COMMONWEALTH OF AUSTRALIA

Proof Committee Hansard

SENATE

SENATE SELECT COMMITTEE ON WIND TURBINES

(Public)

TUESDAY, 19 MAY 2015

CANBERRA

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SENATE

SENATE SELECT COMMITTEE ON WIND TURBINES

Tuesday, 19 May 2015

Members in attendance: Senators Back, Canavan, Day, Leyonhjelm, Madigan, Urquhart, Xenophon.

Terms of Reference for the Inquiry:

To inquire into and report on:

The application of regulatory governance and economic impact of wind turbines, with particular reference to:

a. the effect on household power prices, particularly households which receive no benefit from rooftop solar panels, and the merits of consumer subsidies for operators;

b. how effective the Clean Energy Regulator is in performing its legislative responsibilities and whether there is a need to broaden those responsibilities;

c. the role and capacity of the National Health and Medical Research Council in providing guidance to state and territory authorities;

d. the implementation of planning processes in relation to wind farms, including the level of information available to prospective wind farm hosts;

e. the adequacy of monitoring and compliance governance of wind farms;

f. the application and integrity of national wind farm guidelines;

g. the effect that wind towers have on fauna and aerial operations around turbines, including firefighting and crop management;

h. the energy and emission input and output equations from whole-of-life operation of wind turbines; and

i. any related matter.

WITNESSES

ARCHER, Mr Brad, First Assistant Secretary, Climate Change and Renewable Energy Division, Department of the Environment

KNUDSON, Mr Dean, First Assistant Secretary, Policy, Environment Assessment and Compliance Division, Department of the Environment

MUNRO, Ms Chloe, Chair; Chief Executive Officer, Clean Energy Regulator

PURVIS-SMITH, Mr Geoff, General Counsel, Clean Energy Regulator

RATHORE, Mr Amar Singh, General Manager, Renewables and Carbon Farming Division, Clean Energy Regulator

TREGURTHA, Mr James, Assistant Secretary, Policy and Reform Branch, Environment Assessment and Compliance Division, Department of the Environment

WILLIAMSON, Mr Mark, Acting Executive General Manager, Renewables and Carbon Farming Division, Clean Energy Regulator

Committee met at 08:30

CHAIR (Senator Madigan): I declare open this third public hearing of the Senate Select Committee on Wind Turbines and welcome everyone here today. We acknowledge the traditional owners of the land on which we meet and pay our respects to elders past and present. This is a public hearing and a *Hansard* transcript of the proceedings is being made. Before the committee starts taking evidence, I remind all present here today that, in giving evidence to the committee, witnesses are protected by parliamentary privilege. It is unlawful for anyone to threaten or disadvantage a witness on account of evidence given to the committee, and such action may be treated by the Senate as a contempt. It is also a contempt to give false or misleading evidence to the committee.

I welcome representatives from the Clean Energy Regulator and the Commonwealth Department of the Environment. Could you please confirm that information on parliamentary privilege and the protection of witnesses and evidence has been provided to you.

Ms Munro: Yes, it has.

CHAIR: I remind witnesses that the Senate has resolved that an officer of a department of the Commonwealth or of a state shall not be asked to give opinions on matters of policy and shall be given reasonable opportunity to refer questions asked of the officer to superior officers or to a minister. This resolution prohibits only questions asking for opinions on matters of policy and does not preclude questions asking for explanations of policies or factual questions about when and how policies were adopted.

The committee has your submissions. I now invite you to make a brief opening statement. At the conclusion of your remarks, I will invite members of the committee to put questions to you.

Ms Munro: I would like to take the opportunity to make a brief statement. Many of the submissions from members of the public to this committee express concerns about the impacts of wind turbines. The Clean Energy Regulator understands their concerns and even frustration that the regulation of wind turbines has not resulted in the outcome they would wish. In this regard, the roles and powers of different authorities may not be evident to these individuals. In particular, some of the submissions appear to be based on misconceptions about the nature of the renewable energy target and the roles and powers of the Clean Energy Regulator. Our two written submissions seek to address these misconceptions. The first explains why compliance with state planning and environmental laws is, first and foremost, a matter for the states. The second submission deals with what appears to be a prevalent but incorrect assumption that the issuance of large-scale generation certificates is based on emissions avoidance rather than on electricity generation. We are happy to take questions on these submissions and to provide any further information that the committee requires.

A number of the individual submissions comment on the Clean Energy Regulator and its staff, including allegations of conflicts of interests and a lack of professionalism and integrity. Only two of these submissions have been referred to us for comment by the committee, and we have responded in writing to these two. We have not been invited to respond in writing to any other of the other published submissions which make adverse comments. I wish to take this opportunity to place on record that I strenuously deny that there is any substance to these comments. I note that some of these comments have their foundations in the misconceptions that I have just addressed. They present no evidence that any of the agency staff, including myself, have acted other than with professionalism, without bias or conflict of interest and in accordance with the law. Repetition of unsupported allegations is neither helpful to the committee nor will it sway the regulator and its staff from fulfilling its

statutory functions. Nevertheless, if the committee wishes to put specific matters to us, that it believes our evidence of a failure on the part of the regulator, I am of course happy to take those questions. Thank you, Chair.

Senator URQUHART: I would like to confirm the role of the CER in accrediting large-scale renewable energy projects. I will outline what I understand the process to be. A person must be accredited as a registered person in the RAC registry. The registered person then applies for their power station to be accredited under the act. The CER assesses the application under sections 14 and 15 of the act. The power station can start producing certificates from the date of accreditation or when it began producing energy, whichever is earlier. Is that correct?

Ms Munro: Yes, that is correct.

Senator URQUHART: So this process, as I understand, is only valid for projects of over a certain capacity—is that correct?

Ms Munro: Yes.

Senator URQUHART: What is at capacity?

Ms Munro: I will refer to my colleague.

Mr Rathore: The capacity is generally in megawatts. Power stations come in various sizes and megawatts capacity represents how big they are.

Senator URQUHART: Under the act, the CER needs to be happy that the power station is compliant with any relevant planning approvals—is that correct?

Ms Munro: Yes.

Senator URQUHART: If an accredited power station were found to be in breach of relevant planning laws or approvals, what action would you take?

Ms Munro: I might refer to our general counsel to go through that process.

Mr Purvis-Smith: If there was a finding that a power station was not compliant with planning approvals and other conditions they might have on operation, we look to the act that says we have to have reasonable grounds to believe that it is operating in contravention of a Commonwealth, state or territory law. We undertake an assessment at that stage. The assessment is both subjective and objective assessment—and if I can explain it.

The subjective is effectively that we have a suspicion that something has occurred. The objective is that we have a reasonable grounds to believe; it needs to be more than a mere suspicion. Generally, that will be established by objective evidence, more than mere assertion—something that can be demonstrated to be clearly true. It is the sort of evidence that you would present in a court either by way of affidavit or primary evidence.

We obtain that information in various ways. We might take the direct report or complaint. We might speak to the state and territory regulators. We might do our own inspections. We have information-gathering powers if we need them to obtain information. So what we are effectively doing is pulling together a complete case to ensure that the relevant allegation rises to the necessary standard. Once the regulator is satisfied that it has met the necessary standard, it may make a decision—it is not obliged to—to suspend the accreditation of the relevant power station for as long as the contravention occurs. Once the contravention is no longer continuing then the suspension must be lifted. That is set out specifically in the legislation.

Senator URQUHART: Have you had to take action in the past or are you currently taking any action against anyone?

Mr Purvis-Smith: The power has never been exercised in relation to a power station, but matters have certainly been investigated and we maintain a watching brief. We also have arrangements in place to have the accredited power stations report on a regular basis, both at the time they create certificates and in their annual report to us that they are complying with the relevant laws, planning approvals and these sorts of things.

Senator URQUHART: In your view, is the process working as it should be working?

Mr Purvis-Smith: The process works. The difficulty is that we rely on that objective evidence. In doing that, we rely on the states and territories to a large degree to form a view as to whether a contravention has occurred. It is state based law. These are approvals that have been put in place by state and local authorities. Of course, we are going to listen to what they have to say. We have not been in the situation where a state or territory has made a definitive finding that there has been a breach of their local laws. There has been conjecture but no-one, to my knowledge, has ever moved to a final declaration finding, court proceeding, to say there has been a contravention of the law.

We do not necessarily have to wait for the states and territories to find a contravention. If there was an admission of a breach, that would be sufficient. It is not a closed inquiry, in that sense. We are open to other avenues of finding out that information.

Senator URQUHART: As the body tasked with collecting and compiling greenhouse gas data for the National Greenhouse and Energy Reporting scheme, are you familiar with the work of Dr Wheatley, who will be here today giving evidence?

Ms Munro: I believe we have seen his submission but, no, we have not reviewed his work to form a view on whether we would concur with his analysis—let me put it like; that is with our scope.

Senator URQUHART: You have prefaced that, but I will ask my next question anyway. I am not sure whether you will be able to provide an answer. What is your assessment of his view that wind farms do not remove the equivalent of their output in carbon pollution from coal fired sources?

Ms Munro: This is actually a matter that we addressed in a general sense, not his specific analysis, in our supplementary submission, and we did this for two reasons. The first is when those views are presented in this context, there appears to be an implicit assumption that the issuance of certificates is based on the emissions avoidance. As I commented in my opening remarks, that is not in fact the case. So the relevance of that analysis, I think, is questionable, or at least the conclusions that are drawn from it.

However, what we do address in our submission is that the quantity of greenhouse gas emissions that are displaced by the generation of a particular quantity of renewable electricity may indeed very. There is not necessarily a one-to-one correlation between the specific megawatt hour of renewable electricity that is generated and an average megawatt hour of fossil fuel electricity that is displaced. That is discussed in our supplementary submission. However, that does not lead to the conclusion that there is no benefit. It is just that the ratio at different times may vary. I do not think there is anybody involved in renewable energy regulation or the renewable energy industry who would disagree with that. But I can certainly talk in more detail to the supplementary submission if that would be helpful to the committee.

Senator URQUHART: Okay. I will keep moving on because I am not sure whether the chair will cut me off. Mr Peter Lang, who will also appear before the committee later today, says that we do not know what emissions reductions are actually being achieved by wind generation. Do you believe that is an accurate statement?

Ms Munro: Again, the supplementary submission addresses that. I might go through the key points there if that would be helpful, and also to reinforce that this is not a matter which we regulate or need to consider in our decisions. I think I need to make this clear; this is for information not because it is a matter that we examine in our regulatory decisions.

We agree that, as a matter of practicality, it is difficult to determine on a case-by-case basis how much emission reduction is achieved by a particular megawatt hour, if you like, of renewable energy generation. And that is because of the nature of the electricity market and the way that the electricity is pooled and how generators are dispatched. It is difficult to establish at any particular point in time what alternative would have been dispatched in the absence of the renewable electricity generation and therefore what emissions were avoided at the time. That is because different power stations have different emissions factors and also it varies depending on how much of their capacity is being used. So it varies over time. It is correct to conclude that the ratio of emissions avoided through renewable electricity generated varies over time and between regions.

I think the other point that has been made is that the avoided emissions attributable cannot be directly measured, they need to be modelled. So what you are doing is comparing what happened with the generation with what would have happened without the generation. Of course, that point can be made about quantifying the impact of almost any policy instrument. But that does not imply that a modelled estimate is misleading or that it cannot be relied on to assess the effectiveness of the instrument; how many significant figures it can be accurately modelled to would be the best way of looking at it.

We cannot comment on the design of the models that are used to make those assessments. The committee would be familiar with the modelling that was undertaken by ACIL Allen for the Renewable Energy Target Scheme report of the expert panel, for example. So there are a number of parties who have done that modelling very carefully. But what we can say is that accurate data on actual emissions from electricity generators under different circumstances are known and actual data on the dispatch of electricity are known. Those data can be derived from our own National Greenhouse and Energy Reporting Scheme and from the electricity market operators such as the Australian energy market operator which runs the national electricity market in the eastern states. Taking those data together certainly does provide a sound information base for modelling the emissions intensity of the total electricity supply, including renewables, under different scenarios and therefore the

emissions displaced. It is correct that the amount of emissions displaced by renewable electricity is a modelled estimate and that there are some assumptions in those models. But it is incorrect to say that those assumptions are not based on good evidence, and it certainly is reasonable to think that models can be done which give reasonable estimates of the emissions displaced. I hope that provides sufficient clarity to the committee.

Senator URQUHART: Chair, I have some further questions that I would like to put on notice.

CHAIR: Okay. Senator Day.

Senator DAY: The committee has heard a lot of evidence about the adverse health impacts of wind turbines, particularly around low-frequency infra-sound, which does not appear to be covered by the regulations, which mostly cover audible decibel measured sound. We have also heard evidence from state and local governments to the effect that they are struggling with regulating this industry. Do you have a comment or a response to the state and local governments in this field? They seem out of their depth.

Ms Munro: I am unable to comment on that. As I have said on other occasions, we cannot put ourselves in the shoes of those regulators and do not attempt to do so. Certainly the matters you have raised to do with the potential health impacts and low frequency noise are beyond our expertise and I really cannot offer any comments on that. But the department may be able to do so, as this is perhaps more to do with the policy interaction between the Commonwealth government and the states.

Mr Archer: Certainly on the health impacts, the department looks to the scientific and medical evidence that is presented to us. In that sense, the reviews that the NHMRC have done periodically on this question are generally what we have turned to—and discussions with the NHMRC on the question of health impacts. To date, the findings of those reviews have not really provided compelling evidence to us that there is a need to make significant changes to the way the Renewable Energy Target Scheme operates. Again, the department does not have the health expertise. But we do provide advice on the general operation of the scheme and, of course, we do have an interest in relation to environmental impacts to the extent that there may be impacts that are of national significance which my colleagues can talk to.

Senator DAY: There are reams of evidence from research bodies around the world going back to the 1980s. Are you aware of some of the studies about the adverse health impacts of wind turbines on human beings? We have got volumes of evidence from researchers, statisticians and all manner of bodies. But the NHMRC provided the least information; they provided a one-sentence summary of their opinion. We have had evidence from local, state and national bodies that seem to pass the buck. There was evidence earlier that we rely on state and local governments. They say they are out of their depth. We have hundreds of people providing evidence about the serious health impacts but we do not seem to be getting a lot of traction at either the federal, state or local government level on these serious concerns which have been known for over 30 years.

Mr Archer: That question is best directed to the NHMRC. My understanding is that it has reviewed evidence both within Australia and internationally to reach the conclusions that were reported in the February 2015 report and in at least one earlier study it had done a couple of years ago. Certainly on the issue of the health impacts of wind turbines, the NHMRC is probably best placed to respond to those questions.

Senator CANAVAN: Has anyone from your agency ever visited the community affected by wind turbines?

Mr Archer: As it happens, I visited a property during the review of the Renewable Energy Target by the expert panel.

Senator CANAVAN: Where was that?

Mr Archer: It was in an outer area of Melbourne. I cannot remember the name of the location.

Senator CANAVAN: Are there any other examples?

Mr Archer: To my knowledge, that would be the only example.

Senator CANAVAN: I give you credit for taking that effort. Following up on what Senator Day said, I had not been to any of the communities before this Senate inquiry, but, having been there, I do not think these complaints can be easily dismissed. There are hundreds of everyday people who are clearly being impacted in some way. We clearly do not have enough understanding of why they are being impacted. I understand that you do not directly regulate these issues. But clearly the federal government is contributing to the installation of these facilities and, in my view, we have some duty of care to ensure that our investments are not foreseeably causing adverse health impacts.

Senator LEYONHJELM: For false declarations, does the CER have prosecution power, or does it refer to the CDPP?

Mr Purvis-Smith: If the circumstances arise where we believe that a false declaration has been provided to us, that is a matter we would generally refer to the Commonwealth DPP because it is a matter that arises specifically under the Criminal Code. It is not a statute that we have administration of.

Senator LEYONHJELM: If you found cause within your legislation to suspend the issuing of renewable energy certificates, I understand that you cannot do it for a part of a wind farm. Is that correct?

Mr Purvis-Smith: The legislation is effectively binary. It is the accreditation of the power station that is suspended, not a part of the accreditation. So it is binary in that sense. I mentioned earlier in response to Senator Urquhart that the regulator has a discretion as to whether to exercise that power. My view is that, for example, if it was one or two turbines out of 100, using that power to suspend the accreditation for the whole wind farm may be disproportionate. Each matter would turn on its facts. That is something the regulator could take into account when it makes its decision.

Senator LEYONHJELM: Could you please explain to the committee your role in ongoing compliance with state and local obligations?

Mr Purvis-Smith: As I said earlier to Senator Urquhart, we require the power stations to make a declaration that they are in compliance with all laws—because the legislation is about Commonwealth, state and territory laws. We ask them to confirm that they are in compliance when they create certificates and we are looking at validating certificates, and also in their annual return. If we become aware of an anomaly, we will make inquiries both with the power station and the local authorities. That is generally the state planning departments, but it could be with local authorities where the planning approval is at the local level as well.

Senator LEYONHJELM: It is a sudden-death or sudden-life decision to accredit a power station? In your submission you said the regulator does not have the power to revisit a decision to accredit.

Mr Purvis-Smith: That is correct. The way the scheme works is that, once there is accreditation, you move from the accreditation phase to the potential suspension phase.

Senator LEYONHJELM: No nuance there.

Mr Purvis-Smith: There is a technical legal answer in relation to a decision made. If the decision was fundamentally flawed because of patently false information then there is the theoretical legal possibility that you can say the decision was void from the beginning. But that situation has not arisen, and it would be a very technical and difficult case to run.

Senator LEYONHJELM: In your submission you also say that four renewable energy power station applications have been refused. Can you tell me more about them?

Mr Rathore: When a power station applies it is required to provide the information required under the regulations. When a power station owner/operator fails to provide enough information, that could lead to the application being rejected. From memory, very few applications have been rejected. We work with the provider of that application to make sure—

Senator LEYONHJELM: According to your submission, four have been rejected. I want to know a bit more about them.

Mr Rathore: The main reason for those power stations not going on to the accreditation stage was lack of information or the proponent not going to the final step of the power station being in a position to generate electricity. A combination of these factors led to those four being rejected.

Senator LEYONHJELM: We have heard evidence that the Windy Farm power station in Queensland has been in breach of its local planning regulations for some continuing time. Notwithstanding that you have a requirement for annual compliance statements, what would it require for you to act on that? Suppose you receive notification from somebody to the effect that Windy Farm power station was in breach of its state or local obligations. What would you need to act on that information?

Mr Purvis-Smith: If we receive information we would act on it, and that would be to conduct an investigation. If you are asking whether to act on it would be to exercise the power to suspend, that would be the building of a case, as I described to Senator Urquhart earlier, and we would be looking for some objective evidence rather than a mere assertion or suspicion. In most cases, that would arise through a finding by a local body that there had been a breach. Using Gullen Range as the example, New South Wales has a system where they can issue what are effectively rectification orders, in which they allege that there has been a breach or noncompliance with planning approvals and so on. New South Wales only ever went to draft orders; they never finalised those orders. So clearly there is some question even in the New South Wales department's mind as to whether the objective test has been satisfied—whether it is clear that a contravention has occurred.

Senator LEYONHJELM: In your submission you make some suggestions as to how your powers might become more nuanced. You also make the statement that your powers:

… could be enhanced to ensure that only compliant activity is rewarded, and that economic disincentives are commensurate with any contravention.

Could you just spell out some scenarios of how that might work so the committee can quite understand what you are saying?

Mr Purvis-Smith: If I can use a hypothetical, let's say it is a wind farm that has a local approval for 100 wind turbines, it is ultimately found by a state planning body that, let's say, three of those turbines are not in accordance with their planning approval, and that issue is disputed. If we had the correct power, or a carefully drafted power, we may be able to issue what is called a conditional suspension, for example, in relation to those affected certificates. It would, effectively, have operation from the date that we issue the notice. We would have to rely on some finding by a state or territory planning body with responsibility, and it could be limited to only those turbines that are not in compliance—in my example, the three. As I understand it, and others may have more information, the difficulty with that is that it is very difficult to assess what the generation of those three individual turbines would be, so we would have to be very careful about the number of certificates that would be suspended as a result. Again, for the reasons that I set out before, it would not be commensurate with the alleged contravention to suspend for the whole of the 100 turbines; it may be that we should only suspend in relation to the three. So there are ways that we see that the current scheme could be nuanced, but a significant amount of work would have to go into the drafting to make sure that that is effective and that we do not end up with something that just is not enforceable.

Senator LEYONHJELM: Do you suggest any change to the circumstances under which you might suspend all or part of the issuing of RECs to a wind farm?

Mr Purvis-Smith: Do I think that there should be any change to the current test, which is a contravention of local—

Senator LEYONHJELM: Yes. You are relying on, virtually, a conviction—to a legal standard, a finding of fault—under a state or local jurisdiction. Do you think that there are any other tests that might be applied?

