

TRANSCRIPT

STANDING COMMITTEE ON THE ENVIRONMENT AND PLANNING

Inquiry into unconventional gas in Victoria

Torquay — 13 August 2015

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Witness

Dr George Carman (sworn), Former Petroleum Geologist.

The CHAIR — I welcome Dr George Carman. Could you indicate your position and the material you would like to present and then we will ask some questions.

Dr CARMAN — My name is George Carman and I live in Bellbrae, 3228. I live on an acreage as a transition to retirement. I harvest water, I have solar panels, we have bees and we plant trees. I am fortunately able to do this because I have had a good career in the oil and gas industry as a petroleum geologist, so I am bringing to the table today 40 years experience in the oil and gas business. I worked as a very greenfield explorationist, working in the jungles of Papua New Guinea and other countries, but I have also spent about 50 per cent of my career working on production, living and working on oil fields and gas fields.

Over the last five years I have been associated with the Victorian and federal project CarbonNet for the sequestration of carbon dioxide offshore in the Gippsland Basin. With that project in particular I am acutely aware of the sorts of issues that come about through public concern about the operations of these sorts of businesses.

In my submission I have a few headlines which I would like to talk to this morning. The word ‘unconventional’ in terms of unconventional gas; talking about areas being gas free; the prospectivity of the resources in Victoria; a little bit about legacy wells; legislation — the impact of any changes to legislation and the concerns I have for that; and also a little statement on the co-existence.

Firstly, I would like to try to explain how I think we got here by referring to the slide on the wall.

Visual presentation.

Dr CARMAN — The trap on the right is called an anticline, as is the trap on the left, and when I joined the industry in 1974 this is what we were exploring for. It was just conventional, routine, looking for what we call in the industry ‘bumps’ on our seismic records. It was the low-hanging fruit and easy to win. As the industry drilled more wells it gained more information and we learnt more about in particular the geology, the environment, the deposition of those rocks and how they got there, and in particular the geochemistry of the fluids.

Through fingerprinting of oils and gases back to source rocks we were able to identify where these oils and gases were being generated. We called them kitchens — source rock kitchens — where under normal pressure and temperature organic material is converted into oil and gas which then migrates into these traps. With this geochemical information we were able to then start going back down the migration path exploring for other reserves of oil and gas. Of course this was driven very much by market forces. I like to think that was what was called peak oil and gas was about depleting those low-hanging fruit, those conventional anticlines and other simple structures.

As the technology developed under these market forces, we found that there were other techniques that we could use to extract the oil and gas from lower porosity rocks, from tight rocks. We recognised that we could extract oil and gas from rocks that we had not imagined could produce. For example, in California a rock called a chert produces oil. It produces oil because it is naturally fractured. It is shattered with fractures through tectonic forces, so oil is produced that way.

Also, with the introduction of horizontal drilling we were able to drill extended reach wells off the margins of structures at a much more economic rate and also drill those wells to increase the surface area of the well bore within the productive horizons. That is what led to the introduction of producing from the source rock itself, from shales. That is where the subsurface exploration of oil shales commenced. There is nothing new in that. Oil shales were mined through shafts and hand-dug pits centuries ago; that is where the industry started. So this is just a new technology. It is not an unconventional oil. It is not an unconventional gas. It is the same methane, ethane, propane, butane that Mother Nature has created in the subsurface. What is new is the technology. I do not like to use the word ‘unconventional’. You might say that the motor car was once an unconventional form of transport. It is no longer. I have just suggested there that what the market forces are driving us to extract now are less conventional resources.

In my submission I provided a quote about the use of media. I am very concerned that a lot of people in the public are being swayed by media tactics. This is very misleading. There is a lot of misinformation in the media. I have heard quotes, for example, from industry sources, saying that wells will fail in 40 years. That is true; that

is a piece of industry publication. It is 30 years old. It was a survey of some very special wells in the Gulf of Mexico. Those wells are still in existence. I have not heard of those wells having failed now that they are in their third and fourth decade. The technology has certainly changed an awful lot and it is not correct to quote old data. There are also media stunts being used. Initially I prepared a large presentation — 10 or 11 slides to show to you — but then I was drawing myself into presenting media stunts to you. The power of the images is enormous and I think that is unfair.

