

TRANSCRIPT

STANDING COMMITTEE ON THE ENVIRONMENT AND PLANNING

Inquiry into unconventional gas in Victoria

Melbourne — 22 July 2015

Members

Mr David Davis — Chair

Ms Samantha Dunn

Ms Harriet Shing — Deputy Chair

Mr Shaun Leane

Ms Melina Bath

Ms Gayle Tierney

Mr Richard Dalla-Riva

Mr Daniel Young

Participating Members

Mr Jeff Bourman

Mr James Purcell

Ms Colleen Hartland

Mr Simon Ramsay

Staff

Secretary: Mr Keir Delaney

Research officer: Ms Annemarie Burt

Witness

Professor Peter Cook (sworn), Australian Academy of Technological Sciences and Engineering.

The CHAIR — Professor Cook, I understand that you chaired the Australian Council of Learned Academies expert working group that produced the report *Engineering Energy — Unconventional Gas Production* in 2013. I wonder if you might give us a presentation, for a start, and then we will ask some questions.

Prof. COOK — Thank you, Mr Chairman. Yes, I was the chair of the Australian Council of Learned Academies review of unconventional gas that focused primarily on shale gas, but a number of the lessons and messages coming out of that related to unconventional gas more broadly. Unconventional gas, I should explain, is just the same as any other gas in terms of it being primarily methane, and the unconventional component of it relates to its geology, not to the composition of the gas. I think it is important to get over that point.

I should also make a couple of other points. This review, which was led by the Australian Academy of Technological Sciences and Engineering, is focused on the practical aspects of science and technology — whilst it was leading it, it actually included all the other academies: the academy of humanities, the Academy of social sciences and the Academy of science. So in other words it was a very impartial, considered sort of approach to this issue. People had to declare if they had any interest in the gas industry in any way, so it was a very considered and impartial approach that was taken.

I am sorry. I thought you were going to have copies of this report. You will be getting copies of this report very soon. I do not expect that you have read it, so let me just very briefly — —

Ms SHING — Just for the benefit of the transcript, if could you just read out the title and the date of that document, that would be of assistance.

Prof. COOK — Okay. It is called *Securing Australia's Future — Engineering Energy — Unconventional Gas Production — A Study of Shale Gas in Australia*, and this is a report from the Australian Council of Learned Academies, and it was produced in mid-2013. The review was very well received right across the board by industry, by government, by NGOs, by researchers and by communities, so we were gratified by that. The report covers the whole issue of global supply and demand and shale gas resources and reserves, and it does also mention other unconventional resources and reserves as well. It concludes that there is the potential for large-scale unconventional gas resources in Australia. It did actually briefly look at Victoria and concluded there were potential resources.

Now, resources are things that are not necessarily extractable; it all depends on the price that you get. Once you get a price that makes a profit, then you can actually go from a resource to a reserve. So you will very often get very large numbers which are given for the resources that might be in the ground, and you might only get 10 per cent of that resource actually becoming a reserve finally — in other words, something that you can actually commercially exploit. So we looked at those numbers. They are very broadscale numbers for the Gippsland Basin and the Otway Basin, but there is a lot more work needed, and I am sure your geological survey would have far better numbers than we do because they deal with the detail. We were taking a national view here rather than a Victorian-specific view of course.

We looked at the technology and the engineering that is available, and we concluded it was adequate for the purpose. That does not mean to say that everything always works, but we could see no show stoppers in terms of the technology, provided it was done in the right sort of way and adequately resourced and so on. There were infrastructure considerations. If you look at the position in the United States with unconventional gas, particularly with shale gas, they have lots of pipelines. Australia does not have lots of pipelines. This means that the cost of unconventional gas is not as cheap as it is in the United States.

You might have seen newspaper reports of how cheap gas is in the United States. We concluded that we will not have gas as cheap as that, even if we found lots of shale gas, for example, because the cost of producing that gas in Australia is at least double what it is in the United States — for a variety of reasons. Some of the reasons are the cost of labour, the cost of technology and the cost of getting the gas to a pipeline. In Victoria there is perhaps less an issue there because there are quite a number of pipelines, actually, so that may be a bit of an advantage that Victoria has. We did a financial analysis of

unconventional gas, particularly shale gas and, as I say, concluded it was not going to be cheap gas, but it might be plentiful gas, and it might be adequate gas.