Mr Purvis-Smith: A conviction would be the gold standard; that would be clear. The issuing of a rectification order by a planning authority, where it is not contested and somebody shuts down or says, 'Yes, we will fix that,' would be clear evidence for us as well. So there is a spectrum. I am hesitating because I think that you might be asking me to express an opinion about what policy could be. I will simply say that contravention of the law is a useful test; it is clear, and everybody understands what it means. I think it would be very difficult, from a lawyer's perspective, to draft a provision which allowed a regulator to act on something that was other than a contravention of the law—something that might be genuinely disputed and with no way for that dispute to be sorted out. If it is a breach of legislation or planning approval, there are planning commissions, there are courts and there are tribunals that can make those sorts of decisions.

Senator LEYONHJELM: You have said that you do not want any enhancement of your powers for investigatory purposes. I am pretty sympathetic to that view, but could you just explain why?

Mr Purvis-Smith: The power to suspend is sufficient; it takes away—

Senator LEYONHJELM: But an independent investigation is what I am referring to.

Ms Munro: Perhaps I could expand on that, Senator. I think the issue again goes to the scope of what our functions are rather than our powers. Our function is to establish the economic entitlement, so to have powers to investigate matters that are not related to that and which require an expertise that we frankly do not have would be problematic. For example, if we were required to investigate noise we would have to develop an expertise in noise that we simply do not have. And it would not simply be a matter of us hiring the odd acoustician for the odd report; we would still have to be able to interpret that and have it peer-reviewed and all of that. I think that would be extremely problematic for us because, by having those additional powers, it would take us beyond our functions and there would be no foundation there. That is why we are very hesitant about expanding our scope beyond the purpose for which we were given the functions that are directly in the renewable energy act as it stands.

Senator CANAVAN: Do you have an advisory role to government as well? Do you provide advice to government about the workings of the scheme and how it is operating—a policy advisory role?

Ms Munro: The policy advisory role sits with the department.

Senator CANAVAN: Do you advise the department?

Ms Munro: Fundamentally, the advice that we provide is about operational matters and about the facts that we see in terms of the information that we gather.

Senator CANAVAN: And that goes to my point, Ms Munro: I certainly do not think you should be hiring acousticians and those things, but, as I said, it is a very large-scale program and it involves hundreds of millions of dollars a year. I would expect we would monitor developments, given we are spending that kind of money, and we would be providing advice to government or to the decision makers on any other things that may need to be done, including additional research in certain areas.

Ms Munro: That would be a matter for the department and, indeed, the government gets advice on these matters from many quarters, including, of course, committees such as this, which will be much more well informed at the end of this process—

Senator CANAVAN: We are not as well-resourced as you though, Ms Munro, I would suggest. I think our secretariat would agree with that.

Ms Munro: We are appearing before Senate estimates on Monday, so we can have that discussion there.

Senator CANAVAN: We can compare resources.

Senator BACK: Mr Archer, I have a question in relation to the answers you were giving. In the event that people are able to show that they have been adversely affected health wise, they would obviously individually or as a group bring an action against the host of the wind farm, they would bring an action, presumably, against the operator, possibly even the state planning department or the state government in relation to the approval. Given the fact that the underwriting of nearly all of these projects—in fact, I would say effectively all of them—are renewable energy certificates from the Commonwealth, have you or has anyone in the department looked at the possible liability on the Commonwealth if the Commonwealth was to be joined as a defendant in a class action?

Mr Archer: I am not aware of that having been done.

Senator BACK: No, it has not been done. I am not asking you if it has been done. I am asking: has the department addressed itself to the risk of possibly being joined as a defendant, given the importance of the renewable energy certificates in the funding of these projects?

Mr Archer: Sorry, just to clarify: my answer was, no, we have not done that—not to my knowledge in the time that I have been working on the issues.

Senator BACK: Certainly the time may come when you may have to. Ms Munro, it is good to see you. No doubt we will see you again next week, so that is wonderful.

Ms Munro: You shall.

Senator BACK: I just want to ask you about a comment that you made earlier. I think you made the comment, and it seems to be accepted, that a megawatt of renewable energy is not equivalent to a tonne of carbon dioxide abated—am I correct?

Ms Munro: That is correct.

Senator BACK: Wheatley makes that point, others have made the point. Some people talk 0.78, others talk 0.82. Can you tell me then: what value is the taxpayer getting from what is now $43.50 I think renewable energy certificate—they seemed to go up to $94—if indeed there is not an abatement of one-for-one megawatt for CO_2? At least should it not be 78 per cent or 82 per cent rather than dollar for dollar?

Ms Munro: First of all, I might just return to some of the fundamentals of how the scheme works, in case your question might be misinterpreted. There is no taxpayer funding of the renewable energy targets. The way that it operates is that certificates are created on the one hand and purchased and surrendered on the other hand entirely within the electricity market. So the payment for those certificates is made essentially by electricity retailers—

Senator BACK: Who pass it on.

Ms Munro: Yes, indeed.

Senator BACK: If I could replace the word 'taxpayer' with 'consumer', would I be more accurate?

Ms Munro: That is correct.

Senator BACK: In Australia, in the main, those who pay taxes are also consumers.

Ms Munro: That is absolutely true, and vice versa. I had a conversation with somebody the other day about how you could not substitute those two words. However, I think it is important that this happens under the aegis of Commonwealth legislation. It is the consumers who would ultimately pay, in so far as those costs are

incorporated in electricity prices. Generally, of course, what happens is that there is a contract between the renewable energy generator and the retailer for the provision of both energy—the electricity—and the certificates, and that will be at a price that may be bundled across the two. So the price that is observed in the spot market is not necessarily the price that is actually paid for the majority of the certificates that are bought and ultimately surrendered.

Going to your point about whether it should be adjusted in some sense, the government would have no means of adjusting the price because that is established in a market that has a price for a certificate. Our supplementary submission addresses this question of whether it would be more appropriate for the number of certificates that are issued to a particular renewable energy generator to be adjusted to reflect the emissions avoided. I think that would obviously have the equivalent economic impact. The first thing I would say is, of course, that we do not have the power to do that. The second thing, which the submission addresses, is that as a matter of practicality it would be difficult to do that, because the emissions intensity of the avoided generation basically has to be modelled and then it could vary, as you say. It certainly varies over time and between regions; so it might be 0.76 or it might be more than one tonne per megawatt in some circumstances.

More substantially, I think it is a misreading of the objectives of the act. If I could refresh the committee's memory, the act has three objectives. The first one is to encourage the additional generation of electricity from renewable sources—it is as simple as that—and so the incentive that is embodied in the certificate goes to the additional generation of electricity and it does exactly that—precisely one megawatt of additional electricity receives one certificate. The second objective is to reduce emissions of greenhouse gases in the electricity sector. So that objective, if you like, is about the whole sector reducing the total emissions. It is inarguable that it does that, but how much it does that is a modelling question. It does not—

Senator BACK: That is a question for another time, because I think that it is arguable, but nevertheless I do not think we have time this morning to debate that further. That issue certainly has come up in terms of spinning reserve, and we have seen evidence of it in Victoria where with the increase in renewables there has actually been increased coal fired generation at the same time, simply to provide that baseload—

Ms Munro: Senator, if I could just address those two points. Spinning reserve is addressed in our supplementary submission, and you have to remember that Victoria is a nett exporter, generally, of electricity. So both could be right. I am quite happy to have that discussion on another day, but look at our supplementary submission which addresses the issue—

Senator BACK: Did you say that the payment of renewable energy certificates is based on megawatts of output? Who provides you with the information from each wind farm operation with the number of megawatts? Is it the operator who provides that information?

Ms Munro: Mr Rathore might just explain the evidence that we have.

Mr Rathore: The wind farm operator is required to provide half-hourly interval metering data, and that data is, in many cases, crosschecked with the metering data service provider, or AEMO. Once we are confident that both datasets align, we then validate those certificates. So the metering data is based on meters of high standard, and the standards are based on AEMO or jurisdictional regulators.

Senator BACK: So it is the generator and the service provider?

Mr Rathore: That is right.

Senator BACK: Do you do any independent audits yourselves, or do you simply rely on that high quality meterage?

Mr Rathore: Whenever we have any reason, we have an MOU with AEMO that allows us to get the metering data from AEMO. We have done it on very few cases because we have never had any doubts. We also have some independent checks in terms of how much electricity a certain megawatt sized power station can produce. Once we know that this wind farm in Victoria is producing 40 per cent of its installed capacity, we would constantly give those checks. On some occasions, whenever we see that electricity production has been more, then we question that data. We also look at auxiliary consumption, and we look at other factors that eventually go into the determination of number of certificates that are validated by the Clean Energy Regulator.

Senator BACK: I think it is under regulation 15A(a) that electricity omitted from the calculation includes:

… electricity that was generated by using an eligible renewable energy source that is not ecologically sustainable …

Could you take that on notice and confirm that my understanding is correct?

Mr Rathore: Yes, we can do that. The eligibility for large-scale generation certificates sits under regulation 14, and the formula basically takes care of any generation from non-renewable sources of electricity. For

example, if a sugar mill is producing electricity from using bagasse and also using diesel for start-up, then we exclude the electricity produces by diesel, and that is what the formula does.

Senator BACK: Mr Purvis-Smith, just to be clear with regard to Gullen Range, which appears on pages 13, 14 and 15 in your submission, can you tell us: are renewable energy certificates currently being paid in consideration of power generated from the nine turbines that are not located in their originally approved location?

Mr Purvis-Smith: I do not know the answer—

Ms Munro: Mr Purvis-Smith will not be able to answer that. Mr Williamson may be able to.

Senator BACK: So the nod is, 'Yes, they are being paid'?

Mr Purvis-Smith: No, I do not know the answer. I am referring to—

Ms Munro: Mr Williamson might be able to answer.

Mr Williamson: That is correct. The whole of the power station is receiving certificates for the power generated.

Senator BACK: Even though there are nine turbines that have been located other than their approved area and there is, as you say, a draft order for them to be removed.

Mr Williamson: We have not suspended the accreditation of the power station. So, until we take a decision to suspend it, the power station is eligible to create those certificates, to have them assessed in the way Mr Rathore outlined and to have us validate those certificates.

Senator BACK: Finally, Ms Munro, on your page 8—compliance and reporting—you make the comment that ongoing compliance by accredited power stations with the act is monitored by yourself, supplemented by reporting requirements, and you give three messages. But then, if I take you back to your page 5, you say:

The Regulator does not undertake these assessments to duplicate the role of the local planning authorities. The Regulator does not have the power to give or to veto planning approval …

… … …

These matters are beyond our remit to determine and are the responsibility of the party providing the approvals …

Is there an anomaly in what you have told us on page 8 in terms of your powers and the limits to your powers as indicated on page 5? How do I read those?

Ms Munro: An anomaly is certainly not intended by the way we have described this. On page 5 we are essentially talking about our ability to determine compliance with state planning regulations. We do not independently determine that, nevertheless you could say we are monitoring the ongoing compliance. It is in the sense of compliance action—whether, for example, there is compliance action or there is an allegation of non-compliance, something like that, which we talk about further on page 9. But, certainly, the section on pages 8 to 9 is not intended to convey that we independently consider whether or not they are complying. I hope that is sufficiently clear. It goes to the evidence that we are relying on here.

Senator CANAVAN: In your submission you talk a lot about seeing that operators are complying with state and territory government planning approvals, but I presume that extends to local government as well?

Ms Munro: Yes. What we mean by that is the state and territory legislative scheme which, in some cases, is in the hands of local government to some extent. We encompass that.

Senator CANAVAN: In Queensland, for example, that may change soon, but in Queensland it has been local government. If a local government that provided approval to an operator issued a show cause notice for noncompliance, would you expect that operator to tell you about that?

Ms Munro: I think we would.

Senator CANAVAN: We have received evidence that, in particular—I think it was mentioned earlier—the Windy Hill wind farm was issued a show cause notice a few years ago. Did the operator of that wind turbine notify you of that notice?

Ms Munro: We would have to reach back into the records if it was a few years ago.

Senator CANAVAN: I am happy for you to take it on notice.

Ms Munro: If evidence of that nature has been presented to the committee, or to any senator outside of hearings, it would be helpful for those to be conveyed to us directly so that we can investigate them.

Senator CANAVAN: The general point would be that there would be an obligation on the operator to pass that information on.

Ms Munro: It would be.

Senator CANAVAN: I visited Mount Emerald on Sunday, and they are seeking to build a new wind turbine facility there—the same parent company, but a different subsidiary company. Yesterday, at the inquiry in Cairns, RATCH, which is one of the parent companies, were directly asked whether the subsidiary company building this new wind turbine facility was a two dollar company, and they said no. I would like to table a current company extract of the Mount Emerald Wind Farm Pty Ltd. This extract was obtained on 18 May 2015, and it shows clearly that the paid-up capital of Mount Emerald Wind Farm Pty Ltd is two dollars and is shared equally between two parent companies of one dollar each. They were directly asked—I think the Hansard transcript will show—whether Mount Emerald Wind Farm Pty Ltd was a two dollar company, and they directly said no. I would ask that we write to RATCH to seek an explanation. I also ask you, Ms Munro, if you could have a look at that transcript and establish this yourselves, because these people are applying to be accredited for the issuing of RECs. I believe giving misleading evidence to a parliamentary inquiry is quite serious, and they need to explain why they were not able to respond to that accurately, particularly given they had the general counsel of their company at the table, and he was the one who answered the questions.

Ms Munro: We would be happy to take a look at it. At first blush, I am not sure that that is a matter that we would be able to act upon, or take into account. Indeed, it is certainly not unusual for infrastructure developers to set up special—

Senator CANAVAN: I do not disagree, but that is not the point. Are you saying: if someone has given misleading evidence to a parliamentary inquiry, you are not going to take that into account when deciding whether to credit someone as a fit and proper person?

Ms Munro: I did not say that. I said that we would look into it, if you provide us with that information. That does not lead to a conclusion that we would necessarily be able to act on it, or that it would be appropriate for us to act on it. I do not want to mislead you as to where—

Senator CANAVAN: Sure. I am more than happy to provide RATCH with an opportunity to explain. However, on the face of it, it would appear that some statements have been made that were not fully accurate and need to be rectified.

Senator DAY: The Clean Energy Regulator determines that a person is a fit and proper person for registration having regard to matters in the regulations and so on, and a person or business may appear to be fit and proper at their application stage. What is your assessment criteria for a fit and proper person, or a fit and proper company in this case?

Mr Williamson: Firstly, we would need to take on notice whether we have an application before us. If this is a new company—

Ms Munro: Can we just talk about the fit and proper person criteria?

Mr Williamson: Certainly. The legislation covers the checks that we would normally do. We do a range of checks to ascertain that, and if we had some specific allegations or we were aware of false or misleading information, that would be taken into account at that point in time.

Mr Purvis-Smith: For example, what we have just heard.

Mr Williamson: It would be a factor that if that information, as Ms Munro said, were given to us—including if it were simply an allegation—then we would typically show natural justice. If we were going to not register someone we may put an allegation to them and give them a chance to respond.

Mr Purvis-Smith: Regulation 3L sets out the matters that regulators must have regard to.

CHAIR: Ms Munro, you will recall that I first wrote to the CER several years ago in relation to the Waubra wind farm's required approvals from the state. I also got from the CER under freedom of information the 2010, 2011 and 2012 returns from the said farm—thank you for supplying those. One of the questions there was: 'Was there a breach of a permit or conviction for an offence under any Commonwealth, state, territory or local government law related to the operation of the power station in any year since gaining accreditation?' In each of those cases they ticked the 'no' box.

I also requested freedom of information documents from the department of planning and community development in Victoria, and in 2010 from the minister from the department, in which it says: 'It is recommended to the minister that he sign the attached letter informing the proponent of Waubra wind farm (a) that he was not satisfied with the noise compliance report provided and required the report to be reviewed in response to your concern; (b) that the noise breach under condition 16 of the relevant planning permits and require the proponent to document a program to ensure compliance with the relevant noise standards; and (c) that the noise compliance report submitted is not to his satisfaction and that under condition 16 of the relevant planning permits, the breach

has occurred.' That was in 2010. Then I have got another one here from the minister for planning, which I will table for the committee. Here the minister says to the developer that he was not satisfied with the independent post-construction noise monitoring program required by condition 17 of the relevant planning permit. Further, the report details that 'the operation of the facility does not comply with the relevant noise standard at several dwellings, and I am therefore not satisfied in accordance with condition 14 that the operation of the facility complies with the relevant standard in relation to these dwellings.' That one was also in 2010. Then I have got another one for 2011, and still at this point in time, 'I am not able to reach a determination that the wind farm has complied with the performance requirements specified'.

I note with interest Mr Purvis-Smith earlier saying about this issue of compliance and with relevant state-local government-territory and how do you prosecute. The thing is that in this self-assessment in three returns it says they are not in breach, but the FOI letters from the DPCD and the minister for planning say words to the effect that they are not.

What does the CER actually do?

Ms Munro: Let me take this back to the fundamentals. First of all the wind farm operator reported that they were not in breach. The view at the time was that they were not in breach, and it has never been found in a court of law or a tribunal that they were in breach.

Senator MADIGAN: The proponent says they are not—

Ms Munro: If I can just—

Senator MADIGAN: I am just trying to clarify this. The proponent says that to the CER but the minister's letters here say that you are not meeting conditions 14, 16 and 17. Are they compliant or not? The letters don't support that, do they? I am happy to supply you with a copy of them if you do not already have them.

Ms Munro: I am well aware of the correspondence. Mr Purvis-Smith may be able to answer this better than me, but let me attempt it. The first thing is that the minister's letters say that he is not satisfied that they are complying with the conditions. They do not say that they are in breach of the law. So he is not satisfied. There is a very long period of time where the process is happening in Victoria, which, as I understand it, is a series of assessments so that the minister can be satisfied that they are complying with the conditions. That, as you know, was very extended. So I think you are putting together two separate legal concepts. One is whether they are in breach of the law, to which they said they were not and had never been found to be in breach. The other is: were they complying with conditions to the satisfaction of the minister? That was a matter that was not determined. Indeed, the minister was say, 'I cannot determine whether or not,' and that is why he was not satisfied. Ultimately, that point of satisfaction was reached. So noncompliance and therefore a breach was not established.

So this goes back to this question. We fully agree that what the minister was saying was that he has not established either noncompliance or compliance, and 'not noncompliance' is not the same as 'compliance'. That was the matter that was being examined by the Victorian planning authorities and the company for some period of time—you were quoting correspondence here back to 2010. Nevertheless at no point was a breach of the law established. Therefore, I don't think it is unreasonable that the company said what it said at those times in their returns, because that is what they believed to be factually correct at the time. I am reading their minds here, but I think it would be reasonable to say that they were able to say it was factually correct that they were not in breach. They had not been found to be in breach, even though there were questions about the minister's satisfaction about whether they were complying with certain conditions. I do not know if Mr Purvis-Smith can amplify that.

Also, if I could say one further thing, because you did ask about what we do. After those matters had been raised with us we independently inquired of the planning department on numerous occasions about the status of this matter, and, on the basis of the advice they were giving to us, concluded that we did not have grounds to suspend, which would be the point to which we would go if we were concerned about a breach. Mr Purvis-Smith might be able to—

Mr Purvis-Smith: Ms Munro has given a good explanation. I simply refer the committee to page 16 of our submission—the primary submission that we lodged—which goes to the sorts of things that we would look for as to the state of the mind of the person who has made a statement. As we say there, where an allegation is disputed; where there has been no admission; when it is currently being contested, for example, through the courts, in those circumstances it would be very difficult to mount a prosecution or any sort of case against a person for a false statement, where they are asked: has a contravention of the law occurred? It is a different question to whether anyone has alleged a contravention of the law has occurred.

CHAIR: The whole thing is very ambiguous. There does not seem to be any regulation whatsoever. You can say anything, do anything, tick a box and self-assess and it just goes through to the keeper, doesn't it?

Mr Purvis-Smith: Respectfully, I disagree. I think your definition of regulation is that a regulator takes away something or penalises an entity. What regulators do is much broader than simply imposing penalties. Part of a regulator's role is to monitor compliance with the law, to educate about compliance with the law and where there is suspicion of noncompliance to encourage people to ensure that they definitely are compliant.

Senator CANAVAN: Penalties are one of the tools a good regulator has.

Mr Purvis-Smith: One of the tools.

Senator CANAVAN: I think you have usefully identified in one of your submissions that one of the problems here is that you can only impose a penalty once noncompliance is established. It is then probably pretty easy for the operator just to become compliant as soon as that fact is established, and so a penalty can no longer be applied. You do agree that a core problem here is that there is a gap: you do not really have the ability to retrospectively say, 'You have done something wrong and you are going to pay a penalty.'

Mr Purvis-Smith: I would agree that it is, as drafted, a point-in-time assessment. It is 'contravening', not 'has been' or 'may'.