We cannot say that Victoria is gas free. There are gases in existence in the subsurface and there are gas fields that have produced for a few decades now in western Victoria. The Wombat gas field in the Gippsland Basin is an existing resource. To declare an area gas free is contrary to what Mother Nature has provided for us.

In terms of the prospectivity for shale oil — what I call less conventional resources of gas in tighter rocks — there was a study conducted on behalf of the Australian Council of Learned Academies, which Prof Peter Cook referred to in his submission to you in Gippsland. They commissioned industry experts to look at the resources for 'unconventional gas' in Victoria. They listed the Gippsland Basin as not meeting the selection criteria. In their opinion there are no resources onshore in Gippsland. They listed the Otway Basin as being 13th. I have to correct my submission. I said 8th in my written submission; it was actually 13th in Australia.

The potential for the Otway Basin actually lies much further west from here. It is around the Port Campbell area and even further west than that in the deep true centre of the basin. To put that into perspective, the third-ranking basin in Australia, which is in the Cooper Basin, is not producing unconventional oil or gas. It is not living up to the expectation of the shale and gas industry. In fact in March of this year the Chevron oil company decided to withdraw from that business exploit.

People need to understand it is not a certainty that this is going to happen in this area. The whole point of my submission to you was that in the Corangamite area in this eastern end of the Torquay basin there is very little prospectivity in terms of shale oil and gas.

Legacy wells are quite often reported as being problems for the industry. Legacy wells — by this we mean historical wells — are certainly documented as creating problems in North America, but it has to be clearly understood that, for example, in the state of Texas the Texas Railroad Commission drilled something like over 100 000 wells before the 1930s when regulations were brought into force. There are literally 100 000 wells which are undocumented and could be in the paddock next door to an operator today and he would not necessarily be aware of it. In the state of Victoria there are less than 1500 wells, and they have all been drilled under regulations. Two of those sit within the township of Anglesea and were drilled in 1922. We know where they are, and I suspect that most of the residents in Anglesea are not even aware of the existence of those wells.

Finally, on legislation, I am concerned that there could be a ban on fracking in all forms. The industry routinely carries out an operation called a leak-off test, which is in effect a mini-frack. It is a test of the geomechanical properties of the rock which is run prior to running casing and then drilling the next stage of the well. To ban fracking in all its forms could possibly lead to banning leak-off tests, and they are an essential part of drilling wells both onshore and offshore. Banning activity onshore would certainly affect our energy supply and affect the potential for new petroleum reserves being developed. If fracking is banned in totality, it may well affect the enhanced oil recovery from existing fields, but then it may not affect only the petroleum industry, it may affect the geothermal industry, it may affect the carbon dioxide sequestration industry and, as was mentioned in one of the previous discussions, it may have an impact on the winning of resources from offshore by drilling wells from an onshore location. Drilling a well from the onshore and reaching out to the offshore reserve is a much more economical method of extracting gas or oil.

Finally, I would just like to make a statement on coexistence. For the first 22 years of my life I lived near the producing oil and gas fields in onshore Lincolnshire in the UK. Lincolnshire is a high-value agricultural area. My father was in the forestry business, and I used to work with him in the fields. There would be beam pumps nodding away in the corner of the field, and they have been for decades. There are many other places in the world where oil and gas is produced coexisting with human populations. The Paris basin and all the way through Europe — the Po basin in northern Italy, onshore in the Czech Republic, Poland, Ukraine and the whole of the Carpathian belt.

Onshore — and this has been developed for decades, over 50 years — in Victoria in particular has not had such magnificent success, but success takes a long while to achieve. When I first joined the industry I was placed in

the jungles of Papua New Guinea where exploration had started in the 1920s or 30s. The first production did not start in Papua New Guinea until 1990; it took scores of years. My PhD is based on the fact that I made a discovery while climbing a cliff. There is a cliff in Papua New Guinea that is 1 mile high. I am the only white person I know to this day who has climbed that cliff. I discovered a sandstone body that I think is highly prospective for oil reserves in the subsurface south of that area, but still that discovery has not yet been made, and it was now some 20 or 25 years ago. The exploration for these resources is a very long-term business.