We looked at the issue of the impact on the landscape of unconventional gas, and there is no question that there are cases that came to our attention of where there has been very significant impact resulting from the unreasonable approach that some of the early companies took to unconventional gas. You have probably seen some of the pictures around that show the way that this was done in the past.

It is important to point out that things have moved on, and we saw evidence of that. So it is important to take lessons from the past, but it is also important to recognise that things have moved on. One of the things that has moved on is the whole drilling technology. Whereas previously the gas companies were drilling on the basis, essentially, of pattern drilling — they would drill every few hundred metres, and I have certainly been in parts of North America where you just see mile after mile after mile of gas wells — what has happened subsequently is that they are able to drill up to a dozen wells from a single site now. In other words, they drill deviated wells, and these wells can actually extend a couple of kilometres underground. In other words, they are able to tap into areas that they previously could not. This has been quite good in terms of minimising the impact on the landscape. But there is still an impact there, and it has to be recognised and has to be minimised. We looked at that quite carefully, because it is a concern to communities.

Water resources and aquatic ecosystems were also looked at in the report, and, yes, there is the potential there for impact, but there is also the opportunity to minimise that impact, as long as best practice is followed, and we spend quite a bit of time talking about the need to have adequate regulation.

We looked at induced seismicity, which is one of the issues that has been raised by a number of people and communities, and in particular the concern that people have that there is a correlation between fracking in particular and seismic activity — microseismic activity. It is important to point out these are not massive earthquakes; these are small-scale — as it says — microseismic events, which you can actually determine from instrumentation, but generally you cannot feel them. However, there was one instance that we certainly were able to document where microseismic activity that could be felt resulted from fracking in the United Kingdom. What happened there was that they stopped all fracking at that time until they had a review. They did a review and worked out what had happened. In fact it was a fault that had not been recognised. That fault was triggered, and so on.

The point that came out of that was the need to have a better standard of base-level geology. So the companies were required to do that. They also set up a system of traffic lights so that if you started getting a certain level of activity, you had to slow down the activity or stop it completely if you got a red light and so on. So they put in place a regulatory regime that we believe would work. That is the only case we were able to actually find where fracking resulted in microseismic activity or in seismic activity you could actually feel and that clearly correlated with the fracking. What we did find also is that there is quite a significant level of microseismic activity that can result from the injection of fluids, and that is more likely to produce microseismic activity. What happens is if you inject a fluid — and there is a whole range of reasons why people inject fluids; sometimes to actually put water back into aquifers and so on. If you put that into an area where there is a fault that could actually be lubricated, you can get some potential movement on that fault. That is a more likely cause of microseismic activity than the actual fracking process, so that is something that clearly needs to be adequately regulated.

We looked at greenhouse gas emissions and at the totality of greenhouse gas emissions associated with it. There is no question that using unconventional gas for the production of electricity produces fewer emissions than using coal. But having said that, unconventional gas will also produce more emissions than conventional gas just because of the way that it is produced, so there is a need to look at that. In the United States they have got a system called green completions, which is something that results in the gas being fed into the pipeline rather than just letting it go to the atmosphere. This is going to be a bit of a challenge initially in Australia because in many areas we do not have those pipelines, so we are going to have to think that through. We have to be realistic about it. It is better than coal, it is not quite as good as conventional gas, but nonetheless there is a benefit there arising from the use of gas rather than coal.

We also looked at community issues, and that was a very important part of the study. There is obviously a lot of emotive issues there, and one of the emotive issues is one of the health issues associated with onshore gas. There are one or two studies that have been done in United States and possibly even Canada, and there has been very little done in Australia on this. We did not find any evidence that there was any health impact from gas production, but that does not mean to say it is not there. Really what we are saying is there was not really any particular evidence. There was no evidence to suggest that it is a major issue, but obviously it is an issue to the extent that people feel it is an issue, so it is something that needs to be considered. The report does do that — it does consider it — but it did not feel it was a major issue at that time, but it also did feel it was something that needed to be considered.

