEBOTTOM—I notice you have wind energy generators in your crew, which I am particularly interested in and we never seem to talk about much anymore. What reserves are left of brown coal in Victoria?

Dr Schaap—At current usage rates and at current commercial levels of viability, about 350 to 400 years—vast amounts.

Mr SIDEBOTTOM—I suppose I raise it in the general public debate, where people are quick to say: ‘Let’s go and look at renewable energy sources and let this go. This is old stuff; let it go.’ I do not think we fully appreciate the extent of the reserves of this and how important it is to that total generation of electricity in our country. I just think it is useful to record the type of future it may have and the importance of what we are doing in terms of this industry surviving.

Mr Boshier—Could I place on the record as well, then, that brown coal is an important worldwide resource. Just two weeks ago there was a big international meeting in the Latrobe Valley which included Indians, Chinese, Koreans and a number of nations. The Indians in particular were most interested in brown coal, and they are going to be burning a lot of it, but it is 20 per cent ash compared to our two per cent ash and at the moment capturing the carbon dioxide really is not on their radar screen. They are much more worried about ash disposal than about carbon dioxide disposal. That is what the Chinese said to us as well. Therefore, for Australia to develop the technology for the capture and storage of carbon dioxide in the long run has to be an export opportunity for us. So the continued development of brown coal is good not only for the present people of Australia but also for the future exports of that technology to the nations in the Asia Pacific.

CHAIR—I thank you again for your submission, which was very good, and also for your comments and responses to our questions. If we need any more information we will write to you and, hopefully, you will facilitate us in completing our report.

Mr Boshier—Thank you.

Proceedings suspended from 12.39 pm to 1.38 pm

HARMAN, Mr Graeme, Senior Adviser, Government Relations and Policy, Chevron Australia Pty Ltd

TORKINGTON, Mr John, Senior Adviser, Climate Change Policy, Chevron Australia Pty Ltd

CHAIR—I now call on the representatives of Chevron to give evidence. Welcome. Although the committee does not require you to give evidence under oath, I should advise you that this hearing is a formal proceeding of the parliament and therefore it warrants the same respect as proceedings of the House. It is customary to remind witnesses that giving false or misleading evidence is a serious matter and may be regarded as a contempt of the parliament. The committee has received your submission. Are there any amendments you would like to make to it?

Mr Torkington—There are no amendments. We would like to make some opening remarks.

CHAIR—Thank you very much. Please proceed.

Mr Torkington—Thank you. First of all, Chevron would like to thank the committee for the opportunity to appear and indeed for the opportunity to make our written submission to this inquiry. Chevron is one of the world's largest publicly owned energy companies, with activities in 180 countries around the world and a global workforce of approximately 60,000 people. Here in Australia our principal assets include the Barrow Island and Thevenard Island oilfields and the North West Shelf gas project. Chevron is the largest holder of natural gas resources in Australia and has plans to develop these resources through a number of projects, including the Gorgon and Wheatstone projects, which Chevron operates. Chevron is also currently one of Australia's most active oil and gas explorers. Australia is one of the four global exploration focus areas for Chevron.

Our interest in this bill is twofold. Firstly, it is in the interests of Chevron, as a significant explorer and producer of oil and gas in Australia, to ensure that the existing legislative framework under which we invest in this area is not compromised. Secondly, the underground storage of greenhouse gases is of keen interest to Chevron as it is one of the portfolio of opportunities to reduce emissions from our operations. Chevron, as operator of the Gorgon project, along with our partners ExxonMobil and Shell, is proposing one of the world's largest storage projects as part of the project in Western Australia. While the Gorgon carbon dioxide injection project will be regulated under Western Australian legislation, the development of a workable legislative framework for underground storage of greenhouse gases has the potential to provide Chevron with additional options to further reduce emissions from our Australian operations. The development of a workable legislative framework also has the potential to serve as a model in many other jurisdictions around the globe that use a similar approach to the regulation of subsurface rights.