Finally, in terms of coexistence, I think one of the best examples of industry and the human environment is in the Isle of Purbeck and the Solent, south of Bournemouth in the UK. Over 100 wells have been drilled horizontally out underneath this very prestigious sailing area, from a national park and from islands where the scouting movement — Brownsea Island — was founded. All of these wells are drilling out up to 12 kilometres reach from the pads, and they are barely detectable to tourists who are visiting that area.

That concludes my verbal part of the submission. I am open to questions. Obviously I have a lot of experience. Trying to explain petroleum geology 101 in a few minutes is difficult. The whole business of petroleum economics and the energy balance for the world is a much larger subject which I can only touch on.

The CHAIR — Dr Carman, thank you for your submission. It has been enlightening on a number of levels. I guess there are two key lines of inquiry I seek to pursue. The first relates to gas drilling that has occurred onshore in Victoria. You mentioned less than 1500 wells, a significant number of wells, and some through this area. It is my understanding that gas was extracted down near Cape Otway. Is there something you can tell us about the recovery of gas that has already occurred and any negative consequences or lack of negative consequences?

Dr CARMAN — Further west than Cape Otway, around the Port Campbell area, there are fields. My career has been very much overseas. I have not worked on the Otway Basin itself in detail, but I know and I can tell you that the north Paaratte fields have been producing for maybe 20 or 40 years. Those fields exist and are quite small in scale — I think they only have maybe five or so producing wells per field, if that. There are other fields that have produced other forms of gases. People tend to think of methane, but CO₂ is a gas in the subsurface that is being produced. Over the border at a well called Caroline no. 1 some 20 000 or 30 000 tonnes of CO₂ has been produced for the beverages and food industry. It is an important resource to us. At Boggy Creek-1 in Victoria CO₂ is being produced, and 67 000 tonnes has been produced and sequestered — pumped back into the ground — as a demonstration of how the industry can handle gases. This is all part of the carbon mitigation strategy that is being developed.

The CHAIR — So it is true to say that there have been wells used to extract gases onshore and to your knowledge there have been no negative consequences?

Dr CARMAN — Yes, that is correct.

The CHAIR — That is the first one. The second point is about your suggestions about coexistence. It is your view, your expert view, that coexistence can occur between a range of different land uses, including agricultural land use and drilling mechanisms?

Dr CARMAN — Yes, it is. As I quoted, there are many onshore basins around the world. I have worked in 20 or so countries, and I have lived in 14 or 15 countries for more than six months each, living close to oil and gas fields. It is not unusual.

The CHAIR — If you were to point to somewhere we should examine or look at, where would you point to as a case study?

Dr CARMAN — Groningen in the Netherlands. The Paris basin. The Po Basin in Italy. The Czech Republic and Poland. Ukraine is a difficult one. There is a lot of production onshore in Ukraine but it was developed under the Soviet regime. Environmentally it has problems. I would also suggest a field visit to the producing oil and gas fields onshore in Victoria as a case study here at home.

The CHAIR — Thank you.

Ms SHING — Thanks, Dr Carman, for your submission. I note that you started out saying you are a Torquay local, and I note also that you are a managing director of SEAL Energy and a director of Geodirect

Resources. Are you here today presenting on behalf of SEAL or Geodirect Resources, or are you here in your own right as a local resident?

Dr CARMAN — I am here in my own right as a resident. Geodirect Resources is my own consulting business. It is a one-man consulting business. SEAL Energy is a specialist company for looking at containment of in particular carbon dioxide and projects in the sequestration business.

Ms SHING — Just as a follow-up to that, you refer to industry routinely conducting leak-off tests, which you described as a mini-frack, in Victoria. Is that correct?

Dr CARMAN — Yes.

Ms SHING — Whereabouts in Victoria are those mini-fracks occurring?

Dr CARMAN — Every well that is drilled, it is industry practice to test the mechanical integrity of the rock before drilling to the next stage. A well is drilled in a large-diameter hole and cased off, and then a smaller diameter hole is drilled after that. At each junction point a mechanical test is done on the rock to test the tensile strength of the rock. It is pressured up, a pressure build-up curve is developed, and the initial cracking of the rock is measured as a leak-off in the pressure. That leak-off then allows the company to calculate the parameters for the next stage of drilling. It gives them the parameters for mud weight and other drilling parameters.

Ms SHING — Does that involve the introduction of foreign matter to bring about that?