Monitoring, governance and regulation were all seen as very important parts of getting it right when it comes to onshore gas production. You need good regulators, and that can be an issue. You have got to make sure your regulators are adequately trained, and you have also got to make sure that you enforce the regulations and that people have confidence that the regulations are being enforced. Certainly we felt that was very important in terms of providing the community with the confidence it needs to allow unconventional gas or onshore gas to go ahead.

Finally, we looked at some of the knowledge gaps. The other thing that perhaps I should mention is that this report did not produce recommendations; it produced findings. That was the nature of the report. The report was commissioned by the chief scientist and undertaken by the academies. What happened then was I worked with the chief scientist to produce recommendations.

The CHAIR — The Australian chief scientist or the New South Wales — —

Prof. COOK — The Australian chief scientist, Professor Chubb. He, together with some input from me, produced the recommendations that then went to the PMSEIC — the Prime Minister's Science and Engineering Council — which I believe is a subcommittee of cabinet. You have those four recommendations there. I do not know if these have been published, but they are certainly part of the public record now. They are recommendations that went to the federal government that were accepted:

1. Support the scientific, economic and social research required to facilitate the safe and sustainable development of a new source of natural gas —

et cetera —

... including that needed to build social acceptance and effective management regimes and regulatory frameworks.

2. Develop a comprehensive environmental risk assessment plan to monitor, and mitigate impacts of exploration and production on landscape and biodiversity.
3. Support research to understand the structure and dynamics of Australia's sedimentary basins that contain natural gas and oil associated with shale.
4. Through relevant frameworks (e.g. commonwealth and Council of Australian Governments) build a resilient transparent and effective regulatory system to achieve a resilient compact between the industry and communities.

Those are the four recommendations that went to PMSEIC, which includes a number of cabinet ministers, and that was accepted by them. The point here is that we concluded that there were no major show stoppers to the production of onshore gas in terms of being able to guard against untoward impacts. That is not to say that you can be absolutely sure there will never, ever be an impact — you can never, ever say that — but what you have got to do is minimise the absolute prospect of that.

But we also concluded there were some areas where there were some gaps in our knowledge. One of the things we concluded was that we do not fully understand the way that sedimentary basins work, and increasingly we are getting our resources from sedimentary basins — whether it is natural gas, whether it is coal, whether it is water, whatever — and we are getting a very complex interface between these various resource demands, and we need to carefully manage that. That was one of the conclusions that came out of that. I think I have spoken for long enough, Mr Chairman.

The CHAIR — I thank you for your presentation and begin with the committee by accepting the material that has come forward — your large document, but also the associated letter from Dr Alan Finkel and his commentary in that letter. I want to just quickly recap so that I understand clearly. The chief scientist asked the academies to come back with a set of findings and materials, and that is what you did. You came back with a set of findings, and then the chief scientist presented recommendations that came out of those findings in the form of these recommendations to the commonwealth government.

Prof. COOK — That is exactly the way the process worked. We had 51 findings. That was then concentrated to four key recommendations that went to cabinet.

The CHAIR — Okay. I am going to, in the first instance, concentrate on a couple of these recommendations, 2 and 4. Recommendation 2 says, for the record:

Develop a comprehensive environmental risk assessment plan to monitor, and mitigate impacts of exploration and production on landscape and biodiversity.

Recommendation 4 says:

Through relevant frameworks (e.g. commonwealth and Council of Australian Governments) build a resilient transparent and effective regulatory system to achieve a resilient compact between the industry and communities.

Just looking at those, we obviously have a current regulatory regime in Victoria, and there are different regulatory regimes elsewhere in Australia, and there are quite different — but nonetheless trying to solve essentially the same problems — regulatory regimes in other jurisdictions overseas. I am interested to know what you took out of any comparative examinations of those jurisdictions or whether you think Victoria's regulatory regime is adequate — perhaps a show stopper or not a show stopper, to use your phrase before, suggesting that in aggregate there are no show-stopping matters. Finally, are there things we should be adopting and adapting from other jurisdictions to improve our regulatory regime in Victoria?