We observe that the regulation of greenhouse gas storage, as envisaged by the bill, is principally about access to and the use of a resource—in this case, the subsurface pore space. Importantly, it needs to be recognised that there will be other laws that motivate and regulate the

underground storage of greenhouse gases. Two examples that come to mind are the proposed introduction of an emissions-trading scheme to provide a motivational driver for this technology and the EPBC Act as it relates to ensuring that projects envisaged by this bill do not significantly impact upon the environment. As this is a resource allocation issue as opposed to a climate change mitigation and environmental issue, Chevron broadly supports the resource allocation and management approach proposed by the bill. Furthermore, as the principal competitor to the greenhouse gas storage industry for access to this resource is the upstream oil and gas industry, managing the coexistence of these two activities is critically important. Incorporating greenhouse gas storage provisions in the OPA should enable regulators to manage competition for the resource and coexisting rights more efficiently and is an approach supported by Chevron.

The establishment of a system of title rights and processes modelled on those that currently apply to the offshore oil and gas industry represents a practical and workable framework for the allocation of subsurface pore space. This model has served the offshore oil and gas industry well over many decades and balances competition for resources with a proponent's need for certainty. Chevron also welcomes the recognition that holders of existing title rights, be those related to the offshore oil and gas industry or to other industries, must have those rights protected.

Chevron is, however, concerned at how coexisting greenhouse gas storage and post-amendment oil and gas rights are proposed to be managed under the bill. I need to preface the following comments to the committee by stating that Chevron is not representing the Gorgon joint venture before this committee. I note that one of our joint-venture partners, ExxonMobil, has already appeared before this inquiry. Nevertheless, experience in the Gorgon joint venture, in moving forward with potentially the world's largest greenhouse gas abatement project in the same area as existing oil and gas rights holders, has provided Chevron with practical experience in dealing with the management of coexisting rights. Chevron is of the view that greenhouse gas storage and oil and gas exploration and production activities can coexist provided there is a clear understanding and acknowledgement of, and respect for, the different and separate rights enjoyed by all parties. We believe it is possible for greenhouse gas storage proponents and oil and gas proponents to work together cooperatively and to their mutual benefit, but this can only occur where each party is willing to acknowledge and work within the rights enjoyed by the other party.

As we highlight in our submission, Chevron is of the view the bill, as proposed, increases uncertainty for post-amendment oil and gas rights holders and fails to provide a high level of certainty for greenhouse gas storage rights holders. As currently drafted, the bill provides the minister with a high degree of discretion in the public interest in relation to the management of coexisting rights. This level of ministerial discretion has the potential to create regulatory uncertainty for both the oil and gas industry and the greenhouse gas storage industry. Chevron believes that greater certainty could be created for both the post-amendment oil and gas industry and the greenhouse gas storage industry by treating the initial rights holder in an area, be they rights for oil and gas exploration and production or for greenhouse gas storage, in much the same way as pre-amendment oil and gas rights holders. In that way, the first rights holder in an area has a high degree of certainty about their rights to exploit any discovered resource. Any holder of a subsequent or overlapping right would obtain those rights in the clear knowledge that they had to respect the rights of the existing title rights holder. We believe that this provides all parties with a greater level of certainty than is currently provided for by the bill.

Chevron has also highlighted a number of other issues in our submission. These include: the proposed model for management of long-term liabilities; the duration of greenhouse gas assessment permits; the ability—or rather the inability—to effectively distinguish between exploration for oil and gas and assessment of a greenhouse gas storage formation, and the difficulties that this introduces in terms of a prohibition on unauthorised exploration for greenhouse gas storage formations; and the use of the term ‘significant risk’ and how this impacts upon the use of the term ‘significant risk of a significant adverse impact’.

Before closing, I beg the committee’s indulgence to briefly raise a couple of issues that we did not directly address in our submission. Chevron believes it is important that, where the injection of carbon dioxide is contemplated as part of an integrated oil and gas operation, either for enhanced oil recovery or as greenhouse gas mitigation, these activities should be encouraged by the bill. This should be irrespective of the source of carbon dioxide in the context of enhanced oil recovery or the individual production licence boundaries for integrated oil and gas storage projects. Where integrated oil and gas operations involve more than one production licence, the operators of that operation should be able to inject carbon dioxide in the production licence offering the highest containment certainty and not be restricted to a particular production licence boundary. In addition, proponents of integrated oil and gas projects that wish to utilise underground storage for carbon dioxide to reduce project emissions should not be prohibited from exploring for those within their oil and gas titles.