Dr CARMAN — No, it does not. It is just using the routine drilling fluids, just what is called a normal drilling fluid.

Ms SHING — How can it be called a mini-frack, then, in your words, as an expert with all of your experience, where to my mind — and forgive me, I am still on a learning curve here — it does not involve the processes or the types of steps that I understand to be part of a fracking process? Because language is very important, and you have made that very clear in your submission, but to call it a mini-frack seems to me to be somewhat off the mark. I am happy to be enlightened.

Dr CARMAN — Okay. I call it a mini-frack because it does crack the rock. It starts the process of creating a mechanical fracture within the rock in the subsurface. I cannot tell you how much that is. Probably just a few centimetres of measurable void would be created as a crack in the rock. I mentioned earlier that geochemistry has allowed the industry to move away from the conventional gas into the less conventional gas. Geomechanics is a relatively new part of industry that allows us to understand the mechanical properties of the rock, in particular the control and the design of fracturing programs. I have sat on many wells but I have not sat on a well where a fracture program is being conducted, and I am certainly not a geomechanic. That is a very specialised field.

Ms BATH — I will just continue on with that line of questioning. Has the moratorium on fracking for the last X many years, four years, impacted on other exploration or other scientific looking into geothermal CO₂ sequestration? In your understanding has that stopped the type of research?

Dr CARMAN — On the CO₂ sequestration, there are very large concerns about the public attitude to understanding the process of pumping gas, CO₂, into the ground and storing it there. One of the concerns is that it may be linked to the fracture process. There is no fracturing involved in storing CO₂ underground. There is a perception that came up on our issues register and our risk registers that public perception may link the CO₂ sequestration industry with fracking. It is an issue, but it is not real.

Ms BATH — I guess my thoughts are around if we look at doing something in one area, unconventional gas or less conventional gas, say, in terms of fracking, will that impact on other, for want of a better word, worthwhile scientific investigations into geothermal energy or the like? Do you see where I am tracking on this?

Dr CARMAN — Yes, and again I can only say as a geoscientist — as a general geoscientist, not specialising in fields of geomechanics in particular and having not worked in the geothermal industry — that I suspect that fracking may well affect that industry. Another example could be tight water. There are reservoir rocks with fresh water that may not produce fresh water, potable water, but fracking is a process that may help us bring that water, should we need to. It would be expensive. Similarly, it was mentioned yesterday I think that

fresh water aquifers are understood to extend offshore. Yes, that is true. But could we develop those resources of fresh water from offshore? At a price, yes. Are we likely to? I doubt it.

Ms BATH — Finally I guess on this one — and I have got one more question, Chair, if I can beg indulgence — the chemicals used in unconventional gas, tight shale gas, are they going to be separate to the fracking that would be involved in some of these other explorations, in your opinion?

Dr CARMAN — I do not know the details to be able to answer that accurately.

Ms BATH — Just going back to prospectivity, I think I heard you say that in general there was not a great deal of prospectivity of unconventional gas in the Gippsland area. Is that what I heard you say?

Dr CARMAN — Yes, that is correct.

Ms BATH — And that in terms of Corangamite area it is very low prospectivity. Is that what I also —

Dr CARMAN — Yes. In the Gippsland area there are certainly reserves there, and Lakes Oil has been the target of a lot of discussion. They do have a reserve, a significant reserve, of gas — I think it is over 100 BCF — in tight rock, so it will need less conventional methods of producing it. In terms of shale oil or coal seam gas, the carbonaceous rocks in Victoria are more in the brown coal regime rather than black coal, and therefore we do not really have the same opportunities for a resource in that area. ExxonMobil had formed an alliance with Ignite petroleum, who thinks they have resources. They were allowed to speculate, and speculation does sometimes produce new results. But as I understand it, the ExxonMobil company has now withdrawn from that partnership, presumably on there not being a real resource there. That was in the Gippsland Basin. In the Corangamite area, from Queenscliff certainly to Cape Otway, the old saying ‘I will eat my hat’ — if you find something, I will eat my hat.

The CHAIR — You are not wearing a hat, I note for the record.

Mr LEANE — Thank you, Dr Carman. You mentioned in your submission to us today about misinformation, media stunts, and I assume that you are referring to what is a pretty global community attitude towards coal seam gas exploration in their location or near their location.

Dr CARMAN — Yes.