Prof. COOK — That is a very broad question. I have to say that the academies' review did not look in detail at every set of regulations; that is a task that would have been beyond us in the timescale we had, to be perfectly honest. I might just take off my academy hat and put on my own hat, if you like, and say that I was involved with the New South Wales exercise — the review that was undertaken there by Mary O'Kane, the chief scientist. I think what that produced was quite a good methodology for looking at these issues. That seems to have resulted in quite broad acceptance. I am not quite answering your question in terms of regulation, but certainly what that review by Mary O'Kane did was provide the basis for some of the regulations and some of the approaches they are taking in New South Wales now. I think we can learn from the situation in Queensland because on some of the things they would perhaps say, 'We didn't get them quite right because we were one of the early movers in this'. So I think there are lessons to be learned there.

I should mention that in September this year, 22 to 24 September, the Academy of Technological Sciences and Engineering has organised an international conference which brings together all the major countries that have actually undertaken reviews — the United States, Canada, Australia, the UK and so on —

The CHAIR — This is referred to in Dr Finkel's letter.

Prof. COOK — to actually look at this, to look at the regulations and to look at the approach they have taken to the review. I think it would be important for Victoria to be involved in that. I do not think it is involved at this stage necessarily, but we hope it will become involved in that process because we think that in part will perhaps serve to answer your question. So I am not answering your question because I cannot.

The CHAIR — No, I understand, but I think one of the key questions for us is: what is the best regulatory regime that we can put in place to provide community, environmental and other protections? I am not naive enough, if I can describe it that way, to imagine that Victoria always has the best system and we cannot learn from elsewhere. In summary, I think what you are saying is that there is an international conference where people from around the world will be coming to Sydney in September. There is useful

work for us to look at in the work of the scientist in New South Wales, and we should look at some of the perhaps regulatory failures in Queensland to learn lessons for Victoria. Is that — —

Prof. COOK — That is right. I might also mention that I have been directly involved in looking at some of the regulations in Canada, in particular in Alberta and Saskatchewan. I think there are lessons to be learnt there from their approach to onshore gas, particularly in Alberta. It is a very mature sort of area in terms of the industry, and I think there are lessons to be learned there.

The CHAIR — And Canada, if I can just indulge for a second, is also important because of the similar commonwealth history that we have.

Prof. COOK — That is right. The regulatory regime there and the system of royalties and so on is very similar. In the United States the royalties can be owned by the person who owns the land. In Canada — I think I am correct in this — certainly western Canada, the mineral rights are owned by the Crown, or by the state in other words.

The CHAIR — And regulated by the provinces?

Prof. COOK — Yes, regulated by the province, and also the royalties go to the province.

Ms SHING — And New Zealand's system in relation to the way in which regulation occurs?

Prof. COOK — I suspect New Zealand is pretty much identical with Australia in that respect, yes.

Ms SHING — Thank you, Professor, for that presentation and that discussion about the review and the findings. I take a number of mixed messages from the interaction between what you said this morning and what Dr Finkel's letter of 10 July is, which has been accepted by this inquiry, insofar as you talked about 'no major show stoppers' in the course of your presentation, but then there appear to be a number of caveats around that. I understand that we are in a process of trying to understand the best way to find a balance between these competing interests and that you have indicated in your presentation that where there is a perception of issues at a community level around social licence and other factors that it is in fact an issue that needs to be managed. I note in Dr Finkel's letter to the secretary of this committee that on page 2 he indicates:

... the ... review was of the opinion that most if not all of these impacts —

namely, the processes that occur during a shale gas fracking operation that impact on the environment —
can be managed.

But he then goes on to indicate that if they are not adequately managed, then there can be impacts on soil, fire risk, spread of invasive species, and that there can be, amongst other things, potential environmental impacts on the landscape, including impacts to surface and groundwater systems and ecosystems, and you have touched on seismicity.