Senator XENOPHON: Further to that line of questioning, in terms of the issue of noncompliance that Senator Madigan referred to, what powers do you have to determine whether the operator was aware of the noncompliance? That seems to be an issue, doesn't it?

Mr Purvis-Smith: We could use our information-gathering powers.

Senator XENOPHON: But you did not in this particular case that was put to you?

Mr Purvis-Smith: Not that I am aware of.

Ms Munro: We can and do make inquiries directly of the operator without using our powers. In this case it was quite clear that the operator was fully engaged in the process with the department. So they were certainly aware of the minister's lack of satisfaction. So there was no gap in our understanding and their understanding.

Senator XENOPHON: Because time is really constrained, if I can just run through a few issues. I am happy for you to expand on those.

Mr Purvis-Smith: Very quickly, when we use our information-gathering powers and when we consider using them, we have regard to the Administrative Review Council's report in relation to the use of coercive information-gathering powers. We use the powers in accordance with that report.

Senator XENOPHON: We will give the secretariat a copy of that and we can look the criteria up for ourselves. At the end of your submission you have said that there could be scope to change the powers of the Clean Energy Regulator. You say that you do not believe its responsibilities need to be broadened but there ought to be the issue of proportionality as a disincentive to have more refined powers. In other words, you could have a conditional suspension—

Senator Leyonhjelm interjecting—

Senator XENOPHON: I did hear your earlier question, Senator Leyonhjelm. I appreciate that, but I want to follow through from it. What I am trying to understand is this: are you not constrained at the moment by virtue of the fact that you cannot look behind what a state regulator has or has not done in relation to an allegation of a breach? In the sense that you have to rely on what the state regulator tells you, you really are constrained—it is not a criticism—by virtue of your inability under the current framework to look behind these assertions that there is compliance.

Ms Munro: I would not regard that as a constraint. I would regard it as a division of labour—and the principle of subsidiarity applying. So they do their job and we do ours and if there is a—

Senator XENOPHON: Respectfully, I am not questioning whether you are doing your job, but if a state authority is not doing its job you have no way of knowing whether or not it has done its job adequately, have you? You have to take it on face value whether or not the state regulator has done its job.

Ms Munro: That is broadly correct—

Senator DAY: That was my question. They have given evidence that they are struggling in this area and are just not able to fulfil their obligations in this issue.

Ms Munro: If I can put it like this: we form no view in response to your question, and whether that creates a difficulty for us. Given that our requirement is about compliance with state laws in this case, then we would rely on the state authority. So I do not regard it as constraint. You could certainly, with respect to the matter with which you are concerned, which is the effectiveness of the regulation of the impacts of wind farms on the communities around them, I think that stops there. I am not sure it needs to reach to us.

Senator XENOPHON: You talk about a division of labour but that division of labour can also lead to walls being erected where there is not a fair transfer of information going to the Clean Energy Regulator. For instance, at page 10 of your submission you say:

The REE Regulations prescribe various matters, including that the power station no longer generates electricity using an eligible energy source or no longer uses suitable metering.

That does not extend to actual monitoring. You do not require, as part of the approval of wind turbines, monitoring to see what impact it would have on residents. One of the biggest factors I have seen in terms of constituents, and Senator Madigan and others are well aware of this, is that they say, 'It kept us awake,' 'We heard the vibration' or whatever, and there is no way to verify that short of any independent monitoring. The turbine company says, 'No, it didn't,' and the residents say their amenity has been affected. Surely a simple way to resolve this is to require not just metering but monitoring as part of any approval process.

Ms Munro: Certainly that would be a very large extension of our powers to require that monitoring—for us to require it, as opposed to the planning authority.

Senator XENOPHON: But it would still be feasible to do so, wouldn't it? As a condition of issuing the certificates you could, if there were a legislative change, require that monitoring. That puts an end to issues of dispute as to whether people's amenities were disturbed or not and whether the power company was complying or not with the planning and other regulatory frameworks.

Ms Munro: To be honest, I am not even confident to comment on whether that would have the effect of putting it to an end. Yes, monitoring could be required; the fact that monitoring was taking place could be established, but there is still the question of how those reports are interpreted and so on, and that is taking us into completely different territory.

Senator XENOPHON: Perhaps I overstated it by saying it might put issues to an end. Perhaps it was overly ambitious or optimistic. But surely more information, if it could be reasonably gathered, is better than a vacuum of information. That appears to be one of the great frustrations of residents who argue about this. Indeed, some of the wind turbine companies say, 'We've been accused of things that we could not possibly be doing.' If you were given those powers legislatively, that could, in the framework of this legislation, be something that could be integrated into it to allow for not only metering but also monitoring of the noise.

Ms Munro: I would be very hesitant to agree with you about that. First of all—

Senator XENOPHON: On what basis? On a jurisdictional or a constitutional basis?

Ms Munro: Partly jurisdictional, and it is how it ties in, because it goes back always to that question of the planning. I guess the way I would put it is: more data does not necessarily mean more information, because there is still the question of interpretation of what that means.

Senator XENOPHON: But less data certainly does not mean more information either, does it?

Ms Munro: I do not disagree with that, but it is putting it into our hands rather than in some other party's hands—

Senator XENOPHON: I do not quite understand the reluctance, though. If there were a reasonable regime of allowing for monitoring as part of the condition— in parallel to any state planning approval, because it is the gift of the Commonwealth through this scheme that these projects are up and running. So if there is a requirement for monitoring that is parallel, if you like, to state planning laws, surely constitutionally or jurisdictionally, with suitable legislative amendments, that would not constrain you in terms of that additional role, would it?

Ms Munro: I cannot answer the jurisdictional question about whether it would be constitutional to do that. I do think it would be duplicative, because the proper place of jurisdiction over these planning matters and the environmental and community impacts is there. So that seems to be a problem but—

Senator XENOPHON: I am sorry to interrupt you, but I am just concerned about time constraints. How would it be duplicative if currently that level of monitoring is not being undertaken? How can you duplicate something that is not already being done?

Ms Munro: I do not mean duplicative in terms of the monitoring itself, but it is the planning scheme and those—

Senator XENOPHON: I am not talking about the planning scheme; I am talking about the monitoring. The monitoring will not be duplicative if monitoring is not being undertaken.

Ms Munro: Maybe I am not expressing this. It seems to me that it is not optimal to put an instrument into Commonwealth legislation which should properly be exercised as part of the planning scheme. It is at least a poor substitute. That is my first point. But this is a policy matter that others can determine with more expertise than

me. The second point is also from the point of view of the regulator and what we are to make of this additional information. I have got concerns that we would not be able to exercise our powers with respect to that because of the question of interpretation and causality and all of that, and that would be an extremely difficult task for us.

Senator XENOPHON: Can I suggest to you respectfully that, if there were monitoring that was robust, fair and objective in terms of what it was monitoring in terms of the noise—whether it is decibels or even low-frequency but that there are some scientific standards for that—then wouldn't the job of the Clean Energy Regulator be done by providing that information transparently? Then it can be up to, for instance, another body to determine further or indeed for the regulator to have certain constraints—say if you go over this decibel rating then that causes issues in respect of the continuing issue of your certificates.

Ms Munro: Certainly it is easier if there is an objective black-and-white test—

Senator XENOPHON: Which there is not now.

Ms Munro: Which there is not now.

Senator XENOPHON: Isn't that a desirable thing, not duplicative, to have that additional information?

Ms Munro: You are asking me to speculate a great deal on how a new policy could be established. I think I can do no more than express considerable hesitation about that.

Senator XENOPHON: Do you at least acknowledge that, under the current regime, you have to rely on the face of it on what state planning authorities are telling you? Is that fair? You have to rely in good faith on what they are telling you. You cannot really look behind that at the moment.

Ms Munro: That is correct. I might say that, if we go back to the basis for this, which is any law, we also rely on the safety authorities, the financial regulators or whoever. So this is not specific to this. We are not in a position where we would independently regulate each of those matters, although of course people who participate in the renewable energy target are required to comply with all the laws that apply to them. So we do not see it as a weakness in the same way that you do that we rely on the relevant authorities, primarily, to provide evidence that a law has been breached. We would normally expect that to be established in court or tribunal, whatever the matter was that was pertinent to this regulation.

Senator LEYONHJELM: I have got a couple of questions for the department.

CHAIR: It is up to the committee. We are already now—

Senator LEYONHJELM: I can put mine on notice if you would like. The national wind guidelines are what I wanted to discuss. Your submission says that they have dropped, in response to opposition from the states, except that yesterday we heard from the Queensland government that they wish they had national wind guidelines—that would have saved them from developing their own, in relation to approval of the Mount Emerald farm. And now they have issued their draft guidelines, on which they are seeking some feedback. Is there any scope for revisiting those national wind-farm guidelines, or is that a dead issue?

Mr Archer: That is the first time I have heard of a jurisdiction expressing the view that it would have been beneficial for there to be national guidelines. The position as I had understood it, which was reflected in our submission, was that while there had been worked on several years ago with a view to putting in place national guidelines at least the consensus among jurisdictions, at the end of that process, was that they were not required. Clearly, there is always scope to revisit that matter but, through the forums through which we engage with the states and territories, it is not an issue that anyone has been progressing.

Senator LEYONHJELM: As a general principle, if there were national guidelines would they be of value to the Clean Energy Regulator, in terms of consistent application of compliance thinking?

Mr Archer: Ms Munro can maybe answer that question, but my observation would be that it would depend on what the status of those guidelines are and how they intersect with other legal and regulatory requirements—i.e. what standing do those guidelines have? Are they just providing guidance or is there some legal force or effect that carries with them? I was not involved in the preparation of the guidelines previously, so I am not sure what was intended. But 'guidelines' indicates they are more in the nature of guidance.

Senator LEYONHJELM: Do you have a view as to how long it takes a wind farm to recover its cost of capital? We have heard vastly differing opinions on this. You did venture into offering an opinion that the renewable program lowers electricity prices.

Mr Archer: On the question of electricity prices, we have certainly indicated that there are countervailing impacts that flow through to an electricity bill. We have already heard today a little bit about the direct costs of the scheme flowing through, which is the cost of certificates that retailers bear and pass on to customers,. The other impact that does occur is that through two means, I guess, we have additional electricity generation in the

markets. More supply of electricity tends to have a downward impact on prices at the wholesale level, given a level of electricity demand. It is also the case that renewable energy, particularly wind farms, have low operating costs and so can, through some period of time, bid at quite competitive prices into the wholesale market.

Senator LEYONHJELM: The proposition is that the wind farm is awarded renewable energy certificates for its entire life. Notwithstanding what occurs with wholesale electricity prices, the effect of the renewable energy certificates is to elevate retail prices. The question then is: how long does it take a wind farm investor to recover their cost of capital so that, at least notionally, they no longer require subsidy, because their operating costs are lower than competitors?

Mr Archer: The first point to note would be that certificates will be made available to eligible generators for the duration of the scheme, which is to 2030. The question of how long it takes to recover the cost of capital, I do not have an answer to.

Senator LEYONHJELM: Could you take that on notice, what your estimate is?

Mr Archer: It might be that on taking it on notice we could look at what our modelling suggests, but it would be a question that will differ, or an answer that will differ for specific projects and specific commercial arrangements that they have entered into.

Senator LEYONHJELM: I have a business background. Typically, these things have a range but not a very wide range. What we have heard is a vast range. So I am interested in knowing what your calculations are, if you could take that on notice, please?

Mr Archer: We will certainly do our best to respond to that question, yes.

Senator LEYONHJELM: Thank you. That will do me, Chair.

Senator CANAVAN: Chair, could I ask a question? I did not get very much time.

CHAIR: Twenty-five—

Senator CANAVAN: I know, but these guys are important. Is that okay? I will not be too long. I will be as quick as I can. The 33,000 gigawatt-hour target that has been announced, have you done modelling on how many more wind turbines will then be constructed, before 2020, to meet that target?

Mr Archer: We have done some calculations on how much additional renewable-energy capacity would be required to deliver—

Senator CANAVAN: Because time is brief, can I get to the point? How many more wind turbines? If it is a range, that is fine.

Mr Archer: I do not have a wind-turbine figure in my head. I can take that on notice.

Senator CANAVAN: Okay. How many gigawatt hours will the gap be filled by wind? Surely you have done modelling on that.

Mr Archer: Certainly. Most of the increase in the renewable energy required to meet that target we would expect to be met through wind.

Senator CANAVAN: What is the gap we need to get—

Mr Archer: We are going from a target this year of, I think, 16,000 gigawatt hours to get to 33. I think you need somewhere between four and 5,000 megawatt hours of capacity installed to deliver that additional renewable output—between 4,000 and 5,000 megawatts.

Senator CANAVAN: Of wind?

Mr Archer: From renewable energy, predominantly—

Senator CANAVAN: It depends on what type of renewable energy, obviously, because the capacity would be different.

Mr Archer: That is right.

Senator CANAVAN: If you are saying most of it is from wind, and you have—let's go conservative—4,000. It is the capacity?

Mr Archer: That is correct.

Senator CANAVAN: That is 1,000 wind turbines.

Mr Archer: As I said, I am happy to take that on notice.

Senator DAY: Four thousand—

Senator LEYONHJELM: If they are big ones. Could you please take that one on notice, if you want to refine that answer?

Mr Archer: Certainly.

Senator CANAVAN: How many wind turbines do have right now, in Australia? Surely, you know that.

Mr Williamson: We have 82 wind farms. I do not know that we have the details available as to how many actual turbines there are.

Senator CANAVAN: You do not know.

Ms Munro: We have the information but we do not have it to hand.

Senator CANAVAN: Please take that on notice. I think we have about 1,500 or 2,000 or something like that. Does that sound about right?

Unidentified speaker: Approximately.

Senator CANAVAN: Only smaller ones. So we are going to build 1,000 in five years. Do you think that is achievable?

Ms Munro: This throws into a different matter, which has only recently been resolved, but we have made inquiries with respect to projects that have planning approval and either have financial close or are expected to have it once the target has been resolved. That information indicates that it is possible, based on known existing approved projects, for it to be reached.

Senator CANAVAN: Approved projects?

Ms Munro: Yes.

Senator CANAVAN: There are 1,000 wind turbines approved.

Ms Munro: Yes. We could perhaps re-examine that. But that is a very broad—

Senator CANAVAN: I am deeply sceptical. We were faced yesterday with 60 wind turbines and there have been years of controversy about it.

Ms Munro: I appreciate that. However, there are a number of projects that are—in the vernacular—'shovel-ready'. On the information that we have seen, which is only partial—and this is not our main line of business—it would appear that there are sufficient sites and projects for it to be achieved.

Senator CANAVAN: Mr Archer, have you provided advice to the government?

Mr Archer: I think our—

Senator CANAVAN: It is a simple yes or no. I am not asking for the advice. Have you provided advice to government on whether that number of wind turbines can be built before 2020?

Mr Archer: We provide advice on a range of issues and that obviously is an important issue, so that is an issue we have addressed.

Senator CANAVAN: Thank you. Do you have the latest estimate on the abatement cost per tonne?

Mr Archer: The latest abatement cost estimates, that I am aware of, are the ones that were produced for the Warburton review.

Senator CANAVAN: How much was that?

CHAIR: Senator Canavan, that is it.

Senator CANAVAN: One last one—this is it.

Mr Archer: Unfortunately, I do not—

Senator CANAVAN: I think I got less time than other senators, personally.

CHAIR: No, you have not.

Senator LEYONHJELM: They were good questions, though!

Senator CANAVAN: Thank you, Senator Leyonhjelm.

Mr Archer: Just to ensure I do not mislead you, it would be preferable if I took that one on notice.

Senator CANAVAN: All right. Thanks.

CHAIR: I thank the representatives of the Clean Energy Regulator and the Commonwealth Department of the Environment.

BELL, Dr James Andrew, Private capacity

[10:01]

CHAIR: I welcome Dr Andrew Bell. Do you have any comments on the capacity in which you appear?

Dr Bell: Good morning. I am a Visiting Fellow at the Australian National University. It is an unpaid position at the John Curtin School of Medical Research. I am here today in a personal capacity.

CHAIR: Could you please confirm that information on parliamentary privilege and the protection of witnesses and evidence has been provided to you?

Dr Bell: Yes, it has.

CHAIR: Thank you. I now invite you to make a short opening statement and, at the conclusion of your remarks, I will invite members of the committee to put questions to you.

Dr Bell: Thank you for having me here and showing an interest in my work. I have prepared an opening statement and I do have multiple copies, which have been handed around. Seeing we are running a little behind time, I am prepared to abbreviate the statement and just get straight on to the points of discussion at the end. It depends on how much time you see this discussion taking. Would you like me to do an abbreviated version of the opening statement?

CHAIR: Yes, that would be appreciated, Dr Bell.

Dr Bell: Okay. I am basically a theoretician. I am a scientist who has studied acoustics, I have studied physics and I have studied the human hearing mechanism, so the idea of wind turbines attracted my interest in the light of the NHMRC making a review of the subject. That brought me up sharp when I realised that there seemed to be a common-sense contradiction built in there somewhere. So I read the NHMRC review, and to me there seemed to be missing factors in the monitoring of wind turbine noise. Based on my understanding of physics, I think it is due to a possible synchronisation phenomenon that happens between each of the wind turbines. If that happens, the sound pressure levels will be higher than usually expected and they will fluctuate; and there will be large low-pressure variations which could affect the ear—in particular, the middle ear—which is something that seems to have been overlooked in studies of infrasound perception.

The first part of my statement just describes the synchronisation phenomenon and how it can build up. Basically, that summarises a paper, a technical note, which was published in *Acoustics Australia* in December last year. I believe the committee has already seen that paper and on that basis asked me to come in and explain a bit more. So I will let that paper speak for itself. But there are five implications which I see are of relevance and I will go through those by beginning on the bottom of page 2.

The first point I would like to raise is that usual monitoring schemes do not expect to encounter sudden increases in level lasting for perhaps only tens of seconds. Those levels can be up to 20 decibels higher than the long-term average. Consequently, for a sudden rise in levels recorded, a common response is to attribute this spike to an 'extraneous source' and disregard it. For example, it may be regarded as coming from the intruding source such as a distant vehicle or thunder. In this way, the monitoring record is cleared of higher levels, but these noise spikes may in fact have originated from multiple turbines coming into phase, especially under uniform wind conditions at night.

In the Macarthur wind farm study by Evans 2013, 'extraneous sources' were deleted from the monitoring record because there was no obvious reason such as a change in wind conditions for sudden rises in level. At this point, one cannot be sure whether each omitted data point, and there were dozens, represented a true extraneous source or perhaps reflected a time when multiple wind turbines came into synchrony. Nevertheless, this rather arbitrary discarding of data does carry the risk of inadvertently dismissing real instances of elevated wind turbine levels. Therefore, one aspect requiring closer investigation is examining these so-called 'extraneous sources'. That is my first point.

As I say, I am theoretician, so I actually have not done monitoring, but my understanding is that the situation is made worse because the human ear, and this is point 3, is more sensitive to sound levels than all current measuring equipment. So if the ear were any more sensitive, it would hear air molecules bombarding our eardrums. We are right down at thermal levels. In fact, it is much more sensitive than normal microphones. If we have infrasound thrown in there as well which needs tonal detection, the ear is much more acute at that than any frequency analysis system that is around.

If a human detects a disturbing noise and yet measurements say there is no problem, the more reasonable conclusion is that the measurement technique needs improvement not that the listener is mistaken. Those are the two main points. The other complication is that a noise spike may last only a few seconds, but monitoring

protocols normally employ 10-minute averages. The result is that noise spikes can be submerged into the long-term average figure even though the human ear may well have heard the spike as a disturbing intrusion.

Now to my two final comments. The synchronisation effect can come around through acoustic coupling through the air or via surges in power lines connecting the turbines. It needs to be investigated whether those things are realistically the case. Either way, there is a relatively easy way to avoid synchronisation. As suggested by Doolan and colleagues at the University of Adelaide, again published in *Acoustics Australia* in 2012, an electronic controller could be used to prevent synchronisation ever occurring.

My final point is that I believe wind farms can make a sustainable contribution to this country's energy needs and they should be encouraged. However, it seems sensible to me that a cautious approach be taken and, depending on the geography and prevailing winds, a new wind farm should not be sited closer than five or 10 kilometres from where people live. I am happy to any questions that arise from that.

Senator URQUHART: Thanks very much for that. You indicated that you were here in a personal capacity, but I wanted to know about your capacity with the ANU. When I looked, you were listed on the website as being attached to the diagnostics for eye diseases research group. Are you an employee of that group?

Dr Bell: No I am not. It is an honorary position. I have had many fields of scientific endeavour over my career. The reason I was attached to the eye diseases group was because there was a crossover between that group and some acoustic work which was being done at the Research School of Biology a few years ago. That is where I did my PhD. The professor in charge of the eye diseases group is in fact one of the supervisors from my PhD. So it was, again, a theoretical study. I actually have also done some contract work for the eye diseases group, so I have had various contracts. At the moment, I do have a contract with the Institute of Physiology and Pathology of Hearing in Warsaw, so I do do some contract work wherever it happens to occur. So far as the university is concerned, it is an unpaid, honorary position.