Mr LEANE — You might be able to help me, because what I cannot reconcile in my mind is that gas and oil companies are cashed up compared to the communities and the individuals. How did that happen? They are cashed up, they have got the resources — how did they lose that battle? Because the evidence we have got is they have lost. If they had the resources, if they had the information, if they had all the answers, how did they manage not to go out there and put that out, and get to the point where they have lost the battle?

Dr CARMAN — There are companies and companies. I was the exploration director for an ASX-listed company in the 1980s. We barely had enough money to pay my salary. The shareholders came to rally and supported us when we gave a presentation to drill a well. We did the capital raising and we were able to make progress. As a matter of fact we became the largest acreage holder in Papua New Guinea in the 1980s — larger than any of Chevrons or BPs or Oil Searches that operate there now. As a small cash-poor company but with this scientific background we were able to progress the exploration of that resource. Large companies are focused on doing the business. Your question was, ‘How come they lost the battle?’. I am not sure really that there is a battle that has been lost.

Mr LEANE — I referred to — —

The CHAIR — A couple of submissions — —

Mr LEANE — They have lost the PR battle; they have lost the hearts and minds. To me, it seems they did not try to attract the hearts and minds of the local communities, and the evidence we are getting reflects that. That is what I cannot reconcile in my mind. In your instance you say, ‘There are companies and companies’. With the companies that are proponents in this area, I think I would be quite safe in saying that they are quite big and cashed up, so they have got the resources. I am not too sure what processes you would have had to go through regulation wise in Papua New Guinea, but in this state — —

Honestly, Dr Carman, I just cannot reconcile in my mind how they got to that point, and how they let it get to that point, if they believed everything they say about this product.

Dr CARMAN — I understand you a bit better now. Yes, there is a large difference of opinion between what the companies present and what people hear. I think what people hear has a bias in it because they start off on the back foot and they are not sure if they can trust what is being told to them. A lot of the misconceptions or concerns have come out of North America, where there are huge problems, particularly with this legacy well thing. But it is also media stunts, which is the phrase I have used before.

For example, an area called Burning Springs, where waters in the state of Virginia can be ignited, has been known and was recorded in 1773. In the same area or nearby one of the industries — the shale gas industry or the coal seam gas industry — is being accused in the *GasLand* movie of putting gas into water. The Great Artesian Basin in Queensland is charged with methane — naturally charged with methane. I would not say it is a large amount, but certainly in the 1980s we went out to Longreach in western Queensland and we talked to the local landowners because our exploration strategy was to say to the farmer, ‘Which of your wells is gassy?’, and that was the clue that was taking us down the migration path to find new reserves.

As the rocks are buried under normal burial processes they degas. This is Mother Nature’s way of compacting the rock. There are gases in the system quite naturally. So this is one example of industry having a lot of knowledge, mankind has a lot of knowledge, but they choose not to focus on that path, for example, in the *GasLand* movie. I am really at a loss to take it any further

Mr LEANE — You do not have to. As I said, I was hoping for help to get reconciled in my mind how it could come to this. Thank you.

Mr DALLA-RIVA — Doctor, just a couple of preliminary questions before we get to the main one. Do you have any connection or association with, or have you worked with, Lakes Oil, Moby Oil & Gas, Mirboo Ridge, Jupiter Energy — any of those companies?

Dr CARMAN — So — —

Mr DALLA-RIVA — Lakes Oil NL? In your capacity in your various roles have you given advice or support or other work to Lakes Oil, Mirboo Ridge Pty Ltd, Moby Oil & Gas or Jupiter Energy?

Dr CARMAN — No, I have not.

Mr DALLA-RIVA — Thank you. That clears up that. This sort of follows on from what Shaun was saying. We have had discussion about PEP 163, which is the petroleum exploration permit. In the documentation that we have, the grant of the exploration permit was back on 19 July 2002. We are now in 2015 — —

The CHAIR — You are talking about the local permit?

Mr DALLA-RIVA — The local permit. I am trying to reconcile, pretty much like Shaun is, if there was a permit to explore for petroleum or gas or whatever, is it normally a process that takes 13 years to get to a point where they are now discovering — what do you call it? — less conventional gas? I am trying to reconcile what it is, given your evidence that you have said here:

I have worked 40 years in the oil and gas profession as an exploration and production geologist and in my humble opinion I assert that the geology of Surf Coast shire will not support ... gas fields ...