The question that I have after all of this is if we do not know as much as perhaps we can know about the sedimentary basins and how they operate, and we are still finding out more about that, and if we have potential environmental impacts upon watertables and agriculturally very fertile land that in the instance of Gippsland is responsible for over a quarter of our dairy and beef production in Australia, how do we manage the issue of social licence without it becoming a show stopper?

Prof. COOK — People have to have confidence in the regulations. They have to have confidence they will be enforced, and they have to have confidence in the action that will be taken if something goes wrong. They also have to have confidence that we collectively know what we are talking about and that we have the information we need, we have the basic information. One of the earlier difficulties, and it is still a difficulty, is that some of the issues that arise relate to having an adequate baseline.

People will say, and you have certainly seen this in New South Wales and you have certainly seen it in Queensland, 'That wasn't there before you started drilling'. Conversely the drillers will say, 'It was there before, because we saw it before'. Then you look at it and it is not adequately documented, so one of the things you have got to do is make sure that you do have a decent baseline — an ecological baseline, a groundwater baseline and so on — but at the same time you cannot say, 'Don't do anything until we have got an adequate baseline'. This is the complexity of it, and part of the way you get a baseline is actually by getting people to drill so that you understand what the water resources are, what the quality of the water is and so on. It is a matter of getting that balance right.

The balance has to be provided by making sure your regulations are right and also that your regulations are sensible and that they are science based. All those sorts of things have to be in this complex equation when we are dealing with these natural resources. Communities have gone far beyond the stage of being told, 'It's all right; we know what's all right for you'. They have got to understand what is going on, and they have got to be involved in this. It is not a matter of them learning that things are happening because they read the press. They have got to know about it before then or at the same time or whatever, but it should not be as an afterthought; it should be as an early thought. You have got to involve the community.

I have been involved in a different sort of project in western Victoria near Nirranda. There the community will come onside when they know what is happening, when they have confidence in the science, when you are open with them, and so on. They can become your greatest supporters for undertaking some of these projects if they understand and have confidence in it. If you lose that confidence, you have probably lost it forever, so it is very important to maintain that community licence.

Ms SHING — Thank you, Peter.

Mr DALLA-RIVA — Professor, we have taken evidence in some of the regional centres where that community confidence has been lost. I do not know if you have a view on that, whether once you have lost that community engagement it is very difficult to then repair and develop an industry and if you have looked at that in some way.

Prof. COOK — Not specifically, but I just know from experience when people have had a bad experience with a company it is very difficult to persuade them that things will be different in the future. I mean, you just have to work twice as hard at it as you would have done if you had got it right in the first place. I think we are all learning from that. I think people who are community based, people who are industry based and government, I think we are all learning we have got to get this right and get it right very soon. There is no magic solution: once you have lost it, it is very difficult, I agree.

Mr DALLA-RIVA — The second question is in your presentation you mentioned a number of times that the shale gas will not be a cheap gas in Australia. If that is the case, the obvious question is why not stick then with conventional gas? What is the need to go to unconventional gas if there are all these barriers, the costs are prohibitive? I think we know we have got a lot of offshore gas. Why not stick with that regime until we know better about the issues around unconventional gas exploration?

Prof. COOK — We would not say the costs are prohibitive, what we said is the costs would be higher than conventional gas and probably about double. Why would people look for it in that situation? You might have seen that in Queensland there have been discussions about a shortage of gas for the LNG industry, so they have been looking at bringing gas from the Cooper Basin to be used in the LNG industry, and that would be primarily unconventional gas. In other words, gas, if you like, that you have got to frack and so on. That impacts upon Victoria to the extent that do they then draw on Victorian gas to top up some of the gas they are using in the LNG industry, which is always a possibility? It is a matter of: would it be cheaper? For instance, the sort of numbers that people were talking about is \$10 a gigajoule, I think, for export (LIVG) gas. We thought that, based upon the costings that we did, it would cost at least \$7 a gigajoule to produce unconventional gas. That is going to vary enormously according to the part of the country you are in and depending upon the infrastructure situation. I made the comment earlier that p onshore gas would be cheaper here in Victoria than it might be elsewhere because of the fact that the

infrastructure is here. So we are not saying it is not competitive, we are saying it might be a useful gas but do not expect it to be a cheap gas.