Senator URQUHART: Thank you. I noticed that you have published a technical note, which you refer to in your documentation, in *Acoustics Australia* about your wind turbine theory. Was this paper peer reviewed?

Dr Bell: It was not formally peer reviewed, because technical notes have more of a fast-track publication arrangement. That being said, this technical note was sent to one reviewer. It went through that reviewer twice with extensive revision, so it at least has been through one knowledgeable peer reviewer who from the comments made was obviously closely involved in wind turbine work.

Senator URQUHART: Are you able to say who that peer reviewer was?

Dr Bell: No. I do not know who it was.

Senator URQUHART: Okay. Have you had any other peer reviewed papers published on this topic in academic journals?

Dr Bell: No I have not.

Senator URQUHART: Have you discussed your synchronisation theory with the peak acoustic body in Australia?

Dr Bell: With the peak acoustic body? No.

Senator URQUHART: Your article on wind turbines starts with the proposition that wind turbines are directly affecting people that are not understood, and you have looked for an acoustic explanation. Recent work in New Zealand talked about where participants were expected to positive or negative messages about wind turbines. Are you aware of that work in New Zealand?

Dr Bell: Yes. In fact, the reviewer actually sent me that paper, so I have read it.

Senator URQUHART: In that New Zealand example the participants were exposed to real and/or sham infrasound. Those who had been exposed to negative messages reported significant increases in the number and intensity of symptoms experienced regardless of whether they had been exposed to the real or sham infrasound. In that light, what role do you think expectations may be playing in their attribution of health impacts from infrasound?

Dr Bell: Yes, I am not denying that there is always some expectation. Nevertheless, I do not think that is an absolutely countervailing proposition. I think there are real effects of sound. So far as that study is concerned, I think it is not correct to try to replicate wind sound using any acoustic generating equipment such as loudspeakers. To be able to generate 0.8 hertz cannot be done. I point out in my paper that the South Australian EPA tried to hear what was happening when the noise conditions happened by replaying a digital recording of the wind turbines. I am not sure how much hi-fi knowledge one has, but to reproduce low-frequency sound down to 0.8 hertz is not possible. It is basically very, very difficult, so actually replaying a recording of a wind turbine

sound is not a way of replicating or even detecting what might have been the trouble. It may be very low frequency and cannot be reproduced. That is going to confound any study which tries to replicate what is happening in the real field.

Senator URQUHART: Okay. Could it be possible that people's attitudes are influencing the attribution of health problems to wind turbines?

Dr Bell: It is possible, but one can only say the other situation is also possible—that it is a real effect. It does not rule out a real effect.

Senator URQUHART: Okay. Could it be possible that people with legitimate health concerns are not getting treatment, because they are incorrectly self-diagnosing the causes of their illness?

Dr Bell: That is always the case with self-diagnosis, yes.

Senator URQUHART: Are you aware of any international research published in academic journals that supports your theory of infrasound noise from the synchrony of wind turbines?

Dr Bell: I make reference to a lot of work that seems to get very close to the idea that coherent sources can interfere, but so far as I am aware there is no work that has considered that the emanation from one wind turbine can interact and cause a neighbouring wind turbine to be entrained and rotate at the same rate. That is why I published the paper; I thought it was an important factor that had not so far been appreciated.

Senator URQUHART: Your paper refers to annoyance from wind turbine noise, which I think is an accepted proposition, but you do not mention health impacts. Do you believe that wind turbines harm human health?

Dr Bell: I have not got the qualification to be able to say that there is harm involved or whether there is a health effect, but I would definitely be able to support the notion that it causes annoyance and a lack of sleep and that those factors in themselves may have health consequences.

Senator URQUHART: Thanks.

Senator LEYONHJELM: I found your paper quite fascinating. If you are onto something, it may be quite profound. The question is: are you onto something? Yesterday we heard from Dr Bob Thorne, who said, as I recall, 'We thought synchronisation was the issue a few years ago, but we have sort of decided that maybe it is not now.' What are your thoughts on that?

Dr Bell: I have not heard the evidence for why he would say that he has ruled out synchronisation. The paper itself draws together evidence from a couple of reports that actually point towards synchronisation, so I think I would need to discuss with Dr Thorne exactly why he thinks that is not the case. I have had email conversations with Dr Thorne, and he has not mentioned that he does not think synchronisation is what is going on.

Senator LEYONHJELM: I do not think he closed the door on it, but he was not as sure that it was a key issue now as he used to. I think that is the point he was trying to make.

You have said in your opening statement and also in your evidence—I cannot remember which point was which—that an electronic controller could be used to prevent synchronisation ever occurring and you also say a new wind farm should not be sited closer than five or 10 kays. If they were prevented from being synchronised, why would you need to site them so far away?

Dr Bell: That is a very good question. I take the point that, on a conservative basis, if they are not synchronised then five kilometres or even three kilometres might be a sufficient distance away, but certainly my concern is that the standards as presently set are too lax. They are not allowing for special circumstances arising. If that synchronisation effect is ruled out, I think that would certainly decrease the problem. Basically, I think it needs more research to establish what the true level should be, based on intermittent noise spikes occurring. I would say, yes, if you have circumstances perfectly arranged, then three kilometres may be quite adequate.

Senator LEYONHJELM: We have had evidence that infrasound from any source, not just wind turbines, can be adverse to public health. In fact, a federal government department in 2009 put out a brief to that effect. We will be hearing from witnesses who claim to be affected by infrasound from turbines—not wind turbines, but other kinds of turbines—at Lithgow. It would seem unlikely that there was any synchronisation there. What would you attribute assertions of ill health and adverse consequences to, assuming they are valid, from those situations?

Dr Bell: It all depends on the absolute pressure level in the wave form, basically an infrasonic wave form. The ear's sensitivity is incredibly important, and so if you are looking for, say, micropascals or millipascals of pressure at acoustic frequencies—when you have very low frequency impulses that might range up to hundreds of pascals—that invokes the middle ear muscles. That, again, is another overlooked factor; most people are not aware that they have middle ear muscles which control the position of the oval window and their ear drum. This dynamic system actually controls the sensitivity, like a gain-control device, instant by instant. If you have very

large impulses—whether from a wind turbine or from a coal mine or a gas turbine or whatever it might be—then those large infrasonic impulses can, I think, have an effect of altering the middle ear and causing a pressure effect—maybe headaches, maybe seasickness and things like that. Definitely, there is no synchronisation involved in, say, a gas turbine or whatever it was at Lithgow, but I am saying that the wind turbine is much more likely to give higher readings, because each of the turbines can add to each source if they are in phase. Both conditions could cause problems. There might even be problems living near a single wind turbine, but the synchronisation is another degree of difficulty that needs to be taken care of.

Senator LEYONHJELM: It might not be the full answer; it might be part of the problem.

Dr Bell: I think infrasound by itself with very large low-frequency pressure pulses does disturb the human ear. Exactly how it happens is unknown; my suspicion is that it is the middle ear muscle—the gain-control before the cochlea—but we are just beginning to do work in this area. My work is actually studying very feint sounds that come out of the cochlea—spontaneous auto acoustic emissions is the subject of my PhD and is something that I have been working on with the Polish people as well. It is an ongoing thing. We do not understand how the cochlea works, let alone how the middle ear controls the gain of the cochlea.

Senator LEYONHJELM: I want to change the subject briefly. Did your submission to the draft NH&MRC information paper lead to any substantial change in the final information paper?

Dr Bell: It did. Well, I am not sure whether my work alone did. It is notable that the revised version does say that coherence and sound does need to be studied in further work, so that was somewhat gratifying. I think other people did also make the point that coherence affects. I think Professor Hansen also made that point in his work. It is nice to see that there is some convergence of thinking on this.

Senator LEYONHJELM: Are coherence and synchronisation the same, or similar?

Dr Bell: They are very closely connected. If you have a couple of sources which synchronise, then each source will give coherent wave energy. 'Coherence' means like a laser beam. You can have one source add to the crest of another and add to the trough of another. The amplitude will still have the same waveform but greater amplitude, unlike if they are incoherent, where there is a random amount of phase and random interference of those two waveforms.

Senator LEYONHJELM: You have been critical of the NHMRC discussion paper. Can you spell out where you think it is lacking.

Dr Bell: I think it was too simplistic. It failed to recognise that the human ear is the final arbiter of whether something annoys a person or not, and that the human ear is more sensitive than any of the monitoring equipment that is presently used. Given that there is the choice between saying the person did not or did hear it, I would say you need to believe that a person was troubled by that sound. That was the thing that immediately struck me. I was not planning to get into wind turbine work. I was applying for a grant to the NHMRC, and I saw on their website that they had this preliminary review and wanted public statements. When I read what was there, it did seem to be excessively simplistic and favouring the standard monitoring over the position of residents living nearby.

Senator BACK: I am most interested in the synchrony business. We visited a wind farm the other day, and I took particular note of the rotation of the blades. Having been a yachtsman all my life, the differences in wind strength and even direction, often some metres away—usually when someone else is heading for the finishing line and I am still in their tailwind—makes me ask the question: what really is the chance of there being synchrony of numbers of turbine, given those variations of wind strength, direction and proximity?

Dr Bell: I set it out in the paper, and I have also mentioned it in the opening statement. I did not read it out, but it is written down on page 1 or 2. I cannot exactly see it at the moment.

Senator BACK: Page 1.

Dr Bell: There are two factors at work—on page 2, the first paragraph. There are two conditions favouring synchronisation, and one of them is that there is very tight regulation of the rotation rate of the blades. There is an electronic controller in there that it is making sure that the blades are turning at 0.8 hertz no matter what the strength of the wind is—not totally independent, but largely independent of the strength of the wind. This is for efficiency reasons. If the wind strength increases, the pitch of the blade is altered so that there is not as much force operating and it can still rotate at 0.8 hertz. Similarly, if the wind slows down, the pitch will be controlled to lock into that 0.8 hertz figure. You will need to talk to a wind engineer to ascertain exactly why that figure is chosen, but the point is, if you have a large number of oscillators turning at the same frequency, that is exactly the circumstance you want for synchronisation, because it can mean that one slight perturbation can bring the two

together. Once you have feedback between them, that will continue that state of affairs. The second factor is that most wind turbines tend to be placed about 400 metres apart.

Senator BACK: I notice that you have that in your notes, yes.

Dr Bell: That is right.

Senator BACK: And you are saying that that comes to the wavelength of 0.8—

Dr Bell: A single wavelength. So a single wavelength is also an optimum arrangement for having a pulse from one wind turbine reach the other turbine in exactly the right time for synchronisation to take place. Again, you will need to ask a wind engineer why they choose 400 metres, but that is exactly one wavelength. It might have to do with being able to extract more energy out of the air; I am not sure. But those two circumstances together are likely to encourage synchronisation.

Senator BACK: In point 4, you suggest the possibility of the ability to avoid it. Those were my questions. Thank you.

Senator DAY: I do not have a yachting background, but I have a music background, so I am interested in your comments about the harmonics, in particular. We have been talking about infrasound, which is at the very low decibel level, whereas harmonics tend to be at the higher ranges. What is the connection between the interference on the ear? Harmonics are normally very pleasant; we actually search for harmonics when we are tuning.

Dr Bell: That is right. We have an arrangement in the ear to pick out harmonics, and the wind turbine signature profile has lots of harmonics. My *Acoustics Australia* paper shows a typical waveform, and that was taken from Doolan and colleagues. Doolan and colleagues also do a spectral analysis of that waveform and show all the harmonics, and there is a very rich arrangement of harmonics that go into the audible range. So I think that this factor makes it much more troublesome for the ear, because the ear will automatically pick out a set of harmonics, as you say, and you have a single sort of sensory tone coming from that arrangement of harmonics. So I think that the fact that the harmonics are there facilitates the detection of the wind turbine sound.

Senator DAY: So it is further evidence of the ear's ability to detect them at low level?

Dr Bell: Well, the harmonics are at a low level, and the 0.8 hertz fundamental of the wind turbine sound is at infrasonic levels. We do not normally hear infrasound in the normal way, and there is still much work to be done to see exactly how the infrasound is perceived, but the presence of the harmonics means that the ear can make use of its high sensitivity in that region to give the message that something further down is going on. Look, it is a subtle system and it is aggravated by the fact that the middle ear muscles are arranged to try and keep the eardrum at the most sensitive point in the ear. So if you have a large impulse coming along every second, then that is likely to be straining the middle ear muscles to try and find a rest position so that you can hear what is going on. The middle ear muscles are active whenever you speak. You do not want to overload your sensitive cochlear by this loud noise which is coming through the back of your throat to the cochlear. So what happens is that the middle ear muscles are constantly registered, whenever you speak or are about to speak, to throttle down the sensitivity of the system. So, if you have something that is hunting up and down all the time due to a wind turbine, that may actually be causing you mental effort—to try and stabilise this very anomalous variation in pressure. These are systems which are not fully understood and they need much more research, but no research is going to get done until people realise there is a problem here and we need to understand it. It is not just all okay. We need more work done.

Senator DAY: Have you had feedback from the NHMRC or discussions with them? What has been their reaction to your paper and your findings in this area?

Dr Bell: I did notice that they have now got their final review available on the web. I think it was published in February. They actually have a separate PDF file for download that says what comments were received by the committee and what changes they made to it. I notice that one of the sections in particular mentioned that coherence is an effect that does need to be taken into account.

Senator DAY: But you have not had discussions with them personally?

Dr Bell: Not directly, no.

Senator DAY: Thank you.

CHAIR: Dr Bell, just for the record, I wanted to clarify something. I note here that you are at the ANU John Curtin School of Medical Research and that you have undertaken decades of research into the mechanisms of hearing, particularly the response of the cochlea to sound pressure; is that correct?

Dr Bell: Yes.

CHAIR: I also note that auditory science is one of your fields along with cochlear mechanics, both at ANU, and that you are a member of the Australian Acoustical Society and the Acoustical Society of America.

Dr Bell: That is right.

CHAIR: And you have published in both of their journals. But your research has focused on the crucial role that acoustic pressure plays in stimulating the cochlea. Have I interpreted that correctly?

Dr Bell: Yes.

CHAIR: Okay. I see that you stated in your comments to the NHMRC:

The literature that the Information Paper relies on to make its conclusions on noise from windfarms can be characterised as scientifically incomplete and misleading.

Could you please explain, for the benefit of the committee, why you reached this conclusion?

Dr Bell: Basically, it was short-sighted in not being able to see that there are more dimensions to this issue than just the monitoring equipment. I think the arbitration of whether or not there is a problem tends to be done in terms of numbers and figures and equipment. My perception is that, if you look at the history of the field, there has been a whole revolution in our understanding of frequency range, of decibels, about what effects there are on the ear. Only in 1979 did we realise that the cochlea is actually an active detector: it emits sound. If you put a microphone in the ear, you can detect faint pure tones coming out of most people's ears. This is very similar to a tinnitus phenomenon. It does actually trouble some people. But normally the cochlea is an active detector and we still do not understand what that mechanism is.

Part of my PhD was trying to model what might be going on that has the cochlea produce sound. We have soft pure tones between, say, one and three kilohertz coming out of our ears all the time, and what is happening there is that the ear is always, constantly, trying to hear. So it is a very complex system. It is much more than just a microphone. It is not a passive microphone; it has inbuilt electronics and it works in conjunction with the middle ear muscles. It is a physicological, dynamic system which I think cannot be just put into a simple category: 'We've done a noise measurement over 10 minutes. Here's what the average sound pressure level is over 20 to 300 hertz,' or whatever that band is that is normally used for measurement, or from infrasound, from normally one hertz to I think it is 300 hertz. When you have particular bands, that gives you a number, but whether that actually relates to how the ear itself perceives the sound is unknown. I am saying, on top of a basic pressure level measurement, there is a whole sophisticated, dynamic system involved which we do not understand. So I think we need to be open to the idea that our monitoring system is not as sophisticated as the human ear, and we need to do measurements to try and match even more closely between the ear and what the measurements are telling us.

CHAIR: Finally, listening to your evidence this morning, how the ear interprets noise is a very complicated area. I am not trying to put words in your mouth, but are you saying that people are reporting disturbance and that the depth of knowledge and understanding is lacking in this area and that we should not close our minds to further research?

Dr Bell: Yes, and it seems to me that if a person is perceiving problems we need to send along another set of ears. It is not a case of sending along a microphone. You just need to send along another person to verify that there are problems. So I was pleased to hear that you had been out listening to wind turbines. To me, if a group of people agree that there is a problem, it is like a jury. If a group of people says there is problem, there is a problem. It is more difficult if it is just one person who seems to be complaining. You can see that maybe it is not as clear cut. But there are mechanisms for agreeing whether there is a problem or not, and that is just getting other human ears along to listen to what is going on. If you can hear a rumble going on now, we can all agree that, yes, there is a rumble going on. It does not seem to be as complicated as all this monitoring system has tried to make out.

CHAIR: I will place on notice to you some further questions. Thank you for your appearance here today. Now I call Dr Alan Moran from Regulation Economics.

MORAN, Dr Alan John, Chief Executive Officer, Regulation Economics

[10:42]

Evidence was taken via teleconference—

CHAIR: I welcome Dr Alan Moran from Regulation Economics via teleconference. Could you please confirm that the information on parliamentary privilege and the protection of witnesses and evidence has been provided to you.

Dr Moran: Yes, it has.

CHAIR: The committee has your submission. I now invite you to make a short opening statement. At the conclusion of your remarks, I will invite members of the committee to put questions to you.

Dr Moran: Thank you. My submission is really confined to the economics of the issue, and the issue concerns the renewable scheme, which is dominated by wind power, which is the cheapest source of exotic renewable energy. The scheme does entail costs, which are borne by the commercial sector and by consumers directly. On the basis of these costs, there is a differential between wind and coal, and coal is the energy source which wind is intended to displace. The cheapest wind available is around $100 per megawatt hour, and coal in the eastern states can generate electricity at $35 to $40 per megawatt hour. So the difference between those two is paid for by electricity customers. Added to this there are some backup costs caused by the inherent unreliability of wind and indeed of solar, and these increase exponentially with the increased share of renewables. But, based on market data, which we have from AEMO, the regulator in Australia, it is about an additional $12 direct subsidy to wind in addition to the $40 to $60 per megawatt hour which wind receives.

According to the Warburton inquiry, the cost of the program running its full course would be between $30 billion and $53 billion. This would be around $3.5 billion per year by 2020. Even in the current year, we have the AEMC data which adds about nine per cent to the retail price, or 17 per cent to the energy component. The issue is particularly topical at the present time because many politicians and industry lobbyists have welcomed the agreement of the government and the ALP to a compromise 33,000 gigawatt hour target. Many see this as a boost to investment and to jobs. The Victorian energy minister, for example, has claimed that there would be 2,600 jobs created and $5 billion new investment in that state as a result of this agreement. However, the opposite result will eventuate, because investment in goods that reduce efficiency and increase prices brings lower levels of real income. Policies that force the replacement of higher with lower productivity assets are akin to regulations where the government, say, bans taxis and requires them to be replaced by rickshaws. 'Just think'—the policy advocates would say—'of the extra jobs created from such a move, both in pulling the vehicles and in manufacturing them.' What we have found is that careful studies have demonstrated that the opposite is true—that there are jobs lost. One of the most celebrated is a study by Calzada Alvarez in Spain which estimated that, for every four jobs created by wind subsidies, nine jobs were lost. The truth is that regulations that force the spending of money and the creation of jobs in ventures that require subsidies mean less overall income and, with the wage inflexibilities which we have in Australia, fewer jobs. Capital and labour are diverted from more productive activities, and everyone except the direct recipients of the government largesse is worse off.

That is the kernel of my argument. I would add that there is the issue about the ultimate justification for the renewable scheme, which is a means of reducing greenhouse gas emissions. Whatever the case may be for this, it is clearly not the optimal way do it, by specifying a particular means of meeting the goal in terms of renewables. Indeed, the government has claimed that its Direct Action auction has netted emission reductions at $14 per tonne, and that figure is only one-third of the cost of the renewable program, even at current prices. That is the kernel of what I have to say. I am happy to elaborate on particular issues.

ACTING CHAIR (Senator Day): Thank you. Senator Urquhart?

Senator URQUHART: Thanks, Dr Moran, for that opening statement. Do you disagree with the vast majority of climate scientists and global bodies that human activity is having a significant impact on climate change?

Dr Moran: No, I do not necessarily disagree with that, although I am reluctant to dip my foot in that water. It is not my area of expertise. I read the literature, as indeed you have, and I think most people would suggest that human activity has had some effects. The issue is what effects, whether it has been trivial or whether it has been quite substantial. It certainly has increased the amount of carbon dioxide and similar gases in the atmosphere, and there is a physics equation of this with higher levels of temperature.