Finally, much has been said over the last few years about the comparative advantage provided to the oil and gas industry by the legislative models such as those adopted in the bill. Australia has a system of open file data whereby all offshore exploration data from the oil and gas industry is placed on the public record. The only data that is not on this record relates to appraisal and production data relating to field development which, by its nature, is commercially sensitive; however, production volume data on each field is published by various government agencies. As a result, when bidding for greenhouse gas assessment permits, other opponents have access to principally the same datasets as the oil and gas industry. This does not seem to have been recognised by some of the other submissions to the inquiry.

In closing, Chevron is generally supportive of the resource allocation model proposed in the bill. We feel that greater certainty could be provided to post amendment oil and gas title rights holders and greenhouse gas storage holders, and it remains to be seen how this can be achieved. With that, we would be happy to take any questions.

CHAIR—Thank you very much for that and for adding to your submission. I would like to get a little bit on Gorgon from Chevron, and Shell and ExxonMobil joint partners. What are you doing with this project and what is the design? Could you give us that for the record?

Mr Torkington—The Gorgon project is similar to the three commercial scale projects in the world today, In Salah, Snohvit and Sleipner, is proposing to take carbon dioxide that is associated with a natural gas and removed during the routine gas processing operations. Rather than venting that carbon dioxide to the atmosphere, we are proposing to inject that carbon dioxide below Barrow Island into an aquifer, a reservoir, a bit over 2,000 metres deep. We are anticipating that, as a result of this project, the overall project emissions will be reduced by about 40 per cent, and it involves the sequestration of approximately three million to 3½ million tonnes

of carbon dioxide a year, which will make it the world's largest sequestration project when it gets off the ground.

CHAIR—How long do you anticipate continuing to monitor that site?

Mr Torkington—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. What the joint venture proposed—and we expand upon this in our environmental impact assessment document—was that we would continue to have operational responsibility for the site during what we term a ‘post-injection period’, I think, similar to the concept envisaged by the bill, which would be the period between when you cease injection operations and the point where you reach site closure on the project. We have not specified a time period for that. We have suggested that the period of site closure should be marked by a set of criteria, and those criteria principally involve the demonstration to the state that the residual risk associated with that site is acceptably low. Having met those criteria, the government would agree that we have reached site closure.

CHAIR—You have an agreement with the Western Australian government along those lines?

Mr Torkington—We do not have an agreement. We have legislation specific to the project in Western Australia—the Barrow Island Act. It provides for the authorisation of the Gorgon carbon dioxide injection project. The legislation does not contain detail around that process but it enables the minister to place conditions on his approval to inject carbon dioxide. The approval has not yet been granted, so we are having a look at the conditions. But there has been extensive discussion with the state about the nature of those conditions, and that is the model we understand the state is looking towards.

CHAIR—And that is being done under the environmental act of Western Australia?

Mr Torkington—No. 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.

CHAIR—How would you measure the success or failure of this project?

Mr Torkington—As a joint venture we have not put forward criteria for its success or failure. We have approached it from the point of view that we anticipate the carbon dioxide will remain underground in the formation in which we inject it. We are not anticipating that it will leak. Some people have talked about ‘acceptable failure rates’. I think the IPCC mentioned one per cent over 1,000 years. That position is not endorsed by the Gorgon joint venture. Our position is that it stays there forever.

Ms LIVERMORE—Is the ownership of the injected CO₂ dealt with under the Barrow Island legislation? I should have raised this with the WA government reps who were here yesterday, but it came up subsequent to their evidence.

Mr Torkington—There is no reference in the legislation to ownership of carbon dioxide. I am not a lawyer, so I can only give a layperson's view on this. If you look at the analogies in the oil and gas industries, for example, the oil and gas in the ground is not owned by proponents even though they have production licences over it. It is generally owned by the Crown. We only take ownership of the oil and gas when it leaves the formation and enters into our well bore. You can also draw an analogy with atmospheric emissions of carbon dioxide. A facility that produces carbon dioxide has ownership of the carbon dioxide whilst it is in the facility. Once it leaves the flue stack of that facility and goes into the atmosphere it is no longer owned by the proponent.