You have also made the assessment in terms of the Gippsland area. Are we spending a lot of time debating an issue when essentially there is none of this less conventional gas in existence; and is it a normal process for a company to take 13 years to all of a sudden discover that they want to now — —

Dr CARMAN — Yes, it is a normal process. It is a long-term business, discovering oil and gas. I will come to the local position in a minute. I have quoted it already. In Papua New Guinea it has taken over 60 years and hundreds of millions of dollars in today’s currency to make discoveries and get them into production. There was mention earlier that Lakes Oil has spent a few tens of millions of dollars — \$80 million. I am not sure if that is in the state of Victoria — —

Mr DALLA-RIVA — So we read.

Dr CARMAN — That is not a large amount of money. A single well costs \$10 million to \$20 million onshore. There are 13 wells in the Corangamite area that have been drilled to date, and none of them have produced conventional gas. None of them, in my opinion, have shown unconventional resources. I have looked at the last well to be drilled, Bellarine no. 1, up near Paraparap, a few kilometres from here. It was drilled in 2006 by Lakes Oil. It recorded what I would consider normal background gas — methane and a little bit of ethane. At a couple of depths in particular there was a few PPM — parts per million — of gases recorded. The company attempted a drill stem tests on those, and it flowed nothing. This information is on the public record, so also on the public record is the company's concluding statement that the well is suspended rather than plugged and abandoned. It has been suspended as a potential future frack — I cannot remember the exact words — candidate, or candidate for fracturing of tight gas. In my opinion that is a very speculative interpretation of what they encountered in the subsurface. I would not go racing to the stock market to try to raise funds or put personal funds into taking that any further.

Mr DALLA-RIVA — So as part of that, if I can extend it, from your understanding of the way that the gas industry operates, the speculative nature of the industry is that you can actually make more money speculatively predicting that there might be gas discovered, therefore you — —

Because I noticed the variation in 2006, so there were a few companies involved in the permit then, whether it is the same area, but there seems to be a bit of activity in 2006. So is it that they speculate, they do some sampling — and this is not particular to Lakes Oil but just generally in the industry — they do speculative drilling, they then surmise in the marketplace that there might be this huge gas reserve or whatever, and that they suspend it, anticipating that the market itself might get a bit enthused in the discovery of this reserve?

Dr CARMAN — Yes, that is exactly correct. There are companies that are skilled in presenting a speculative view. I have participated in that sort of activity myself, and in our case our funders were three Texans — from Austin, Texas — and we were able to spend a few million dollars, which for these guys was play money, and we were able to work up a prospect ready for drilling. Then we would do what the industry calls 'farm out', which is devised in our own interest so that we have another investor come in to help fund the well. If the well was a discovery of course then it was a win-win.

Mr DALLA-RIVA — And if it was dry?

Dr CARMAN — If it was dry, it was a win-lose. We as the promoters have generated some activity. We have kept ourselves in business, as advisers to industry or speculators, and the loss has been to the real investor.

Mr DALLA-RIVA — There is a notation in the document 'farm-in agreement'. Is that terminology?

Dr CARMAN — 'Farm-in', yes. I do not know where it comes from. It means to seek out a co-invest in the project.

Mr DALLA-RIVA — So that is a 2006 agreement summary form that I have on the form here? It is notated PEP 163/06, just for the record. So a farm-in agreement, just so I can get clarity — —

Dr CARMAN — So a farm-in agreement is an agreement whereby the licence-holder enters into an agreement with another party or a group of parties to share the risks and the financial outlays with the intention of then sharing the rewards if the discovery is made. The strategy really is reducing your exposure to risk.

Mr DALLA-RIVA — So if you spend, for example — I will just pick a figure out of the air — \$80 million, you would like to see some recoup of that money through speculative processes and means?

Dr CARMAN — Yes. That depends very much on the oil price of the day. There was a time in the industry when we could recover 100 per cent of our past costs on such a deal. These days you may receive a very small contribution to your past costs which you owe on your speculative costs.

Ms DUNN — Thank you, Dr Carman, for your presentation. We have heard evidence as part of this inquiry that there is already plenty of gas supply in Victoria through conventional means, and you yourself have articulated the lack of resource in relation to unconventional gas. I am just wondering if that, in terms of gas supply for the state, that is a proposition that you agree with — that there is plenty of conventional gas?