Senator URQUHART: In your submission you have said that there has been no discernible warming for the past 15 years, but the UN's World Meteorological Organization say that 13 of the hottest 14 years have occurred

this century. They have also said that the last three decades have been warmer than the preceding ones. So do you disagree with those claims?

Dr Moran: I do not know about the first one, but the second one is probably true because the earth has been warming for about a hundred years, for reasons that have nothing to do with the greenhouse phenomena. What is certainly true—and three sources of satellite data confirm this—is that there has been no discernible warming for the last 15 or 17 years, depending on what series of data you use. I do not think that is controversial. Certainly the interpretation of that is controversial. Some say that it is simply a pause and that the heat is hiding in the deep ocean, or wherever it is, and that it will resume in the future, but certainly the evidence from all the satellite data is that there has not been a warming for the last 15 or 17 years.

Senator URQUHART: You have also argued against the RET. What role do you think renewables should play in Australia's economic transition as the mining boom recedes?

Dr Moran: Zero role. Anything that renewables do—certainly as a result of subsidies—would detract from economic growth and job creation.

Senator URQUHART: So you do not think there is a role for renewable energy?

Dr Moran: I do not think there is a role for renewable energy which is subsidised. Certainly I am very much in favour of renewable energy which meets the normal economic tests, and certainly there are areas—for example, in hydro-electricity—where renewables can have an increased presence in Australia.

Senator URQUHART: The government's own review, which was headed up by Dick Warburton, found that the RET would reduce pressure on electricity bills due to the downward pressure on wholesale electricity costs. If we are getting cleaner energy, driving investment and jobs, and delivering cheaper electricity, surely that has to be a good thing, doesn't it?

Dr Moran: Well, yes and no. Simply, you can always get cheap electricity if you actually subsidise it. Let me just put it to you: supposing we have a situation where the government gives away free Mars bars—free confectionery. The price of Mars bars would be driven down quite remarkably, and yet that certainly would not constitute in your eyes, or in anybody else's eyes, a benefit for the society, because one knows that the free Mars bars are being paid for by the government from somewhere else. So there would be a transitory downward trend as a result of the inflexibility of production from the introduction of free or highly subsidised goods, and we would see that, and that is what the Warburton report was arguing. But, as you would know, the Warburton report's analysis used the ACIL and various other sources' information to demonstrate the aggregate cost over the course of the period to the economy was something between $30 billion and $50 billion.

Senator URQUHART: Environment Victoria has done work that found the federal government loses $10 billion a year in the form of subsidies and incentives to the fossil fuel industry. As a strong advocate for the free market and small government, would you like to see these subsidies removed altogether?

Dr Moran: If there are any subsidies for fossil fuels then the answer is yes. I think that you would find that work done on this on by the federal Treasury has indicated that there are not any or, if there are, they are trivial. The subsidies which Environment Victoria has pointed to are general for the encouragement of R&D and various things like that, which are available to all sectors of the economy.

Senator URQUHART: So you agree with the R&D subsidies but not other subsidies

Dr Moran: I do not necessarily agree with any subsidy, but I think that if you are picking out a particular sector which is subsidised then that is not appropriate. There may well be a case for removing altogether the R&D subsidies, but one would do that across the whole economy, not just the one sector.

Senator URQUHART: This is my final question. Your submission states that wind power costs $100 per megawatt hour compared to black and brown coal at less than $40 per megawatt hour, but surely we need to compare like with like. According to Bloomberg New Energy Finance in 2013, wind energy was 14 per cent cheaper than a new baseload coal-fired power station, even without a carbon price. Isn't this a more appropriate comparison, especially given that experts advise that 75 per cent of existing thermal plant in Australia has passed its useful life?

Dr Moran: I think that is a terrific statistic. What it actually says is that we do not need any subsidies, because if wind is already competitive—and indeed, it is 13 per cent more competitive—then what are we talking about here? Why do we have a subsidy? There is no case for one. My scepticism about the Bloomberg study is that there is nobody in the wind industry, or the renewable energy industry, who says: 'Great! We are now competitive; we do not need the government's support. We will stand toe to toe against these fossil fuels and we will win.'

Senator LEYONHJELM: Dr Moran, you outline in your submission that Australian electricity has been among the cheapest in the world a decade ago, but by 2013 it had risen to become among the most expensive. Do you know which country has the highest ratio of wind energy in their electricity grid?

Dr Moran: I would guess Spain, but I could be corrected.

Senator LEYONHJELM: My information is that it might be Denmark.

Dr Moran: It probably is Denmark, but the problem is that Denmark does not really exist—it is not really an electrical entity. It exists as a state, but Denmark is sandwiched between the Scandinavian countries and the German grid, while Spain is relatively isolated from the rest of Europe. It is like saying the ACT uses a lot of renewable energy; it does not really exist as an stand-alone electrical entity.

Senator LEYONHJELM: Which Australian state has the highest ratio of wind energy in the national grid?

Dr Moran: Almost certainly South Australia.

Senator LEYONHJELM: How do Denmark's or Spain's electricity prices compare in Europe?

Dr Moran: Both of them are relatively high. One of the things you have to bear in mind when you are looking at prices is that often the subsidies are paid in such a way that looking at the prices gives you an unrealistic valuation of how much it is costing. In any event, the Danish price is amongst the highest in Europe, and the Spanish price is also quite high.

Senator LEYONHJELM: How do South Australia's prices compare internationally?

Dr Moran: They should not really differ very much from the rest because, again, South Australia is not really an electrical entity. Its prices are the same as in Victoria and New South Wales; it is part of the national electricity market and the prices there are pretty much the same. They tend to be a bit higher in South Australia than in the rest of Australia, possibly partly because of wind, but largely because the South Australian sources of electricity are somewhat more expensive than those for New South Wales and Victoria.

Senator LEYONHJELM: The committee has been told that wind energy is lowering the price of electricity. Indeed the department, in its submission—and we heard from them this morning, although they were not questioned about this—also made the point that wind energy will lower the price of electricity. Given Spain's, Denmark's and South Australia's prices, is that happening yet? Is it going to happen? Do we just have to wait longer?

Dr Moran: It cannot happen. It can happen in a transitory basis, and that is an issue which Senator Urquhart raised. It can happen if you pile subsidised fuel into the market. That will reduce the price because the cost of firms exiting the market. The firms which have got a high capital investment involved is considerable, so they will stay in even if they are only covering the marginal cost, and the prices will fall as a result of that. But overall, basically the issue of wind is that you are trying to drive out coal which costs $35 or $40 per megawatt hour with wind which costs $100 per megawatt hour. Overall, it cannot reduce the price of energy, except in that transitory period when you are fighting for market share.

Senator LEYONHJELM: Many people have scoffed at the concerns raised about wind energy's unreliability and its having a stabilising effect on the grid. It has been suggested to us that there is no cause for concern when wind energy represents less than five per cent of electricity generated. Do you have a view as to what the impact might be if it rose to, say, 15 per cent?

Dr Moran: A recent UK study only been published in the last week or so indicates that when the price—wind is about nine or 10 per cent in the UK—reaches 15 per cent there is an additional cost of something like A$12 imposed as a result of that because of the need for backup. There is some real-market data available, which I have cited in my submission, that the cost of buying what they call a hedge against wind being not available, if you are reliant on the wind, averages about $12. In other words, that is the cost of insuring yourself against wind's unpredictability. That is an additional cost, which I think was considered in parts of the ACIL study and other studies that have been undertaken as a result of the Warburton inquiry.

Senator LEYONHJELM: Do you have a view on the capital payback period for turbine establishment at wind farms? Do you have a view as to the period they require to operate under current circumstances, with the renewable energy program in place, to recover their cost of capital?

Dr Moran: I do not have a unique view. I understand from lots and lots of secondary data that it is about 15 years. Wind is not actually free; there are marginal costs associated with wind of about $12 per megawatt hour—these are maintenance costs and things like that. But I understand that, to ensure that the capital is recovered, it is about a 15-year period.

Senator LEYONHJELM: We have had other evidence that suggests it is quite a lot shorter than that. The question that occurs to me is that, if there is a defined period of some years during which the capital is recovered, and then after that they are operating on a marginal cost basis and are competitive with other generation sources, the policy issue is: is their subsidy justified during that period once they are competing on a marginal cost basis with other sources of generation?

Dr Moran: I think that is an interesting question. The issue with subsidies all along is that favours readily given by government can be readily taken away by government, which I think was said by former Treasurer John Stone when he was referring to the customs tariff. People will always claim that they base their decisions upon the government saying that it would give a subsidy for 10, 15, 20 or 100 years or whatever, but I think it is unwise of governments to lock themselves into lengthy periods on that basis.

Senator BACK: Thank you for your submission. I take you to your chart 3, ' Residential electricity prices 2009 and 2013' across 15 countries and ask if I am right in my assessment. In 2009, Australia had the lowest residential electricity prices of the 15. By 2013, four years later, according to chart 3, those prices had doubled from about US$7 to US$15 per kilowatt hour and Australia had gone from being the lowest of those 15 to being equally third highest. Is that an accurate summary of the data you have provided in chart 3?

Dr Moran: Yes, I think it is. The data is readily available from different sources; I used an NUS electricity report for that. Yes, certainly it is unquestionably a fact that Australian electricity prices rose over that period. I do not maintain that this is solely because of greenhouse type impositions; there are other factors at play as well, but certainly we moved from a period of one of the cheapest sources of electricity in the world 10 or 15 years ago to quite an expensive source of electricity today.

Senator BACK: You say it is not renewables only. What other factors have come into play, in contrast to other countries in the world who are surely experiencing similar challenges. What causes do you attribute to us doubling the residential price and going from the cheapest to the third highest?

Dr Moran: We had the carbon tax in place in that period as well. Also, there has been some increase in the line charge—the network charges. Some of that has been basically a catch-up, because the charges were too low. It is argued, quite plausibly, that that catch-up has overdone things a bit and that the prices will now be reduced. The network charges are fundamentally regulated by the Australian Energy Regulator. The regulator herself has indicated in recent decisions that she will be reducing the allowable prices that the networks charge, and that will have a flow-on effect to consumer prices.

Senator BACK: Presumably, whilst these are residential electricity prices, would it be logical to ask if they would also be reflective of commercial and industrial electricity prices? Would they be, if not different in price, different in the actual trend across the countries as well, if you were to chart them?

Dr Moran: No, there would not be that much difference in trend. What you will find is, for residential prices, more than half the cost is in the networks, and for commercial, depending on the size of the commercial entity—for example, in aluminium smelters or whatever—a much smaller proportion, maybe only 25 per cent, of the cost is the network cost. The actual energy cost looms larger the more energy intensive the business is.

Senator BACK: What do you think will be the impact now in the commercial space rather than the residential space? What impact is this likely to have, if we are seeing such a significant increase in electricity prices to manufacturers and others?

Dr Moran: Basically, it has reversed our comparative advantage. Australia built itself on the basis of cheap electricity, especially once we had privatised and otherwise improved the efficiency of the electricity industry. That will be reversed. A lot of people maintain, for example, that Australia has a very high level of greenhouse gas emissions per capita. It is about as high as the United States and a few other places. One of the reasons it is high is that, in the past, a great deal of our exports were quite energy intensive. In the case of aluminium, that is clearly the case—and we seem to be destroying that industry now by jacking up electricity prices. It is also the case with agricultural products, which entail quite a lot of electricity in their processing. If these trends progress and we cease to encourage, or we actively discourage low-cost electricity, we will see a transformation of our industry. In my view, that will almost certainly leave us less well-off than we would otherwise have been.

Senator BACK: If, and as, the Renewable Energy Certificate value goes from $43.50 to $94 per certificate, what impact do you think that is going to have on electricity prices?

Dr Moran: I could not tell you off the top of my head, but arithmetically one could work it out. It would almost double the cost of wind, which retailers are obliged to include within the total availability of energy, and that will have quite a strong effect in pushing up prices. It would not be difficult to offer an estimate of the actual effect of that, but it would be quite substantial.

ACTING CHAIR: We heard evidence this morning that approximately 4,000 gigawatt hours of energy are going to be required from wind over ensuing years. Do you have a view on the ability or the capacity of the wind sector to provide that level of energy?

Dr Moran: It has been suggested that it might not be possible to be provided. In my view it would possible, it is just a question of price. Firms will respond if in fact the subsidy is great enough and the certainty that the subsidy will be maintained is strong enough. It is not a difficult process to actually erect wind turbines; it may be more difficult to get the planning permission for that, and you would know a lot about planning permission generally. But in terms of erecting these things, they are manufactured off the shelf and erected in quite a straightforward way. With a strong enough incentive, I am sure almost any quantity you could imagine would be built.

ACTING CHAIR: There has been an estimate of a thousand new wind turbines required.

Dr Moran: Which sounds not unreasonable to me. It are a lot of wind turbines. There are about 4,000 in the UK onshore. Incidentally, as you probably would have heard, the new UK government has said it will not allow any further ones onshore unless it gets the full support of the local people nearby. Getting another thousand in a period of years would be a difficult ask, but not impossible.

ACTING CHAIR: So to pick up on your opening statement comment about the economic benefits as a result of yesterday's announcement of 33,000 gigawatt hours, are there any economic benefits to this project?

Dr Moran: The only economic benefit is that it is not as bad as it might have been. Clearly any substitution of high-cost electricity or high-cost anything for low cost, which is the intent of the present scheme, will leave us worse off. It will mean a reduction in GNP, and that reduction could actually be amplified by the issues that I think Senator Back was discussing—that is, the costs of electricity to secondary industry, which would need to restructure away from energy intensive industries to less intensive industries with considerable dislocation costs involved.

Senator BACK: Dr Moran, you made a comment on hydro. I also believe there is tremendous scope for hydro in the renewable space. With regard to yesterday's announcement of 33,000 gigawatt hours, what role do you think improvement in hydroelectricity could play in meeting those targets? How quickly could the hydroelectricity generators do that if they had the incentives?

Dr Moran: As I understand the 33,000 for eligible subsidy, it is only small hydro that is eligible. In other words, we do have some capacity to increase hydro, but it is mainly in Tasmania, which has long been a political problem. I do not think that would fall within the eligibility criteria, although others may correct me, for renewables. So the answer then is that there are incremental changes that can be made, and have in fact been made to various aspects to the hydro system across the various states, and there will be some further improvements possible there, but unless one allows the large licks of hydro, which basically means Tasmania at the present stage I guess, hydro will only be a modest share, in my view, of that 33,000 incremental.

CHAIR: Thank you, Dr Moran, for your evidence today.

Dr Moran: Thank you very much, Chair.

CAMPBELL, Mr Roderick Edward Stuart, Research Director, The Australia Institute

[11:20]

CHAIR: Could you please confirm that the information on parliamentary privilege and the protection of witnesses and evidence has been provided to you.

Mr Campbell: Yes it has.

CHAIR: The committee has your submission. In light of time constraints, I now invite you to make a brief opening statement. At the conclusion of your remarks, I will invite members of the committee to put questions to you.

Mr Campbell: The Australia Institute is an independent research organisation here in Canberra. We have had quite a bit to say about renewable energy policy over quite some time. We are mainly economists. I am an economist. However, we have also published various reports—one of which I have provided to the committee looking at wider impacts of wind energy that was written by researchers at the Nossal Research Institute for Global Health at the University of Melbourne.

To summarise that report before moving to things I have got some more expertise on, our medical researchers from the Nossal institute came to the conclusion that there was no credible peer reviewed scientific evidence that demonstrates a causal link between wind turbines and adverse physiological health impacts on people. However, they found that there was some connection between wind turbines annoyance and sleep disturbance. They felt that attitudes towards wind farms have a considerable influence on these factors and the extent to which noise, visual disruption and social change resulting from wind farms can cause stress or annoyance, which in turn can contribute to health issues. Any effects from such exposures are therefore likely to vary considerably across communities and are best considered indirect effects.

So my non-expert understanding of their findings was that if you find wind farms confronting visually or you feel that they have impinged upon you and your community in some ways that you are far more likely to attribute to health and annoyance impacts to the wind farm itself. As such, they found that there was some evidence to show indirect links between wind and those sorts of annoyance. In my personal experience, my family has a house not too far from Melbourne. When the Calder Highway was redirected closer to the house, you could certainly hear it a lot more. I find that quite annoying and I guess if I was suffering from headaches I might be tempted to attribute them to that.

That is quick summary of our research outside of—

Senator XENOPHON: What has that got to do with the noise from a highway? If cars are closer to you or trucks that are going past are closer, that will have an impact on your amenities, won't it?

Mr Campbell: Sure.

Senator XENOPHON: So what is the relevance of that in the context of this inquiry?

Mr Campbell: To expand, if I had been suffering from headaches and I felt that I had been impacted on by the movement of that road, perhaps I might attribute a worsening of my symptoms to the movement of that road, even though a neighbour may not.

Senator XENOPHON: But if you had a predisposition, sensitivity or if the highway is closer and there was more noise then it would not be unreasonable to attribute the headaches or any sleep disturbance to an increased level of noise if the level of noise was such that it would wake someone.

Mr Campbell: Sure. But whether that level of noise is causing the problems seems to be—

Senator XENOPHON: Ah, that's the question! Sorry to interrupt you.

Mr Campbell: That's all right. I hasten to add that I am not an expert on health matters. I would much rather get on to something I am a little more informed about, economics. As the committee has just heard, the Warburton review, along with almost every other review of the Renewable Energy Target—which is, of course, dominated by wind energy—has found that the Renewable Energy Target either has a minimal impact on household prices or, in the longer term, is likely to put downward pressure on wholesale electricity prices.

Senator DAY: Because of the subsidy.

Mr Campbell: Shall we go into this now? Should I finish my opening statement?

Senator DAY: No. Keep going.

Mr Campbell: The Australia Institute's research generally supports that. I am a little concerned that the committee has been given some misleading evidence by Dr Moran relating both to his submission and points that

he raised earlier. I had a look at his submission last night—and I think I have provided the committee with this document. There are several fairly obvious inaccuracies in Dr Moran's submission. One is his claim that additions to wind capacity globally appear to be decelerating. He produced the first graph that you can see there. I was a little puzzled by that, so I went to the source and found an updated graph which actually shows that the level of investment in wind globally is increasing. I was a little surprised that Dr Moran did not correct that today. Regardless of how aware of that data he is, you can see on page 2—from the same organisation, the Global Wind Energy Council, which Dr Moran had referenced—that, even with the anomaly that we see in Dr Moran's chart, the cumulative investment in installed wind capacity did not abate by very much even through that 2013 year. So I was quite surprised that he did not amend what was quite a misleading claim in his submission.

Perhaps more importantly though, Dr Moran seems very confused about electricity costs. At chart 4 in his submission—and this was the topic of some discussion just now—he refers to coal power costing $35 to $40 a megawatt hour whereas wind power is costing over $100 a megawatt hour. But neither in his discussion nor in his chart does he talk about what exactly he is measuring there, what exactly he is referring to. When economists talk about producing a megawatt hour of electricity we are usually talk about levelised cost, a cost that includes capital operating expenditure over the life of the asset. That is what it seems Dr Moran is talking about in relation to wind. However, it is not what he is talking about in relation to coal—and probably not gas or nuclear either—so he is not comparing apples with apples there. If we turn the page, we see some work from the CSIRO which does compare apples with apples. It compares the levelised cost of energy in dollars per megawatt hour, in their estimate, for 2020 with or without a carbon price. With or without a carbon price, you can see that wind is very competitive with fossil fuels by then—as indeed it is now. A similar result is found by the Garnaut review in another graph that I have provided there.

Dr Moran says he has never heard of a renewable energy generator going toe to toe and competing with fossil fuels. That is actually not true. No-one is proposing to build new coal fired capacity in Australia at the moment whereas there are plenty of people proposing to build new wind farms and solar projects. It is also not true in the wholesale market. We talked a little bit about South Australian energy prices. At times, the South Australian wholesale energy price in the NEM pool goes close to zero. So when we are talking about the costs of electricity generation it is very important to understand what we are talking about and whether we are comparing apples with apples. Dr Moran clearly is not, which suggests either that he does not know what he is talking about or is trying to mislead the committee—and being somewhat familiar with his work, I would suggest it is a little bit of column A and a little bit of column B.

Senator CANAVAN: Are you making an allegation that someone has misled the committee? It is a pretty serious allegation. There is no problem with you disagreeing with his views, but are you saying he misled the committee with intent? You may like to reflect on that comment.

Mr Campbell: I will reflect on the comment. If he as familiar with the data that he is quoting as I suggest he should be, and if he is to bringing it to the committee's attention, then I think he should be familiar with the updates of it.

Senator CANAVAN: That is fine, but you do not need to throw around accusations like that.

Mr Campbell: Sure. To finish my opening statement, Dr Moran said that our current policy settings are like giving away our cars and buying rickshaws. I do not think that is a very good analogy.