My understanding is that in jurisdictions like the United States, where subsurface rights are actually physically owned, you have the issue of ownership of the carbon dioxide. In Australia, generally no-one owns the subsurface. It is owned by the government and the government gives rights to access or use that subsurface space. I think it needs to be recognised that, in the United States context, generally issues around liability can be tied back to the ownership of the product in the subsurface.

In Australia, the way I view it, it is not so much the ownership of the carbon dioxide but the doing of the activity that can lead to the liability. So I do not think it is necessary to have ownership of the carbon dioxide vested in any particular individual. What is important is the activity of putting the carbon dioxide into the ground. That is what gives rise to potential liability. The way we interpret the law currently is that, once this carbon dioxide has been injected, under the Barrow Island legislation we would no longer own the carbon dioxide; effectively it would be owned by the Western Australian government. That does not mean to say that we would be absolved from any liabilities that might arise if that carbon dioxide went astray.

CHAIR—The common law would apply.

Mr PERRETT—As you say, if you release it into the atmosphere the ownership might end, but that does not mean that you are not liable for any damage caused by it.

Mr Torkington—That is exactly the point. With, say, a power station, once the flue gases are emitted they are no longer owned by the power station. But if those flue gases were to kill off someone's cabbage patch downwind then there would be a reasonable case under the law that the cabbage patch owner could make a claim against the power station.

CHAIR—Those are the normal circumstances in Australia for any industrial test.

Mr Torkington—As we understand it, yes.

Ms LIVERMORE—How does the Barrow Island Act, the regime the Gorgon project is operating under, deal with long-term liability?

Mr Torkington—It is anticipated that the conditions the minister places on the approval may or may not deal with liabilities. At this point there is no clear position on that. I guess our

expectation is that the state will look towards this bill as providing a model for how to deal with that. That has certainly been the indication provided by the state, albeit informally. I guess the starting assumption is that the conditions may remain silent on liabilities, in which case, as proposed in the OPA, common law and general statutory law provisions apply. The joint venture has been talking to the state about opportunities to have the state indemnify the joint venture at the point of site closure. We have not had any resolution on that.

Mr SIDEBOTTOM—On page 6 of your submission, under the heading ‘Promotes certainty for investment in injection and storage activities’, you make some comments about some of the uncertainties you think are raised by what appears to be widespread ministerial discretion and you raise the prospect or the possibility of an alternative model to the system of post-commencement rights in the draft legislation. Would you like to take us through, for the record, your reservations about what the draft contains now in terms of that and then take us through the alternative model that you are proposing?

Mr Torkington—To be fair, this legislation tries to treat post-amendment oil and gas rights holders and greenhouse storage rights holders as being on an equal footing, going forward. The difficulty that that creates is that you are going to have these overlapping titles that are going to be treated equally. Therefore, if there is an issue of conflict arising then it goes to the minister, essentially, for determination and the minister uses a public interest test. That creates for the proponents a degree of uncertainty. Today, when we go out and explore for and find oil and gas, we have a reasonable certainty that we are going to be able to develop it. Going forward under this new regime, we can invest significant sums in exploration, not just the oil and gas industry but the greenhouse gas storage industry, and our certainty that if we have found a resource we will be able to exploit it is lessened because the minister may decide, for whatever reason, that it is not in the public interest for that activity to go forward.

We are proposing the same model as included in the bill for pre-amendment oil and gas rights, recognising that once you have a rights holder on the ground, whoever comes on top of that rights holder needs to respect the initial rights holder’s rights. We have proposed that, post the amendments, whoever got on the ground first, be they an oil and gas explorer or a carbon greenhouse storage explorer, the first person to get title rights in an area would have primacy over any subsequent or overlapping right. That way, the initial rights holder has a high degree of certainty if they find a resource that they will be able to exploit it. The second rights holder’s rights are limited, but he also clearly knows that he has to work within the rights of that pre-existing rights holder. We do not see any preference there for oil and gas or for greenhouse storage; whoever gets on the ground first has primacy in terms of their title rights. We think that provides all industry with a high degree of certainty. If you do that, there is far less requirement for ministerial discretion and public interest tests because it is clear that one set of rights holders has greater sway over another.