Mr DALLA-RIVA — So would consumers in Victoria expect their household gas to be cheaper should unconventional gas be allowed to be produced in Victoria?

Prof. COOK — You are driving in the direction of speculation rather than science here. We did not look at that.

Mr DALLA-RIVA — I make that statement, Sir, on the basis that we have heard evidence continually that by bringing in unconventional gas, it will be cheaper for industry and consumers. We have also heard evidence that it will be substantially more expensive, and I am just wondering, from your investigations and examinations, do you have a view on it?

Prof. COOK — Certainly based upon our review, we would say that unconventional gas is unlikely to be cheaper than conventional gas, but that does not mean to say it is going to be massively more expensive in Victoria. It will depend entirely upon the circumstances, upon the depth that you are getting the gas from, the technologies you have to use, all those sorts of things. But it is unlikely to be cheaper than the gas at the moment, but it might be cheaper than some of the other options.

Ms HARTLAND — I wanted to continue on with the comment you are making about confidence. Having been at the hearings in Sale, except for one farmer, the impression we got was that there was no confidence in the processes that were being talked about in Gippsland and that there was no faith in the way that the company was dealing with them, but also — this is my personal experience — that the EPA does not regulate well and does not deal with industry well and that causes problems for communities. What are the steps that you would be saying that need to be taken to give communities confidence that regulations would be enforced?

Prof. COOK — Just before I try and answer the question, the only comment I would make about the EPA is that my experience has always been very positive with the Victorian EPA. We have found them good to work with in a research mode and eager to learn and all very positive, so I do not know that I have any reservations about the EPA as such. How can things be done with the community? I think it is a matter of timeliness in getting the information to them, openness so they do not feel you are being devious about things, you have to be clear about the benefits. One of the difficulties we have at the moment, because of the royalty system, is that the benefits accrue to the community as a whole, by and large, and the impact is on a local community or on a local farmer. This is where the difficulty is. We have got to get that balance right of the risk and reward associated with them for the people who are impacted.

In the case of Queensland, they now have several thousand agreements that have been signed between the gas companies and the farmers, and there are various reasons for this, but I am sure a major reason is because they get income from having the oil and gas installations on their land. So they obviously feel they have got their balance right. Conversely, there is still Lock the Gate and so on, so there are other communities that do not feel it is right. Obviously you will get to the stage in some communities where they will say, 'We don't care how much money you throw at this, we do not want you doing this', or 'We don't want you doing that', and that has to be considered in this whole thing as well. It is going to be a political decision, not anything else, to say, 'We will not have gas exploration in this area under any circumstances'. That is a fairly drastic step in many cases, but maybe it is the appropriate step in some circumstances. I am not saying it is or it is not. That is a political decision.

Ms HARTLAND — If I can continue there, I can understand what you are saying about the EPA. My personal experience with the EPA is that they do very little to protect the community, so that is a personal position and it is also one that I have seen constantly in a whole range of community settings. The other thing I did want to ask you about is that you talked about the fact that this could be managed. Can you explain or can you give a guarantee that, with either unconventional gas or shale, there would never be any damage done to the environment or the aquifers or to people's farms?

Prof. COOK — You can never, ever say that in science. You can never give an absolute guarantee, 100 per cent certainty, on anything. You are dealing with natural conditions and sometimes something happens — you are suddenly not aware there is a connection between one aquifer and another aquifer, nobody has ever found it before and so on. So you have got to have an adaptive system for managing those sorts of things when they happen. You have got to have a system in place with adequate monitoring so you immediately detect it. You have got to have a process in place so that you can immediately deal with the issue before it actually becomes a significant issue. But it is like everything else that you do in life, it has an impact, whether it is a road or a powerline or anything. It is part of what we do — we have an impact. It is a matter of minimising that impact, not ensuring we have zero impact. We cannot have zero impact. It is a matter for the community then to balance between what is the benefit of exploiting onshore gas versus the disbenefit of the impact of it, and that is one for the community and government to decide.