Senator XENOPHON: I think it was a motorised rickshaw!

Senator URQUHART: No, there were people pulling them!

Mr Campbell: He was talking about people running around pulling them! I think a better analogy for what he is proposing is that we keep the cars that we bought and built in the 1960s, that we keep on repairing them and allowing them to exceed modern emission standards and just keep hoping we can fix them and find the parts. He is saying we should never invest in new cars, an electric car or, heaven forbid, a train system. So I think his cars and rickshaws analogy is quite misleading.

Senator DAY: That is not how I interpreted it at all.

Senator BACK: With regard to Dr Moran's chart 3 comparing and contrasting residential electricity prices from 2009 to 2013—

Mr Campbell: I do not do have that in front of me but I am happy to talk about the intent in general.

Senator BACK: The source was the NUS report. You might have to take it on notice to advise the committee. The information contained in that chart is that in 2009 Australia had the lowest electricity prices of all the 15 countries—including Europe, the United States, Canada, South Africa and Scandinavia. But by 2013 electricity

prices had doubled and Australia went from being the lowest to being the third highest. I would be interested in your comments on that. Also, in your conclusion you said that the Australia Institute's public polling showed that 84 per cent of people ranked wind power in their top three and there was a high degree of support. We were given evidence yesterday in Cairns that 70 per cent of people surveyed were in support of a wind farm known as Mount Emerald. When we asked about this, we were told 400 people were surveyed. I then asked them how many people living within 1.5 kilometres of the proposed wind farm—the people who would be affected by it—were surveyed. The answer was zero. I then asked them how many living within five kilometres of the proposed wind farm were surveyed. There were seven. Of the 400 surveyed, 393 did not live within five kilometres of the proposed wind farm. When we then asked those who do reside within 1½ kilometres, do you know what the answer was of those who opposed the proposed wind farm? It was 91.7 per cent. You are an economist, you are used to statistics; so I would urge that when we hear this sort of information like 'X number of people support something', we do need to look at the support in relation to those likely to be affected, don't we?

Mr Campbell: Absolutely. I think that is a point that our medical researchers make quite clearly through our report—that community engagement and consultation appear to have a very significant effect on community attitudes. That is not surprising, and clearly that has been done more and less well in places around the country.

Senator BACK: So we do need to interpret carefully, don't we? Again, I think you made mention of various NHMRC findings in response to surveys of supposedly peer-reviewed literature. It may or may not be of interest to you to learn that these were some of the key words that were not used by the NHMRC when they conducted their international literature review. The words not used, which they did not seek information on, were: stress, annoyance, heart disease, headaches, misophonia, dizziness, vertigo, sleep disturbance and sleep deprivation. It is a long time since I was an active veterinary surgeon, as has been pointed out in other fora, but I am a trained scientist. For somebody to do supposedly international research and avoid using those key words, to me would render any outcome of any review to be useless, meaningless and wasteful.

Can I also put this point to you in relation to people's perceptions: in an inquiry we did in 2012 in which we had a United States researcher report to us, he gave the indication in that context in which his findings were evident that the community was vehemently in favour of the proposed and the subsequent wind farm for two reasons. The first was that they were promised they were going to get cheaper power; the second was that in the light of this move towards renewable and clean energy they would see themselves as leaders in the United States. Far from their being opposed, as a question was asked earlier, or having a perception that they were going to be disadvantaged, he reported to this committee the exact opposite—that there would be strong support. But nevertheless when they actually surveyed the people subsequent to the wind farm being installed, their findings were substantially negative.

Finally, in the key findings on your page 7—and again, perhaps I can ask you to take in on notice—you have a number of dot points. I will go to the eighth one:

> Perceived high levels of opposition have been linked to a vocal minority, with many surveys suggesting reasonably high levels of support, especially in community owned wind operations.

Could you assist the committee, if not now, then on notice, to give us further information on which ones you are talking about and which are community-owned. Unless you can respond now.

Mr Campbell: I would rather take that on notice. Could you phrase that as the question I am taking on notice.

Senator BACK: With your key findings on your page 7 there are a number of dot points. The eighth dot points starts with the quote I just gave you:

> Perceived high levels of opposition have been linked to a vocal minority…

I am keen to get further advice from you on who that relates to, and information you might be able to provide to us.

Mr Campbell: Let me respond to your question about changes in retail prices internationally. I am not familiar with the ins and outs of the different parts of retail pricing in the different countries that you mentioned but, according to information from the Independent Pricing and Regulatory Tribunal, with the vast bulk of the price increase that national electricity market—the east of Australia and households—has experienced since 2009-2010, 74 per cent of that had to do with network charges; that is, poles and wires. Six per cent was the increase in the cost of electricity generation, which I imagine would relate to increased coal and gas prices, although I am not 100 per cent sure about that. Ten per cent was retail costs and profit, and around 10 per cent was found to be the Renewable Energy Target. So 10 per cent of the increase related to the Renewable Energy Target. I think, in our submission and also in Dr Moran's submission, he looks at, within the cost of a kilowatt

hour to the retailer, the Renewable Energy Target and green schemes being a small percentage, between two and five per cent.

Senator URQUHART: In the document you just handed around with the coloured bars on it, where you talked about the different types of energy sources, obviously the issue about the costing there is the headline price, and that is just one part of the picture. Are you aware of any work that evaluates the total cost of different energy sources that takes into account external issues like health and environmental impacts?

Mr Campbell: It may be out there. I am not aware of it. But you raise a very important point. Dr Moran was talking about various forms of subsidy. If we look at an obvious example like the Morwell coal fire last year, which covered a reasonably large town in toxic smoke for a month, the impacts of air quality from coal mining, coal combustion, gas extraction and gas turbines do impose pretty significant costs on the community. I think, as an economist, that is what you need to weigh up when you are considering forms of energy generation and what the opportunity cost is there. I think you are absolutely right: we do need to consider those sorts of impacts. I think it is a good thing that the committee is looking at some of those impacts in relation to wind generation, and I hope a similarly close view is given to the alternatives.

Senator URQUHART: I understand you have also done work on what it costs the taxpayer for subsidies and incentives for the fossil fuel industry. Can you elaborate on this? Do you think that renewables are competing on an even playing field?

Mr Campbell: I was a co-author of the study last year that looked at state government subsidies to the mining and fossil fuel industries. We found that, over six years, state governments in Australia had paid around $17½ billion in either indirect subsidies or, more often, spending that directly benefited the mining and fossil fuel industries. That has been confirmed by the Queensland Treasury, who talked about the costs that the mining and fossil fuel industries impose on the Queensland taxpayer. The Queensland Treasury points out that every dollar we spend on coal railways and coal ports means a dollar less that we spend on hospitals and schools. So I think those forms of subsidies are not given adequate attention. Or they were not, until recently—not so much in relation to fossil fuels. In Western Australia, the Western Australian Treasury has claimed to the Commonwealth Grants Commission that the Western Australian taxpayer has paid around $8 billion to get the North West Shelf project underway, and that it has seen precious little in return. That is obviously more criticism—

Senator BACK: That is because the GST money has gone to the eastern states, Mr Campbell. Western Australia ran a deficit because we put $6.7 billion into the east and we got $1.9 billion back again.

Mr Campbell: Yes, that is certainly a criticism of this system. The point being that there was a fossil fuel project that was given $8 billion from the Western Australian taxpayer. I think your point is a good one that there are a lot of subsidies paid to the fossil fuel system that are not recognised in a lot of accounting.

Senator URQUHART: How is market and investor behaviour changing in relation to both fossil fuels and renewables, and what impact could this have on Australia, depending on the energy mix that we choose into the future?

Mr Campbell: We have seen the uncertainty over the renewable energy target drastically reduce investment in renewables in Australia. Australia is almost the only country in the world to have seen that. That is a pretty clear signal. Strong support for the renewable energy target is important, not just for wind—I realise that is the main point of this committee—but for solar as well. If you want to see large-scale solar, then you have to support a larger, longer-term RET, because the levelised costs—again, talking about levelised costs as opposed to any particular marginal cost—of solar are forecast to become really competitive with other forms of energy over the next decade. So we really do need to be maintaining a longer-term commitment to renewable investment for the solar industry.

Senator URQUHART: Tesla recently released an industrial-scale battery. What impact do you think this sort of destructive technology could have on the renewable and fossil-fuel sectors and the national electricity grid?

Mr Campbell: It is very difficult to say. I do not have a crystal ball, but it certainly raises a lot of exciting opportunities for storing energy when it is cheap and using it when it has traditionally been expensive. I think its potential impact on the electricity market is considerable. In terms of what it means for our grid, we do not know—I am not an engineer—but I think it could have some pretty serious implications for our grid.

The biggest game in town at the moment is the privatisation of the New South Wales poles and wires. When we are seeing that sort of disruptive technology come into the electricity market, is that a good time to be privatising a grid and locking in technology with private investors who will have an incentive not to move away from what they have just bought? I do not think it is.

Senator URQUHART: I am being wound up by the chair. I do have a few more questions, so if I could provide those to you on notice that would be appreciated.

Mr Campbell: Certainly.

Senator CANAVAN: I will be really quick. I think in your submission, Mr Campbell, how many wind turbines are there? That is something that the department—do you know how many wind turbines we have in Australia?

Mr Campbell: I do not know, off the top of my head.

Senator CANAVAN: Would it be about 1,500 or 2,000?

Mr Campbell: That sounds about right.

Senator CANAVAN: In your submission you say that each turbine kills around one or two birds a year. So that is about 1,500 to 3,000 birds a year, on those numbers, that we kill by wind turbines. Is that right?

Mr Campbell: That sounds about right.

Senator CANAVAN: I will move on, because I do not have much time.

Senator URQUHART: How many cats are killed, Senator Canavan?

Senator CANAVAN: Cats serve some useful purposes, sometimes.

Unidentified speaker: Anyone who had chicken for lunch has probably accounted for that themselves.

Senator CANAVAN: Because I have limited time, I should not have to take interjections. What is your estimate of the abatement cost per tonne of the renewable energy target?

Mr Campbell: I will have to take that on notice.

Senator CANAVAN: I have a report here from the Australia Institute. It is called *Fighting dirty on clean energy: the case for the renewable energy target*. On page 17 of that report your organisation has a graph. I am reading off the graph. I am probably being generous, but about two million tonnes of carbon dioxide equivalent has been abated in 2014. In 2014 something like $400 million or $500 million in RETs were created, depending on what price you use. On that basis, it is around $250 a tonne per cost. Is that about right? They are your figures—and the amount of RET sold as a publicly-available figure, is that about $250 a tonne?

Mr Campbell: I would be happy to talk to my colleague and take that on notice.

Senator CANAVAN: You have said you are an economist. Have you not looked at this yourself, in your work? It is obviously a very relevant economic question, in terms of the costs.

Mr Campbell: It is a very relevant question. I am very keen to answer it correctly and accurately—

Senator CANAVAN: But you do not even have a ballpark—

Mr Campbell: and not misrepresent the views of my colleague. So I will take that on notice, as I said right at the start.

Senator CANAVAN: Yes, you can provide details on that very complicated modelling behind the estimate of the impact on prices that is obviously very relevant to electricity prices. Obviously, a very relevant consideration for us is how cost-effective the scheme is and we would be very appreciative if you could come back to us on what your estimates are, as an economist and an expert in this field, on the abatement cost per tonne.

Senator XENOPHON: Mr Campbell, because of time constraints I am going to ask you to take these on notice. Can I direct you to the submission made by Frontier Economics about an alternative approach for a more cost-effective way of reducing greenhouse gases—that is, having a low emissions target—and whether The Australia Institute has considered that in terms of efficacy?

Mr Campbell: What number submission is that, do you know?

Senator XENOPHON: It is submission No. 87. And I also ask you to reconsider your claim in respect of solar energy. The Australian Solar Council's Chief Executive, John Grimes, is basically saying that the deal that has been struck on the RET is a disaster for the solar industry and, despite your optimism that the solar sector will be able to do well out of this, those who are part of the sector, who are in the know, are saying that wind will crowd out solar and, indeed, other forms of baseload renewables such as hydro and landfill gas. So could you please take the economics of that on notice? I am sorry that we cannot have an interchange because of time constraints, but I would ask you to consider those because they are certainly very serious issues. Thank you.

Mr Campbell: Sure. Given the details that were announced yesterday, do you want me to reflect on the—

Senator XENOPHON: Mr Grimes of the Solar Council is saying that this is very bad news, and also new hydro and those sorts of renewables—

Mr Campbell: From what I understand of what was announced yesterday, I would tend to agree with his point of view that it probably is.

Senator XENOPHON: Sure, so that means that mitigates against the statement you made a few minutes ago that things are looking good for solar, because they are not.

Mr Campbell: No, I said that if you are keen on supporting the solar industry you need a large and long-term renewable energy target. From the sounds of what was announced yesterday, it is obviously a considerable reduction on the original renewable energy target in terms of gigawatt hours. I think we generally agree with each other.

CHAIR: Thank you, Mr Campbell, for your appearance here today before the committee.

CROMARTY, Mr Peter, Executive Manager Airspace and Aerodrome Regulation, Civil Aviation Safety Authority

FARQUHARSON, Mr Terry, Deputy Director, Aviation Safety, Civil Aviation Safety Authority

[11:53]

CHAIR: Welcome. Could you please confirm that the information on parliamentary privilege and the protection of witnesses and evidence has been provided to you?

Mr Farquharson: Yes.

CHAIR: Thank you. I remind witnesses that the Senate has resolved that an officer of a department of the Commonwealth or of a state should not be asked to give opinions on matters of policy and should be given reasonable opportunity to refer questions asked of the officer to superior officers or to a minister. This resolution prohibits only questions asking for opinions on matters of policy and does not preclude questions asking for explanations of policies or factual questions about when and how policies were adopted. I now invite you to make a brief opening statement and, at the conclusion of your remarks, I will invite members of the committee to put questions to you.

Mr Farquharson: Chair, the Civil Aviation and Safety Authority appears here to give you information relating to aviation safety. We are not versed in economics or environmental matters, so other than those we are here to assist in any way we can.

CHAIR: Thank you.

Senator LEYONHJELM: I wonder whether you are aware—I assume you are aware—that the New South Wales Rural Fire Service will not conduct aerial firefighting from the Crookwell aerodrome because of the safety hazard and the fact that the aerodrome no longer complies with category B, due to the wind turbines? Are you aware of that? Is it accurate?

Mr Cromarty: I am not aware of that.

Senator LEYONHJELM: Following a land and environment court case, I understand that CASA started a safety audit in relation to the wind turbines near Crookwell aerodrome. Is that accurate? And, if so, what was the outcome of that safety audit?

Mr Cromarty: I would not call it a safety audit. We assess each proponent's application on its merits and so we did with the application around Crookwell aerodrome. In fact, we did it on many occasions and we provided information on several occasions to the council and the proponent. In fact, we have written to this committee, to Ms Jeanette Radcliffe. We submitted some information on 13 May about all of the activity that we undertook in relation to Crookwell aerodrome.

Senator LEYONHJELM: Did anyone from CASA officially visit the Crookwell aerodrome?

Mr Cromarty: Not that I am aware of.

Senator LEYONHJELM: My final question, because I am being very efficient here. Leaving aside Crookwell aerodrome, have you done any work or looked at the effect of turbulence from wind turbine operations and their effect on small aircraft?

Mr Cromarty: We have considered it. There is little information about it. Most of it comes from either the Netherlands or the UK. The National Airports Safeguarding Framework contains information about it in, I think, annex D. For example, on the information that is available, the CAA of the UK produces an information notice, which covers it to a certain extent, but we do not have a lot of information about it internationally.

Senator DAY: Thank you for appearing. As a former pilot, I have more than a passing interest in this matter. Can you comment on any negotiations, discussion, lobbying or anything that has happened as a result of wind farms being built near aerodromes? Can you comment on any aspects of that?

Mr Cromarty: We have a process that we go through, as I say, for each application. Each one is judged on its merits. The process is not straightforward. It is reasonably complex, depending upon whether the aerodrome is a federally leased aerodrome, whether it is certified—for the remaining aerodromes, such as Crookwell, it is called an aeroplane landing area—and the process for each of those is different in certain respects. So it is not straightforward. But in general terms we allow the local council, the local planning authority to approach us if they consider that a proponent may have a proposal which would cause an obstruction to the safe navigation of aircraft and we will assess it on its merits.

Senator DAY: Have you felt under pressure in your responses to applications in any way, shape or form?

Mr Cromarty: Not generally, no. We know our responsibilities and the power of our legislation, which is very limited. For the most part, wind turbines are built away from aerodromes and certainly away from federally leased aerodromes. So the only power that we have is to make a recommendation to the planning authority about whether the turbine is going to be an obstacle and, if we decide it is an obstacle, we can make a recommendation as to whether it should be lighted and marked. That is the extent of our power.

Senator DAY: A final question, have any of your recommendations, in your opinion, not been applied or have you have been disappointed with any of your recommendations in this regard?

Mr Cromarty: I am not aware of the outcome.

Senator URQUHART: Do wind farms have any effect on aircraft flights in Australia?

Mr Farquharson: That is a very difficult question.

Senator URQUHART: Are you aware of any?

Mr Farquharson: There are some indications of people who might be close to below the level of the turbines suffering or experiencing some degree of turbulence.

Senator URQUHART: What sort of aircraft would they be?

Mr Farquharson: They would tend to be light aircraft.

Senator URQUHART: I would hope a light one would not be below the line of a turbine, unless they were taking off and landing of course. Have pilots or operators raised concerns with you over the size or siting of wind farms?

Mr Farquharson: We have had representations from the Australian Agricultural Aviation Association, yes.

Senator URQUHART: How do you deal with those?

Mr Farquharson: In relation to aerodromes, I am aware that we have made one recommendation that seems to have been followed. Based on the international information available, we have recommended that turbines not be placed any closer than particular distances. That development, I believe, has conformed with that.

Senator URQUHART: Can I ask which aerodrome that is?

Mr Cromarty: That was the one we wrote to you about, Crookwell, where the proponent wanted to put it within 3,000 metres from the aerodrome. We recommended 3,600 metres. I believe that 11 of the turbines were not constructed. The 3,600-metre exclusion zone mandated by the New South Wales government should ensure excessive turbulence from the rotors is not experienced in the immediate vicinity of the aerodrome. They did take our advice on that occasion.

Senator URQUHART: Do you regard wind farms as a safety issue for aircraft?

Mr Farquharson: They can be and we assess these applications that are brought to our attention, as we said before.

Senator URQUHART: What about large solar farms? Can they affect pilots as well?

Mr Cromarty: We have had solar farms assessed with the possibility of reflection off them. There was one built right near where I lived, down to the south of Canberra, the largest in Australia, and it was determined that it would not have an effect on the approaching aircraft.

Senator URQUHART: So it is about the placement, is it?

Mr Cromarty: Yes, and the reflection. As I understand it—and this is not something that I have particularly researched coming here—they have low reflectivity or something like that that they use on them.

Senator URQUHART: You spoke about Crookwell. I think we are hearing from a pilot and we have had a submission from Mr Jim Hutson, who raised concerns about the proximity of the Gullen Range wind farm to the aerodrome. Have you received any correspondence from industry bodies concerned about that?

Mr Cromarty: Yes. In the letter that we sent, there was a lot of correspondence to and fro about that one. We have tried to deal with it as best we can within our remit.

Senator URQUHART: You talked earlier about regulation. What are the regulations that surround the lighting of wind turbines and what body is responsible for managing those regulations? Is that yourselves?

Mr Cromarty: The standards for the lighting is set by the International Civil Aviation Organisation. They vary depending on how obvious you want to make the lighting. So some lights might be what we call a low intensity red, which is a steady red light that shines at night; some of them you might have seen have high visibility, high powered flashing white lights. It depends on the circumstances.

Senator URQUHART: So is it similar to what you would see as you are coming into a normal airport with big buildings and those sorts of things around them?

Mr Cromarty: Yes, that is right. Some of them flash, some of them do not. In general, if we say an obstacle will be a hazard if it is not lighted and the council decides to make the proponent light the obstacle then we say that it must be in accordance with the lighting standards. And generally we tell them that they have to have a low-intensity or medium-intensity steady red light.

Senator URQUHART: Are you aware of any circumstances in Australia where a wind farm's proximity to an airstrip has resulted in an accident?

Mr Cromarty: In Australia?

Senator URQUHART: Yes.

Mr Cromarty: No.

Senator URQUHART: Are you aware whether the aerial agricultural association has always held the position that there are safety concerns resulting from wind farms to their members' activities?

Mr Cromarty: Yes.

Senator CANAVAN: Could you explain turbulence? What are the physical or aerodynamic issues?

Mr Farquharson: Anything that moves through the air will create turbulence to one degree or another. So downwind of a turbine with rotor blades, you will get a degree of turbulence. The question then becomes how far and for how long it takes to attenuate. There is data available that suggests between one and two minutes and up to 16 rota diameters, depending on the size of the rota, before it becomes attenuated.