Mr SIDEBOTTOM—But history would say that the oil and gas concerns would primarily be the pre-amendment holders of rights, rather than the carbon storage people. So really you are saying that pre-existing rights should continue, and they normally lie with gas and petrol companies.

Mr Torkington—I think our reading of the bill is that pre-existing petroleum rights holder are provided with that level of protection. We think that it is appropriate that this industry has had

those pre-existing rights protected. Changing and removing those rights would open up areas for compensation. We are not concerned primarily with how those pre-existing rights are managed. What we are proposing is that the same model be applied post amendment but be applied irrespective of whether the initial right in the grant was an oil and gas right or a greenhouse gas storage right. Whoever got on the ground in an area first would have that primacy. That also takes away the need to distinguish between pre-existing and post-existing rights. The policy would be that whoever gets on the ground first has a high level of certainty about what they can do. Any overlapping title rights holder would have to work within that framework.

Indeed, that has been our experience with Barrow Island. The oilfield on Barrow Island, whilst it is operated by Chevron, is owned by different participants, so we have to treat it as a separate legal entity, effectively. We have had to undertake this project in the recognition that we have a pre-existing oil and gas holder there. Once you get across the acknowledgement of where each of the two parties' rights are, what their rights are and how far they extend, we have found it is quite possible to work around that. We have a position where it is very clear what our rights are and what the oil and gas titleholders' rights are. Our concern with the model proposed is that you are envisaging both parties having equal sets of rights and therefore it will be much harder for them to arrive at a commercial negotiation. You have to defer to the minister to arbitrate.

CHAIR—Would you envisage your organisation becoming a storage company or taking on the role of sequestering CO₂?

Mr Torkington—I am not clear that Chevron has a formal policy on how we see this technology going forward. It is my understanding, however, that we have considered geological storage as a business opportunity and at this point have decided that we are not going to pursue that. We will look at it seriously where we can integrate it with our core business operations, but we have not yet taken on board the idea of taking other people's greenhouse gases and disposing of them on their behalf. That is not currently a business model that Chevron is considering.

CHAIR—What is before our committee is the public interest—that the need might arise for that to occur and trying to find a mechanism that will allow that to happen. At the moment it is probably more an issue in the Gippsland basin than elsewhere. But it could happen in the gas industry, from the point of view that there would need to be some consideration.

Mr Torkington—I should say that I do not see any difficulty with the model put forward in the bill in terms of allowing proponents to sequester other people's greenhouse gases as a commercial entity. What the bill sets forward is a way where competition for the subsequent resource can be managed and how projects can be regulated going forward. That is irrespective of whether the projects are injecting their own carbon dioxide or somebody else's carbon dioxide. I think regulations around where that carbon dioxide come from are not really appropriate for this bill. This bill is around the resource competition for that pour space.

CHAIR—Thank you very much.

Ms LIVERMORE—I am curious about what you might have learned so far from the development of the Gorgon project about the commercial viability of this technology into the future.

Mr Torkington—Commercial viability is a difficult question. Currently, today, these sorts of projects are not commercial. But, as we indicated in our opening remarks, 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. You see this technology being embraced by the oil and gas industry today. There are three projects currently around the world that are doing this; Gorgon will be a fourth one. They are all essentially gas-processing projects. There are probably two reasons for that. The first is that those projects have a source of pure carbon dioxide as part of their operations, so we do not have the cost and the technical complexity with the capture part that is faced by other industries. The second point is that the technology is very much oil and gas industry technology. The oil and gas industry is really about extracting fluids from the subsurface and putting fluids back under the subsurface. It is all about moving fluids underground. The storage component is about moving fluids through the subsurface. So you find the oil and gas industry very comfortable with that technological fit. I think there will be a challenge in getting other industries to embrace the technology, because it will be a very foreign technology for them. So the reason you see the oil and gas industry proposing to do it is that (a) we have this source of carbon dioxide, which means a large proportion of the cost problem goes away, and (b) we have the technology and we are very comfortable with it.