Dr CARMAN — The supplies of gas and oil are finite resources, and this has been stated many a time, particularly in the many discussions leading up to trying to understand what peak oil and gas is. However, the amount of resources to be utilised is very price controlled. Today we are — I do not know where we are — at \$50 a barrel or something. If we were still on the scale going over \$100 or \$120 a barrel, a lot of the less conventional resources would still be being tackled. Certainly price may have driven Chevron out of the Cooper Basin; and certainly price might have taken ExxonMobil out of the Gippsland Basin.

But nonetheless the reserve is still finite. The gas and oil reserves that Victoria enjoys offshore, both in the Otway and Gippsland basin — certainly in the Gippsland Basin — fields are in near complete depletion. So there are fields that have been producing for 30 to 40 years now producing water with the oil; I am thinking particularly of the oilfields in the western part of the Gippsland Basin, where it is just sustainable to co-produce oil and water, dispose of the water and still be able to make some economics work on the oil. But that is not going to last much longer on fields in the western parts.

For gas I am not fully familiar with the reserve. It is several tens of TCF in the Gippsland Basin. As the fields that are being developed move further east, they have a higher concentration of CO₂, so at the moment ExxonMobil are entering into a new development, called the KTT project development — it is the Kipper Tuna Turrum — where they are producing fields with higher CO₂ components, and they are having to extract that before bringing it ashore. It is a more expensive gas; it is a more expensive process.

Ms DUNN — In your submission you talked about opponents using stunts and misinformation to sway public opinion and influence local governments. Are you suggesting that the decisions of local governments in relation to taking a position on unconventional gas have not been informed by evidence-based decision-making?

Dr CARMAN — On 31 July last year I attended the Frack Free Geelong meeting in Geelong, and the chairman stated that they would use media stunts to get attention. The chairman presented a map of a drilling program — I cannot remember the exact words in which he presented it — but unfortunately he was falling victim to his own strategy. It was a media stunt, illustrating over 100 wells allegedly drilled near the village of Glenfarne in Ireland. I was very shocked when I saw that map; it was not challenged by any of the people present in the meeting. I went home and checked the source of that information, and it is an artist's impression of what a drilling program would look like. But the effect that that map had on the meeting was profound. You could feel that people were seriously concerned that this may happen, and it was being presented in the context that this could happen in Geelong. There is no gas in the Torquay sub-basin in my opinion that would ever lead to a large number of wells being drilled.

Ms DUNN — You touched a little bit on coexistence; you talked about some wells, although I am not sure if it was gas or oil, that were barely detectable to tourists. I am just wondering if you are aware of anywhere that may be similar in make-up to Victoria in that it has a very large agricultural industry, a huge amount of primary production, that links in with tourism and our landscape values? This area we are in today is a very good example of that. We have heard there are 5 million visitors a year here alone. Are you aware of anywhere else that has the significant agriculture and tourism industries that have unconventional gas as well, and the experience of those communities?

Dr CARMAN — My forefathers were gamekeepers for 150 years on an estate in Norfolk in the UK, and adjacent to us in the county of Lincolnshire, where my father also worked as a forester, is a place called the Fens, and in northern Lincolnshire adjacent to that is a very historical area for oil and gas production. I record that as one area for you, Ms Dunn.

Ms DUNN — Thank you. In your submission you talk about the allegations that community aquifers are at risk in Corangamite and that that is scaremongering. Yesterday this committee heard from the local water authority, Barwon Water, which suggested in their submission:

Barwon Water's interest regarding unconventional gas is focused on the identification and management of potential risks to the quality and yield of our water resources, both surface and groundwater.

I am just trying to reconcile your statements with Barwon Water's and whether you would agree with Barwon Water, as the local authority, that there is potential risk to water resources.

Dr CARMAN — Yes, and I have read submissions here in the Victorian inquiry but also for inquiries in the other states — WA, South Australia and Queensland — where water resources are very important. As I said in my opening statement, I harvest my own rainwater, and many people in Victoria rely on tank water. In addition to that, much of the state of Victoria's water, as I understand it, comes from surface catchment. The Barwon Water authority has surface catchment water supplies. Occasionally it taps into subsurface aquifers in times of lower rainfall, and I think those aquifers are able to support about 60 per cent of our requirement. So the aquifers in the Torquay-Corangamite area are not capable of sustaining the water supply, as I understand it. And they are deep, so they are costly to produce.