Senator CANAVAN: Is that a distance?

Mr Cromarty: I think that is in the letter as well. It comes out at 1.7 kilometres for the ones at Crookwell.

Senator CANAVAN: From a single turbine?

Mr Cromarty: Yes.

Senator CANAVAN: And practically, what does that mean for a light aircraft, maybe a single-engine aircraft?

Senator DAY: It could bounce around a lot. It is like following a large public transport jet.

Senator CANAVAN: But could you potentially, if things go the wrong way somehow, lose control of the aircraft?

Mr Farquharson: It depends on where you encounter the turbulence. The closer you are, the more intense it is likely to be. But the requirement is for pilots to actually be aware of their circumstances. There is a minimum altitude, unless you are doing something particular, for flight above ground level and that is normally 500 feet. We can deal with take-off and landing by separating these turbines at an appropriate distance.

Senator CANAVAN: So the issue is what height you are at when this affects you because you can regain control usually, whereas if you are low to the ground you may not have that flexibility. Is that fair?

Mr Farquharson: It could influence things, yes. For aerial applications, they may want to conduct operations closer to the turbines.

Senator CANAVAN: Such as aerial spraying, which is low to the ground by definition.

Mr Farquharson: Yes.

Senator CANAVAN: You did mention there is a little uncertainty about its impact. Have you had anyone ask you to do further studies into its impact?

Mr Cromarty: Yes we have. But we have not undertaken any work in that area. The physics of that topic are quite complicated. Some years ago when I was in the UK CAA with weight vortex generated by aircraft and it is a very difficult area to study. Lye dye is used these days to try and visualise what is going on in the atmosphere but it is pretty tricky and expensive research.

Senator CANAVAN: Presumably you have not done the research because you do not have the expertise or the funding yourselves—is that the reason?

Mr Cromarty: We do not have the money.

Senator CANAVAN: It is not a lack of need, it is a lack of resources.

Mr Farquharson: If we were to do that, we would contract that out. We do have a limited budget to ask people to do research into various things, but we have not raised that as an issue as yet.

CHAIR: I thank representatives from the Civil Aviation Safety Authority for their appearance before the committee today.

HUTSON, Mr James Henry, Private capacity

[12:10]

CHAIR: I welcome Mr Jim Hutson. For the Hansard record, will you please state your full name and the capacity in which you appear today.

Mr Hutson: My name is James Henry Hutson. I still am, although I am retired, a commercial pilot and a licensed aircraft maintenance engineer. I have held chief engineer positions and chief pilot positions. I have lived on the aerodrome at Crookwell for approximately 25 years and have operated from that aerodrome since 1974.

CHAIR: Could you please confirm that the information on parliamentary privilege and the protection of witnesses and evidence has been provided to you.

Mr Hutson: Yes.

CHAIR: The committee has your submission. I now invite you to make a brief opening statement, and at the conclusion of your remarks I will invite members of the committee to put questions to you.

Mr Hutson: I presented myself before this Senate inquiry today due to my ongoing concerns about the failure of government departments, namely the Civil Aviation Authority and the New South Wales government Department of Planning, to secure a safe outcome for the Crookwell aerodrome. We have had the ability to use the aerodrome for aerial firefighting taken away from us, and now we are left with an extremely dangerous, hazardous situation which poses a threat to all aviators using the aerodromes. In my opinion both departments have been shown to be morally bankrupt, and they are now trying to distance themselves from their failure to provide good governance. They have been well and truly informed of the outcome but chose to place the interests of a wind turbine company before the interests of our local community and of aviation safety in general. A visit to the Crookwell aerodrome will confirm my views. I stand by my submission to this inquiry and sincerely thank you, Senators, for this opportunity.

Senator URQUHART: How long has the Gullen Range wind farm been operating?

Mr Hutson: It started in approximately October last year.

Senator URQUHART: Do you live near the wind farm?

Mr Hutson: Yes.

Senator URQUHART: Have you had any other concerns with the wind farm aside from its proximity to Crookwell aerodrome?

Mr Hutson: Personal concerns, or aviation concerns?

Senator URQUHART: Either.

Mr Hutson: My concerns are for safety of aviators using the aerodrome.

Senator URQUHART: What is the volume of traffic at the Crookwell aerodrome?

Mr Hutson: Less and less all the time now, because people are not coming there because it is so darn dangerous.

Senator URQUHART: How many take-offs would there be on a daily or weekly basis?

Mr Hutson: It varies. If you have bad weather in the Sydney Basin—Canberra—very few. You might get aircraft coming in from the western side of the range, but as soon as it opens up you might get six, seven or eight a day. It is mostly used for flying training. The aerial ambulance has been in there, which concerned me. We had New South Wales air ambulance helicopter there at about eight o'clock on 22 March—I remember that because it was my birthday. Here it is—a helicopter flying around at night, and they are probably aware of it, but you have got wind turbines stuck up on the hill at 750 feet only 3.5 kilometres from the aerodrome. You have only got to get it wrong, and pilots do get it wrong.

Senator URQUHART: From your submission, it seems that many of your concerns stem from questions about the jurisdiction and responsibility because of the type of airport. Are you aware of how many other aerodromes there are in Australia that fall outside of CASA's jurisdiction?

Mr Hutson: No I am not.

Senator URQUHART: Are you aware of any circumstances in Australia where a wind farm's proximity to an airstrip has resulted in an accident?

Mr Hutson: Not yet—have in America.

Senator URQUHART: On the topic of potential wind farm risks, the New South Wales Rural Fire Service submission says that wind turbines are not expected to pose increase risks due to wind turbulence or moving blades. They do not mention Crookwell Airport in their submission, and I pick that up because you talked about the aerial firefighting. Do you have any documentation that confirms that?

Mr Hutson: Yes. There are two items in my submission as attachments that have been forwarded to the Senate inquiry—one from the superintendent of Crookwell, who clearly states that he refused to use the aerodrome for aerial firefighting due to the turbulence and hazard, and one from—I forget what they called it—some formal meeting for, I believe, Crookwell 3, which is not up and running yet, where he expanded further on. That document is with you. But that document would not be produced today, because policy has come down on it from on high and the official policy now is that there is no effect.

Senator URQUHART: When you say policy coming down from on high, who are you talking about?

Mr Hutson: It is current, but these documents were issued a couple of years ago.

Senator URQUHART: But who were you talking about?

Mr Hutson: The Rural Fire Service.

Senator URQUHART: Okay, that is fine. Do you know if those attachments in your submission you are talking about have been forwarded to CASA? Have you or has the fire service superintendent?

Mr Hutson: Over the whatever it is—eight years or something—I have got sick of writing to CASA.

Senator URQUHART: But do you—

Mr Hutson: They have copies of all my correspondence.

Senator URQUHART: The question I am asking is if that documentation that came from the superintendent's decision not to continue with firefighting has been forwarded to CASA.

Mr Hutson: I have not forwarded it to them.

Senator URQUHART: Do you know if the fire service has?

Mr Hutson: I do not know if that has been forwarded to CASA. Sorry.

Mr Hutson: No worries. Thanks very much.

Senator BACK: I am going to read, if I may, from CASA's submission to the secretariat from Mr Farquharson: 'I do accept the allegation made in the submission that CASA has failed to investigate air safety issues at the Gullen Range Wind Farm. CASA has no record of receiving correspondence from this particular body on this issue, though other individuals and organisations have written over an extended period of time.' Could you provide us with your view on the accuracy of that comment?

Mr Hutson: I am sorry; I missed the first—who did they say they had not received from?

Senator BACK: They are referring to allegations made in a submission to this committee by Parkesbourne/Mummel Landscape Guardians Inc. They go on to say, 'I don't accept the allegation made in that submission that CASA had failed to investigate air safety issues at the Gullen Range Wind Farm.' They have no record of receiving correspondence from this body. Do you know who this Parkesbourne/Mummel Landscape Guardians is?

Mr Hutson: Yes, the gentleman who is here—Mr David Brooks—may be able to answer that. I cannot.

Senator BACK: Thank you.

Senator DAY: I do not know if you were here for the previous evidence of CASA.

Mr Hutson: Some of it. I wish I had come in a bit earlier. I purposely stayed outside because I knew, but I should have come in. I do not agree with it.

Senator CANAVAN: I can understand your frustration.

Senator DAY: As a former pilot, I do have more than a passing interest in this. It has been suggested that in aviation practices one should not commence turning until you have reached the minimum altitude of 500 feet and so on. Do you want to comment?

Mr Hutson: Yes, I would love to explain that. Take a normal aerodrome as this table and use that object as a wind turbine. Those wind turbines would never have been allowed to be put up at any other aerodrome in Australia. They would be finished and shown the door. If the prospect was to go to Bankstown or somewhere like that, they would laugh you out of existence—'Go away. Who are you? You're a nutter.' But, even if they did—if they put the wind turbines up at Mascot—it would be safer than our aerodrome, because aircraft come in on what is called an ILS. They come up, they line up; with GPs now they are so accurate—within feet. You could fly them

close—not that you would want to; they would still be a hazard. On flat country that is not so bad. They keep referring to the magic figure of 3.6 kilometres. That would be fine, but these are placed on top of a hill of 350 feet and are 420 feet high. If our aerodrome is here and the hill is there, instead of being over there our turbines are up here. They have neglected that completely. That is the problem. The aerodrome has been lined by people in the past, which was good, and it takes off through a gap in the hill. I have seen many aircraft struggle to get over that hill, and I mean go below treetop height to get over the hill.

Senator DAY: So you are suggesting they are in breach of safety.

Mr Hutson: What is happening now is he refers to 500 feet, and he is correct. When you take off, you are supposed to climb to 500 feet—

Senator DAY: before making a turn

Mr Hutson: make your turn, 15 degrees angle of bank, climb away. What is happening now is the wind turbines are offset to the runway; so, when there is a south-westerly wind, pilots are now starting their turn at about 150 feet, which is illegal. They are climbing at anything up to 30, 35 degrees angle of bank in a steep climbing turn, which is set up for a stall spin accident, and they are turning inside the downstream velocity and turbulence from the wind turbine. I watched an aeroplane the other day come around, and he got caught in it. I thought he was going to keep going, but he did not; he corrected it.

One of my fears has been of a stall spin accident. If they climb straight ahead with a south-westerly wind, they are in a velocity deficit. These things, people do not realise, are 100 metres in diameter. That is the length of a football field. They are staggeringly big. In America the aerial agricultural people say do not fly directly at them closer than 1½ miles and do not fly across them at less than 600 yards—they use yards. I have two friends: one flew behind and one in an Aero Commander. He said it frightened the heck out of him and don't ever do that again. This is a twin engine aeroplane. He said it stopped flying. He said, 'We thought we were dead.' It fell out, it picked up and went through.

Another friend of mine I did my commercial helicopter pilot licence with in 1972. He had an exciting episode over at Oberon, where he took a film crew in, landed along side one, hovertaxied over, they did whatever and he departed. This guy has been flying since 1972. He is still flying now, so work that out. He is one of the most experienced helicopter pilots in Australia, and he said all of a sudden it just fell out. It just was not flying anymore. The thing that saved him was it was downhill. In front of that turbine the wind actually slows, so he picked up in airspeed and flew into a velocity deficit in front of it. He had just got into translation, and then it went out of translation and down he went.

So these things are dangerous. Everybody knows they are dangerous. CASA do not point out to the aviation community that they are dangerous. There is nothing in writing. I have spoken to people in CASA who wish to remain nameless who want a study done. They know that there are dramas. But now, as I say, they put these things up on the top of the hill. They are actually in the circuit of the aerodrome.

Senator DAY: How does Crookwell Airport maintain its compliance rating?

Mr Hutson: It is a trusted aircraft landing area. It was normal and just fine, but now, because the obstructions are up on the hill, it does not comply with a category B circuit anymore, so we cannot do aerial firefighting from it.

Senator DAY: Or training, I presume.

Mr Hutson: There are recreational aircraft that come out and train. Flying schools come up from Bankstown, the University of New South Wales. Lots of them come up, but they are all under instruction. You do not send anyone in there and do ab initio training or solo flights from it. It is a potentially dangerous aerodrome but, touch wood, to my knowledge—and I have been associated since 1974—there has never been an accident on the aerodrome. Now they have stuck them up there. They wanted to put them virtually in line with the aerodrome. We got rid of 11—and that was a drama in itself.

Senator DAY: You got rid of 11 turbines? You reduced the number by 11?

Mr Hutson: Yes. We reduced it by 11. I wanted 21 gone to keep the circuit compliant for firefighting. It looked, at one stage, like we got the 21 gone, but someone overrode it. Typical! Turbines come first. Now we are left with this dangerous situation—and that is why I am here.

Senator CANAVAN: I just want to go back to a response you made to Senator Urquhart. You said there was an accident in the United States. Can you expand on that. Do you have some knowledge of that?

Mr Hutson: There have been four accidents.

Senator CANAVAN: Do you have details of what happened with those?

Mr Hutson: Briefly, the last one was an agricultural pilot doing to a charter flight in a Cherokee or similar, with apparently three very prominent cattle buyers. He was getting home; he was scud running.

Senator CANAVAN: He was what?

Mr Hutson: Scud running—underneath. You have two choices: go over the top or through it. But sometimes it is better and safer to go under, but you can get caught. He flew into a wind turbine, and they were all killed. Another one was an approximately 10,000- to 12,000-hour airline pilot flying a Cessna with people on board. He found himself inside a wind farm. The radar traces showed he was doing figure 8s and all sorts of screwy things when he got inside a wind farm. I guess he had a wind turbine; he had another wind turbine—he was doing all that—and then he actually got out. But I would say, by that time, his gyros had probably toppled anyway, and he flew into the ground. There have been two others, but I cannot—

Senator CANAVAN: Were there fatalities?

Mr Hutson: Yes. Then I believe there has been one in England—a glider—and a parachutist got caught up in one somewhere in England.

Senator CANAVAN: CASA is the regulatory authority here. I do not know who the operators of Crookwell are, but presumably this is an issue being canvassed in other contexts. They have an obligation to make sure they take reasonably foreseeable actions to prevent accidents occurring. Have you communicated with them at all about these concerns, and what has their response been?

Mr Hutson: CASA?

Senator CANAVAN: No, the operator. Who is the operator? Someone would know.

Mr Hutson: The council?

Senator CANAVAN: Who owns Crookwell aerodrome?

Mr Hutson: Upper Lachlan Shire Council.

Senator CANAVAN: They own this particular facility? Sorry, I am not familiar with it. Have you expressed your concerns to them, and what has their response been?

Mr Hutson: They do not want to know me.

Senator CANAVAN: Have they done any studies themselves?

Mr Hutson: No. They just do not want to know. Can I just briefly go back to what you said. The Civil Aviation Act, sections 9 and 9A, is the most important thing here. Section 9 clearly defines what type of aircraft—the VH-registered aeroplanes operating in Australia and overseas. I rang up the CASA legal department and spoke to a lawyer. I told him who I was. The words I used were the guts of section 9A. I am not a lawyer. I cannot interpret it. I will quote what he said. I told him that I was writing it down, but I can remember. He gave me his name. He said section 9A is designed specifically for air navigation. In my writings to CASA I have pointed this out. Once the wheels leave the ground by one millimetre, you are navigating. Forget the aerodrome; you are navigating. You are flying past obstacles. It is non-specific. It is designed to cover everything foreseen an unforeseen. You have to have that in aviation. Aviation is described by the British CAA as fluid and ongoing, and you know that because every now and then you get an unusual accident or circumstance with an aeroplane. There is a new design, or an aeroplane goes missing, or whatever. It is ongoing.

The other word she used was 'all-encompassing', and there was another one too. I will think of it in a second. When a person—any person—tells CASA there is a safety issue, CASA, under the act, must investigate, adjudicate and let you know. It is very similar to the police: if they cannot get you for anything, you can get careless driving or driving in a manner dangerous, and that is their thing. You cannot fly an aeroplane without there being oversight on that, but they have chosen not to use it.

Senator CANAVAN: Thank you.

Senator URQUHART: Just before we wrap up, I want to ask Mr Hutson—he does not have to answer it now, but could he just provide it to the secretariat—about the areas that he talked about before in the USA—the accidents. Can you just provide us with the locations and the details around those.

Mr Hutson: I will try to do that for you.

Senator DAY: Just one point: you said that the moment the aeroplane—the aircraft—leaves the ground you begin to navigate. 'Aviate, navigate, communicate' is the golden rule.

Mr Hutson: Yes.

Senator DAY: Do you agree with that, Mr Hutson?

Mr Hutson: Yes.

Senator DAY: So aviate first, navigate second.

Mr Hutson: Yes, and communicate last. If it really turns pear shaped, forget the communication.

CHAIR: Thank you, Mr Hutson, for your appearance before the committee today.

Proceedings suspended from 12:31 to 13:18

TAIT, Dr Peter William, Convenor, Ecology and Environment Special Interest Group, Public Health Association of Australia

WALKER, Ms Melanie Jayne, Acting Chief Executive Officer, Public Health Association of Australia

[13:18]

CHAIR: We will now resume the Senate Select Committee on Wind Turbines hearing and I welcome representatives from the Public Health Association of Australia and from the CSIRO via teleconference. The committee has agreed to hear from the Public Health Association of Australia first. Could you confirm that information on parliamentary privilege and the protection of witnesses and evidence has been provided to you?

Ms Walker: Yes, it has.

Dr Tait: Yes.

CHAIR: I remind witnesses that the Senate has resolved that an officer of a department of the Commonwealth or of a state shall not be asked to give opinions on matters of policy and should be given reasonable opportunity to refer questions asked of the officer to superior officers or to a minister. This resolution prohibits only questions asking for opinions on matters of policy and does not preclude questions asking for explanations of policies or factual questions about when and how policies were adopted.

The committee has your submission. I now invite you to make a brief opening statement. At the conclusion of your remarks, I will invite members of the committee to put questions to you.

Dr Tait: Thank you very much. I will reiterate and elaborate on our conclusions, and build on that. Firstly, the Public Health Association of Australia has confidence in the National Health And Medical Research Council in its current role and functions for providing high-quality independent advice to the Australian public and governments on health related policy matters.

Secondly, we submit that any potential health impacts of wind turbines need to be assessed within the broader context of the health impacts on individuals and society from all energy choices and that the broad health and energy needs of the 21st century economy and society, faced with the prospect of runaway global warming if we do not rapidly reduce greenhouse gas emissions, is as much as—we are in strife if we do not reduce our emissions as much as technologically feasible, starting as soon as possible.

In this context we argue that wind turbines can make an important contribution to human health and wellbeing, which offsets the noise disturbance effects on a minority of people. The balance of evidence currently suggests that although wind turbines are not completely free of all harm to neighbouring populations, in comparison with non-renewable energy sources, particularly fossils fuels and nuclear energy, they are likely to be considerably less harmful in both the short and long term, at a population level, than these alternatives.

We also suggest that the noise of wind turbines needs to be put in the context of other sources of noise in our society—such as aircraft, flight paths, train lines, road traffic, air conditioners, surf and so forth—and that wind turbine noise should be managed in a similar way to which those noise sources are managed. We would submit that sensible government leadership on the transition from an unhealthy to more healthy energy sources, by a set of articulated energy and greenhouse gas mitigation policies, is essential to good government in the 21st century. So wind energy is an available, relatively benign source of energy that can immediately contribute to energy transitions and therefore to a more healthy society.

Ms Walker: In the context of what people are saying, the Public Health Association believes that the following steps should be taken: one, complaints of people affected by the noise of wind turbines do need to be recognised and managed, and fair and reasonable solutions for them developed; two, allegations of harm to health from wind turbines need to be placed in the context of minimal evidence supporting some of these claims and the considerable evidence supporting harms from other energy sources; and three, governments should support wind power as one of the viable evidence based renewable energy options to rapidly transition the economy from fossil fuels. This is supported by the Public Health Association on both health and safe climate grounds.

Senator URQUHART: Thank you for your opening statements and submissions. As I understand it, no national, medical or acoustics body in the world holds the position that wind turbines are dangerous to human health. Would you agree with that?

Ms Walker: That is correct.

Dr Tait: Correct, yes.

Senator URQUHART: Despite this seeming medical consensus, the committee has been directed to a number of studies and papers which seem to support this proposition. I am interested in how we can go about

resolving this, what seems to be, contradiction. One thing I have noticed is that a very large number of these papers seem to have been published in a small number of journals, which are listed as having a low-impact factor. In contrast, it is hard to find papers that are supportive of the assertion in high impact factor publications. What factors are relevant to consider when analysing the contribution, importance and potential credibility of individual publications and research contributions?

Dr Tait: As you are alluding to, the committee needs to be looking at the journals that the evidence is published in—clearly, acoustic specialist journals would be better than non-acoustic journals. They then need to look at the background of the authors of those papers and what their experience and qualifications are. They also need to be cautious of studies which have either small numbers or are self-published, as these are less likely to be robust in terms of the evidence they provide. I would draw the inquiry's attention to a recent paper by Simon Chapman where he has analysed some of the studies that have looked at wind turbines in some detail. I cannot remember the reference to that off the top of my head.