As for when this becomes an opportunity that is more widely embraced, I think it really comes down to the price that the government engineers through an emissions-trading scheme. For the sorts of projects Gorgon are looking at, the costs are relatively low compared to the cost when you start talking about it in the context of coal-fired power generation, and there is published data on the ranges of costs that that technology might entail. 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 of 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.

CHAIR—There is a slight commercial differentiation between gas and coal in the sense that the gas industry are the ones that actually need to do the storage.

Mr Torkington—Sorry, I do not see why we need to do it!

CHAIR—It is finding the right mechanism to allow those things to occur.

Mr Torkington—Yes. 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. I know there has been a lot of discussion in the last few days about access to data and the oil and gas industry having some sort of inherent competitive advantage in terms of bidding for acreage. I think those comments are misguided and do not seem to recognise that all exploration data in the offshore region becomes publicly available in a period of time—the only data that does not is production data. But, if you are looking at bidding on acreage for greenhouse storage, the data sets that will be available for either the oil and gas industry or the greenhouse storage industry should be much the same.

Ms LIVERMORE—We had evidence earlier today where the witness was suggesting that it would be useful for not just exploration data but also production data to be either publicly

available or put on the table in any negotiations between existing oil and gas operators and potential greenhouse gas storage operators. What would you say to that?

Mr Torkington—I think there is a balance in how much data that is commercially sensitive to oil and gas producers you should allow to go forward. We see the existing open-file arrangements being applicable to both the oil and gas and the greenhouse storage industries going forward and we think that should remain. Where we get to more site specific issues, I think we would look towards the various industries working together. The experience we have had on Barrow Island is that very early on we started to engage with the oil operations there. We have had a number of agreements over the last few years dealing with things like exchange of data, access to existing facilities and those sorts of arrangements. Clearly those negotiations can be a bit one-sided. The oil and gas industry might have the data, but the way we have structured it is that, if you show us your data that you have now, we will agree to disclose our data to you as we acquire it. That can have an advantage for the oil and gas industry. For example, if we go out and drill appraisal wells for geological storage, oil and gas proprietors are very keen to find if there is any oil and gas in that well. An early agreement on the exchange of data can address both those concerns. We think that those sorts of arrangements can be relatively easily accommodated around the more commercial negotiations that the two parties should look to undertake.

CHAIR—This seems to have worked extremely well, especially in the North West Shelf area—the large corporations being able to work together to achieve common goals and use expertise and resources from whatever areas are available at the time. How did that occur?

Mr Torkington—In context, there are a couple of points there. When we first started looking at opportunities for where we might be able to inject this carbon dioxide from the Gorgon project, we did not just look under Barrow Island; we looked at areas within 300 kilometres of Barrow Island. We were able to do that because there is this publicly available open-file data that the oil and gas industry has generated but is now owned by government across that area—so there is a large amount of data there. When it came to working on Barrow Island, the discussions with our Barrow Island colleagues have not been painless. There has been some difficulty there. It took quite a while to get both sides to recognise where the existing rights were and where they were not. There is, I think, a tremendous potential for people to misinterpret the extent of their rights in a lot of this. As we pointed out in our submission, once you get each side recognising where their rights are and where they cease, then you find it a lot easier to bring people together.

CHAIR—So that is a communication issue?

Mr Torkington—I think so, yes. I think it is a matter of understanding one's legal rights first and then openly engaging with the other rights holders in the area. I think that is probably a message across any area where you have the issue of coexisting rights—early communication is very important. The negotiation of mutual agreements will not be painless; there will be some difficulties in that. We still have not concluded a comprehensive agreement in relation to Barrow Island, but we are close to it. As I say, there have been a number of agreements put in place looking at particular issues that needed to be addressed at the time, and one of the earlier ones was the exchange of data.

CHAIR—Thank you very much. Thank you very much for your submission and for your evidence today. It has helped us a lot in that area of people working together, commercial corporations working together, to achieve the objective, and we need to endeavour to achieve those things. Thank you again. We might need some additional information; if we do, we will write to you to that effect.

Mr Torkington—Thank you.

Mr Harman—Thank you very much.

Resolved (on motion by **Ms Livermore**):

That this committee authorises publication, including publication on the parliamentary database, of the transcript of the evidence given before it at public hearing this day.

Committee adjourned at 2.11 pm