Ms HARTLAND — One final question: do you think there are any areas in Victoria that should be off-limits to this kind of work?

Prof. COOK — No; I mean that is one for government and the community, I think, to say which areas we should not ever touch. No, I do not think I will go there.

Ms BATH — My question relates to fracking. When we go out into the public, there is grave concern around fracking and the dangers and implications of it. Could you outline to us a little bit more about shale gas and the fracking that would occur with shale gas. I guess in some respects there are some commonalities, even though there are differences in terms of regions — Queensland will be different to South Gippsland or the like — but there must be some commonalities around rates of fracking or types of fracking?

Prof. COOK — Yes. Let me make a couple of general comments first. For shale gas you essentially always have to frack. In other words you shoot water loaded with sand, basically, into the rocks. That fractures the rock. The sand keeps the fractures open, and you are able to extract the gas or extract the oil from it. That is the way the system works.

I will deal with unconventional gas more broadly because it is worthwhile just commenting on coal seam gas as well. Some coals do not need any fracking at all; they produce the gas fairly readily because you have open cleats or open fractures. Some coals do require fracking, and I think something like 25 per cent of the coal seam gas in Queensland needs to be fracked. All the shale gas needs to be fracked because that is the only way you can actually get permeability from these fractures that allow you to produce the gas. So that is the difference.

In the case of Victoria — and I am by no means certain it is possible — if you were producing coal seam gas from the brown coals, then it is highly unlikely you would frack that rock. It is soft. You would frack it, and it would not have any impact whatsoever, quite frankly, in terms of production. If you had very deep coals, you might need to frack it to get some coal seam gas out of it. When it comes to fracking of shale gas, you are talking then about much deeper fracking. You are talking depths of about 3000 to 4000 metres, perhaps something like that, whereas you might be doing your fracking at much shallower depths if you were doing it in coals. But I stress that it is not necessarily clear you would need to do it in coals at all to produce coal seam gas.

The important thing is to understand the geology of the area so you do not start fracking in areas that are likely to have active faults and that sort of thing. We know quite a lot about the geology of Victoria. The Victorian geological survey has been working on this for more than 100 years so they have a pretty good background. Do they have enough background? I cannot comment on that. I am sure they could usefully use some more information that would enable them to be more confident about this. I do not know if that has really answered your question.

Ms BATH — That is fine; that is good. In relation to that then, once the fracking has occurred and there are certain chemicals — even if there is a very small percentage of chemicals that go in with the sand and

the water — and they are removed, what is the process there? How would they then recycle the remove from the environmental systems on the surface?

Prof. COOK — What they do is they inject it into the rocks and then they produce that fracking fluid back. Most of that they are able to get back — not all of it. Some of it stays there and it is essentially trapped in those tight rocks, but you do produce most of it back. You then have tanks at the surface, and you hold the fracking fluid at the surface. You will then use it for the next fracking operation.

Some wells are fracked several times. One of the things that does concern people is the size of the fracking operation. I have been in the field with fracking operations, and it involves a lot of trucks and a lot of truck movements and so on. That is something you work to minimise, particularly in a rural area where people value their lifestyle and so on, so you have to look at that in a very considered sort of way and make sure you get that right. The logistics of that sort of thing are a very important part of the fracking activity, and it is something that I am sure you need to look at in terms of regulations.

Certainly that is a very important one when it comes to dealing with the community. You have a quiet community in western Victoria, and suddenly there are 40 trucks. If people have not been aware that that is going to happen, they are going to be very annoyed about it. They are going to be very upset about it, so you have to make sure you get that right.

The CHAIR — Professor Cook, I thank you for your submission and also thank your learned societies for the work they have done. We may need to have the secretariat come back and talk to your organisation at some future point in the next period, but I thank you for your thoughtful submission.

Prof. COOK — Thank you.

Witness withdrew.