Ms DUNN — Thank you, Dr Carman, for that. I guess the core of my question is around whether there is a risk or not a risk. The water authority is saying that there are potential risks, and you are saying that risk is simply scaremongering. Do you still contend, given that evidence provided by the water authority, that there may well be a risk or potential risk as highlighted by Barwon Water?

Dr CARMAN — In the industry, many people refer to an organisation in the UK called Quintessa for risk management. Quintessa was originally set up as a risk management company for the nuclear industry, for storage of nuclear waste, and they developed a best practice — a list of risks that should be considered by industry. This is now being adopted by other industries, including oil and gas. The list is called a FEP list — features, events and processes that may present a risk. There are a few hundred features, events and processes in that list. It is like a pilots checklist: have we considered all of these aspects? Some of them include a meteor strike, for example. What is the likelihood and what is the significance of a meteor impact on a producing gas well, for example? The impact would be catastrophic; we probably would not be around to even measure it. The likelihood is very low. So risk management involves being aware but, I suggest, not being alarmed. What I am suggesting by using the word 'scaremongering' is that people are being made acutely alarmed about something that is not significant.

Ms DUNN — Thank you for your clarification and giving more clarity to the intent of your meaning in your submission, because for my mind it certainly does not read as you have stated today. In terms of the businesses of which you are a managing director and a director, so SEAL Energy and Geodirect Resources, do either of those companies provide any services to any businesses involved in unconventional gas in Australia?

Dr CARMAN — SEAL Energy is a new company and has worked for one client to date. Geodirect Resources, my consulting industry, has not — sorry, the SEAL Energy client was not related to unconventional.

Mr RAMSAY — I just want to perhaps sum up for my own benefit in relation to your contribution. I will confine my comments to the Otway Basin, which this area is part of and which I represent. As I understand it there are over 15 billion tons of brown coal in the Otway Basin, and your evidence suggests that there is little economic value by using coal seam gas exploration and using that brown coal seam. However, you have suggested that perhaps there is some economic value in maybe shale gas exploration in the Otway Basin, but still there is no clear indication whether that would be of economic value to do a commercial extraction.

You have also said that you have identified areas where there has been coexistence between the agricultural industry and the gas industry in other countries but perhaps have not really identified in what areas in Australia, particularly in Victoria, there has been that successful coexistence. If that is the case, then, and shale gas requires fracking, and there is a clear indication from evidence we have already received that there are communities in the Otway Basin that are not as supportive of that process, why would the companies then continue to seek access for exploratory work, given the high cost and the long period of time, if the economic value is not there in the brown coal in the Otway Basin?

Dr CARMAN — You are pushing a lot of buttons there. So for coal seam gas, the brown coal — again, I have not worked in that industry directly, but my understanding as a geoscientist is that you really do require black coal to get a decent coal seam gas development. We are talking about lignites and brown coal is in this area. Therefore I just cannot envisage that as an industry developing. Shale gas in this area — I quoted the AWT report in the findings for the Australian Council of Learned Academies, Professor Peter Cook. They did put the Otway Basin as having some small potential, about 13th, in the western end of the Otway Basin, so from Port Campbell over towards the South Australian basin, but that is a very low potential in terms of much larger potentials in other basins in Australia, particularly the Canning, the Cooper, the Galilee and the Bowen Basin in Queensland as well.

Tight gas in this area, yes, I think there may well be some tight gas resources, but I do not think the industry has really covered enough information to understand that really well. The Otway Basin, I am sure — I do not know the exact number, but it is just over a few hundred wells. It is a very small number. As I said, hundreds of thousands of wells are drilled in the US to tackle these sorts of resources. Do we need to do that here? No, I do not think we do. But it is a long-term aspiration, and if we were to give up now, I do not think we would ever know whether there is a significant resource there or not. Does that touch on all the points that you — —

Mr RAMSAY — Yes, that is fine.

The CHAIR — Thank you, Dr Carman, for your evidence. It has been most enlightening, and we are very appreciative.

Witness withdrew.