Ms Walker: We can certainly provide that to the committee, but we have already provided as an attachment to our submission the Public Health Association of Australia's policy on the health effects of wind turbines that does have extensive references. We lean very heavily on reviews of the evidence from the documentation for that policy paper. Obviously, numerous studies have been done in this space, but it is the comprehensive reviews of the evidence that we find most persuasive. One of the comprehensive reviews of 60 scientific review articles on wind turbine noise and health states that, based on the finding and scientific merit of the available studies, the weight of evidence suggests that, when sited properly—and that is a key point—wind turbines are not related to adverse health impacts. I think that is reference No. 5 in our policy document. We are also very cognisant of the work that the NHMRC did in this space in 2014 that looked at the three aspects of wind turbine effects—noise, shadow flicker and electromagnetic radiation. We think it is particularly persuasive that the review of the literature found at the electromagnetic radiation applicable was less than people have in their houses as it is, so that is obviously not a huge concern. Likewise, shadow flicker was found to be not a serious concern, and the issues around noise were particularly well looked at in that study.

I might get Peter to elaborate on the issues around noise, but what we have found overall is that some of the health impacts that were reported in some of the smaller studies are due to stress. That is not to downplay the impact that stress has on people's lives, but certainly things like sleep effects are related to people's stress around the issue of wind turbines. That is why we think it is particularly important for communities that are going to have wind turbines coming into the area to be provided with evidence-based information in relation to the impacts of this new technology. Stress about change is something that can affect people's sleep patterns and can cause stress, and those factors are significant over the longer term and should not be minimised in terms of this discussion.

Dr Tait: My understanding of the literature, mainly based on stuff that Leventhal has written, is that there seems to be a small number of people who are more sensitive to noise for reasons which we do not really understand. In that context, whether it is a wind turbine or a flight path or the next door neighbour's air conditioner or the road outside their bedroom window, they are disturbed by noise. We know that people who are disturbed by noise become annoyed, and we know that if you are annoyed you become more acutely sensitive to the cause of your disturbance. We are also aware that if you are annoyed and disturbed that you are going to have interrupted sleep, and we know that this is not good for people's health in the short term, because they are annoyed. The linkage from the short-term annoyance to longer term health problems is more problematic, because there is a chain of events that takes decades to work through. But we do know from the broader social determinants of health literature that there are some connections between psychological distress and, over a period of years, the emergence of chronic diseases. So we are not saying that this does not happen, but we are saying that it is a long-term, not immediate, effect. We are also aware that people who live near coalmines in the Hunter Valley or people who live in Morwell in Victoria also have sources of stress in their environment which is contributing to their sense of unease as well. That also has to be taken in context.

Ms Walker: From a public health perspective we are not saying that these concerns need to be dismissed but, as I said in my opening statement, they need to be recognised and managed and fair and reasonable solutions do need to be developed to address people's concerns. However, in terms of acute health impacts that are directly attributable to a source of technology, I think the Morwell fire is the case in point but is at the other end of spectrum for very demonstrable and immediate health problems arising from an acute impact. In the context of broader public health measures, we are very keen to continue to explore this technology with a view to moving away from those sources of energy that have been demonstrated to have very serious acute impacts.

Senator BACK: You have itemised in your bibliography at point 4 the NHMRC's rapid review and at point 7 their reference group study in 2014, and you note your confidence in them. What would your response be if you

were assessing such a review and you were to learn that the following search words were absent from the literature review, 'Nausea, headaches, heart disease, cardiac effects, stress, annoyance, dizziness, sleeplessness, sleep deprivation and vertigo; and any documentation not published in the English language including Japanese, Polish and Scandinavian.' If there was an absence of search words of that type in relation to the issues that we are discussing, and in fact you have mentioned them yourself, what confidence would you have in a literature review?

Ms Walker: I think we have a great deal of confidence in the methodology employed by the NHMRC.

Senator BACK: No, I ask you to answer my question. If those reference words were absent in a widespread literature review, what confidence would you have in the outcome of the review?

Ms Walker: In order to answer that question, we would really need to know whether those search terms were used exclusively as a mechanism for identifying studies or whether a variety of methodologies used. Our understanding—

Senator BACK: But you would expect them to be included.

Ms Walker: Please let me finish the answer to the question for you. Our understanding is that the literature review undertaken by the NHMRC employed a range of methodologies. We would be confident that in employing a range of different methodologies in order to identify the literature, that they would be able to uncover indeed the vast majority of literature that was relevant. Obviously, if those search terms were excluded and that was their only methodology, that would be problematic. But we believe that there were a variety of methodologies used in order to decide what literature needed to be included in the study. Therefore, we would have confidence in the methodology employed.

Senator BACK: If I was to ask you or Dr Tait to undertake a literature review into the apparent health effects on people in this particular context, and you have mentioned sleep disturbance, would you exclude those words from your search?

Ms Walker: Again, I think we would have to say that there is a range of methodologies that you would use—

Senator BACK: I heard you, Ms Walker. I am asking whether you would exclude them from your search. I know there is a range of methodologies. I also have a scientific background.

Ms Walker: That would not be only mechanism that we would employ.

Senator BACK: I understand it would not be.

Ms Walker: I believe I am answering the question. If that was our only methodology then that would be problematic. But if we were using a range of different methodologies to identify the relevant literature then that might not be so meaningful. I think that does actually answer the question.

Senator BACK: Dr Tait, would you be happy to exclude those words from any literature review you were undertaking?

Dr Tait: When you are trying to look at a particular issue, you want to look for search terms that are likely to give you information you need about that condition. So very general search terms such as 'nausea' and 'headache' may not be helpful when you are trying to look for health effects of a specific issue because you will find a vast amount of literature, which will take a lot more time to assess. So you have to make some practical decisions around where you draw the boundaries around what you search on in order to have enough information to make a robust opinion, but you can also do it within the resource constraints that you have.

Senator BACK: Would you exclude any papers not in English—Japanese, Polish, Scandinavian?

Dr Tait: Again, that comes down to the question of what resources you have open to you to be able to assess the literature. So if you do not necessarily have the resources or the time to get those, you may have to exclude those sources.

Senator BACK: Would it then be an incomplete study?

Ms Walker: I think the issue is also: how much information is there in English language? Do you need to go to translations to find all the answers you need to have?

Senator BACK: Very often the bibliography and the summary are actually there in English. Present at our inquiry in Portland were the officials of Pacific Hydro, the operator of the wind turbine at Cape Bridgewater and Mr Steven Cooper and some of the six people who participated in a very preliminary study, in which Pacific Hydro, to their immense credit, participated—as did Mr Cooper, a highly-regarded acoustician, and six people who would report that they are suffering ill effects.

I want to emphasise that it was on the directive of Pacific Hydro that three dwellings, with two people in each, were the subject of the study. I am going to ask you for what guidance you think the committee should

recommend, based on information provided by Pacific Hydro that, when turbines started up or closed down and fluctuations were greater than 20 per cent, Cooper placed his very sensitive equipment into each of the houses successively over a period of time and the people within them were asked to record when they could hear turbines, when there were physical vibrations in the dwellings and when they experienced sensations. That preliminary study indicated that it was in the non-human audible infrasound range—not the human audible range, the infrasound range. Cooper reported on this and, amazingly, he has been the subject of ridicule even by some of those associated with it—and you mentioned people who have ridiculed the work—but at no time was it suggested to be statistically significant. Would your advice to the committee be that we should then urge other operators of wind farms to participate with credible acousticians, Cooper and others, either to validate Cooper's preliminary findings or to dismiss them. Would you think that would be a wise move for the committee to recommend?

Dr Tait: I would think that some of the problems with that study were that it was a very small number.

Senator BACK: Yes, there were, and directed by Pacific Hydro.

Dr Tait: Regardless of the reasons and that if you wanted to get useful information from a study, then it would probably be better to restart it. So you would need to have a proper study protocol worked out, assessed within a peer review situation so that all the bugs in the protocol could be finalised, and then run the protocol. I cannot comment specifically on this study but—

Senator BACK: No, I am not asking you to.

Dr Tait: if I was advising the committee, then I would suggest that that would be the approach they should take.

Senator BACK: In other words, I think we are in loud agreement with each other, and that is that such a study should be expanded to get to a level where in fact we may be able to find statistical significance. If, as you suggest, there may be weaknesses or failings or insufficiencies in that study, they can be addressed by expanding that study. Obviously, the study would be at that same location, but would you support such a contention more broadly?

Dr Tait: I would not support the words 'expand that study', but I would support the contention that you need to have a properly designed robust study, if you want to have another look at what was going on.

Senator BACK: Exactly, I think that is correct. The interesting outcome of all of that is that using Australian, New Zealand or South Australian standards or whatever for approval of wind farm—and it now is critically important, as we possibly move towards a rapid expansion of industrial wind turbines—that the approvals given at state level relate to the audible sound range. If Cooper has demonstrated anything, and we would be very foolish to ignore from a precautionary point of view, it is the fact that these recorded annoyances or sensations were not in the audible sound range; they were in the sub-audible infrasound range.

Ms Walker: If I could just add to that, I think such a study would need to consider other factors that we pointed to in our research in terms of people's genuine concerns and those other factors, other than physical, that can actually generate harm over a period of time as well.

Senator BACK: Absolutely, I agree 100 per cent with you, Ms Walker, except to say that the breakthrough here was an operating wind turbine company which cooperated, worked with and presented its data. I think those are the critically important points. In fairness, whether there are issues that you believe that may or may not affect it, I think it is incumbent on the parliament and on this committee to recommend that we look at it in a serious way.

Ms Walker: Certainly, I would never suggest that the time for research has passed. It is very important that we continue to look into these matters over time.

Senator LEYONHJELM: Do you have any formal health qualifications, Ms Walker?

Ms Walker: My formal health qualifications: what do you mean—in terms of being an audiologist? No, I am not an audiologist. I am not a doctor and so that is why I have my colleague, Dr Tait, with me today.

Senator LEYONHJELM: Dr Tait, are you an audiologist or do you have qualifications in acoustics ?

Dr Tait: No.

Senator LEYONHJELM: You state in you submission you have confidence in the role and the function in NHMRC. You have reiterated that here. Can we assume you support the NHMRC's recent decision to call for expressions of interest in conducting research into the effects of wind turbine operations on human health.

Dr Tait: Yes

Senator LEYONHJELM: You state also that some people record adverse health effects despite a paucity of peer reviewed evidence. You would presumably support investigations of claims of people of adverse health effects, if there were peer reviewed studies supporting adverse health effects?

Dr Tait: I am not sure that I understand your question.

Senator LEYONHJELM: You say that there is a paucity of peer reviewed evidence to support adverse health effects?

Dr Tait: Yes

Senator LEYONHJELM: You would presumably change your view on the adverse health effects, which you are inclined not to regard as serious, if there were peer reviewed studies supporting those health effects.

Dr Tait: If there were peer reviewed studies based on good solid, robust research protocols that were demonstrating there is a problem, then I would have to change my mind and accept what the evidence was showing us, yes.

Senator LEYONHJELM: I see. So, are you aware of the theme of the recent work of hearing specialist Professor Alec Salt, sleep disorder specialist Dr Christopher Hanning or psychoacoustician Dr Daniel Shepherd and others who detailed the links between wind turbine noise and adverse health impacts?

Dr Tait: I shall have to admit that I am not across that literature.

Senator LEYONHJELM: Are you aware of the 2014 Inagaki paper detailing links between infrasound and adverse brain activity of wind turbine workers?

Dr Tait: I have heard of that paper but I cannot recall any details about it at the moment.

Senator LEYONHJELM: Ms Walker, I think I understand your suggestion to the committee was that people who are living in proximity to new wind turbines should be advised that, if they do feel adverse health effects as a consequence of new turbines being erected, they do not.

Ms Walker: No, I do not believe that is what I said, Senator.

Senator LEYONHJELM: Perhaps you could assist—

Ms Walker: I think what I said was a quote that said that the complaints of people affected by the noise of wind turbines need to be recognised and managed, and fair and reasonable solutions for them developed. I am in no way minimising the concerns that people have. I am simply stating that people's concerns can be exacerbated by stress and the health impacts of people can be exacerbated by stress. Not being provided with enough information about what is going on in their communities, be that about wind turbines or any other factor, can cause people stress. It is important that people are provided with adequate information in that context.

Senator LEYONHJELM: We have heard from people who have been in favour of having wind turbines erected on their properties. Prior to the turbine going in, they are very supportive of renewable energy, and then after the turbines are erected they say they suffer adverse health effects. What would you do differently in those cases?

Ms Walker: Obviously I cannot comment on the specific cases that you have heard about without reading back the transcript from those individuals. We would have to look at what those concerns were. It is very difficult for me to comment without knowing what their specific concerns were, around noise or—

Senator LEYONHJELM: Chronic sleep disturbance is the most common complaint.

Ms Walker: As we have said, there are a variety of factors, including noise, that can cause sleep disturbance, but it is very difficult for me to comment on those specific cases without reading the transcript, I am sorry.

Senator LEYONHJELM: How many affected residents have you personally engaged with?

Ms Walker: At the Public Health Association we have heard, via email and telephone, from many concerned residents in relation to wind farms. That is why we felt it was so important that we developed a Public Health Association policy on the issue. Indeed, we heard from a lot of people who were going to have wind turbines put into their communities and they were concerned to hear what the evidence was. So we have played a role in providing them with the evidence as it now stands in relation to that, because people do need information about what is going on in their communities and they need to be informed in thinking about whether they are pro or against those sorts of things.

Senator LEYONHJELM: Absolutely, but, based on your introductory statements and so forth, the chances are you would say to them, 'A wind turbine is going in in your area. You won't feel anything and, if you do, it's not the wind turbine.' Is that right?

Dr Tait: Incorrect, I am sorry. We would not—

Senator LEYONHJELM: What would you say to them?

Dr Tait: We would point out to them that there are some issues around wind turbines and that they need to get together with their neighbours and the proponent of the wind farm, have a conversation around what is going on and become involved in making the decision about whether to have the wind farm or not. We would also be advising the proponents of wind farms that it is important that they have meaningful participatory consultations with communities where they want to site wind farms and that the package that they come up with for the community has benefits both for the people who host the wind farms and for the general community. We would be advising residents not necessarily on what was going to happen but rather about a process to make sure that they had some control over what was going to happen.

Ms Walker: Certainly what we have done is provide our policy so that people can have a look at that and consider what some of the issues might be, based on the evidence.

Senator LEYONHJELM: The essence of the advice you are giving, based on your statements here, is either (a) 'Whatever adverse effects you have are not attributable to the wind turbine'—

Dr Tait: No, I am sorry, we are not saying that.

Senator LEYONHJELM: or (b) 'If you do suffer adverse effects, it's all in the good cause of renewable energy anyway, so it's a price worth paying.' Those are the two options you seem to be advocating.

Ms Walker: I think you are putting words in our mouths. If I can reiterate what I said initially and what I have repeated a couple of times, complaints of people affected by the noise of wind turbines need to be recognised and managed and fair and reasonable solutions for them developed. We are not saying that people do not have legitimate concerns; what we are saying is that these can be managed and the kinds of consultation and participation mechanisms that Dr Tait has talked about help to manage those issues.

Senator LEYONHJELM: I am yet to find anybody who gets better from a physical disease through consultation.

Ms Walker: I think what we are saying is that the best available evidence shows that the acute impacts of wind turbines do not cause physical disease. However, noise related issues such as sleep deprivation and those sorts of things can cause ill health over the longer term, but these things can be managed if the initial concerns are recognised and managed and fair and reasonable solutions are developed for them to ensure that those impacts are mitigated for people who are having wind turbines coming into their communities. It is about being fair and having a fair and balanced approach. Of course people should be consulted and involved in discussions around the siting of these things if they are going to be in their communities and in proximity to their homes. That is just fair and reasonable, and I guess that is what we are saying: a fair and reasonable approach is the way to address the concerns here.

Senator LEYONHJELM: I just wonder if you know what fair and reasonable actually means if you have a turbine next door to you.

CHAIR: Has the wind industry or any organisation or individual connected with the wind industry or renewables ever given any funding or benefits to anybody in the Public Health Association of Australia—office bearers et cetera?

Ms Walker: In terms of the organisation itself—the Public Health Association of Australia—I can say no; that is not the case. However, we do have some 2,000 members or so. I could not speak to whether any of them had received funding from the wind farm industry for their personal projects. But, in terms of the actual organisation itself and the national office, no.

CHAIR: You could take that question on notice. Did the Public Health Association of Australia or its members contribute to the AMA's position statement on wind turbines?

Dr Tait: Not that I am aware of. They may well have consulted our policy, but I am not aware that we contributed to their wind farm statement.

CHAIR: Dr Tait, what area of medicine are you qualified in?

Dr Tait: I am a general practitioner.

Ms Walker: Senator, can I just clarify. You said to take on notice one of those questions. What was it specifically you were wanting me to take on notice?

CHAIR: To confirm that, as you have said, the PHAA has not received any financial assistance from the wind industry or the renewable sector and whether any of the members of your board, staff et cetera have.

Ms Walker: The first part I can confirm now: the organisation has not. I can go back and get on notice whether any of the board have ever received any money for any projects.

CHAIR: In light of the time and the fact that we have the CSIRO waiting via teleconference for us, are you happy for members of the committee who have questions they would like to put on notice to you—there are some—to table those? They will be forwarded to you by the secretariat.

Ms Walker: Absolutely. That is fine. We are very happy to. Thank you to the committee for allowing us to shorten our time frame a little so that Dr Tait can get back to his practice. We really do appreciate that.

HALL, Dr Nina, Senior Social Scientist, Land and Water, Commonwealth Scientific and Industrial Research Organisation

SMITHAM, Dr Jim, Deputy Director, Energy, Commonwealth Scientific and Industrial Research Organisation

[13:52]

Evidence was taken via teleconference—

CHAIR: I welcome the representatives of CSIRO. Could you please confirm that the information on parliamentary privilege and the protection of witnesses and evidence has been provided to you.

Dr Smitham: I can confirm that.

Dr Hall: I can confirm that.

CHAIR: Thank you. I remind witnesses that the Senate has resolved that an officer of a department of the Commonwealth or of a state shall not be asked to give opinions on matters of policy and shall be given reasonable opportunity to refer questions asked of the officer to superior officers or to a minister. This resolution prohibits only questions asking for opinions on matters of policy and does not preclude questions asking for explanations of policies or factual questions about when and how policies were adopted.

The committee has your submission, and I now invite you to make a brief opening statement. At the conclusion of your remarks, I will invite members of the committee to put questions to you.

Dr Smitham: The CSIRO has conducted energy research in a wide range of technologies. It is our belief that a range of technologies will be needed in order to meet Australia's future energy demands and that every technology has some risk and some uncertainty. The essence of our research is to try to identify those risks and how to reduce those through research. Dr Hall and I would welcome the committee's questions.

CHAIR: Thank you.

Senator URQUHART: I would like to talk to you about the study that you have done on community attitudes to wind turbines. Can you just take the committee through the methodology process and findings of this study, please.

Dr Smitham: I will refer that to you, Nina, please.

Dr Hall: This study was published in early 2012. We believe that is the reason why you have asked us to address the committee today. We called the study a snapshot—that is actually in the title—acceptance of rural wind farms in Australia. We used three short methodologies. One was a content analysis of media articles from newspapers around Australia in the second half of 2010. The second was nine case studies using desktop research to look at the issues that had arisen around these nine wind farm case studies all in different stages of development. Thirdly, we conducted in-depth qualitative interviews with 27 stakeholders who represented different dimensions of stakeholders affected by wind farms across those case studies.

They included representatives from the company, the local government, local opposition—those that identified as publicly in opposition—and, similarly, those that identified as publicly in support, turbine hosts, and a small number of others that either fitted into a couple of those categories or not quite but were considered to have valuable views. The report findings are detailed in that 2012 report.

To provide a very brief summary of the findings, at that time in 2012, it was found that there was stronger community support for the development of wind farms than might be otherwise assumed from media coverage—that was a result from the media study. The actual perceived local costs and benefits of wind farms is strongly influenced by the design implementation and community engagement process. That finding was gleaned mostly from the interviews but also from the desktop analysis.

Thirdly, existing regulatory approaches provide an appropriate framework for negotiating wind farm developments, but there is scope for improving outcomes. I will note that this is a report from early 2012, so it is not a comment on current or updated policies.

Finally, the emerging notion of a social licence to operate provides a useful framework for wind farm developers to engage local communities in ways that could enhance transparency and local support and complement formal regulatory processes.

Senator URQUHART: Thanks for that. One of the things that I picked up out of the finding of the report that you mentioned was that there was strong support and there was also support from rural residents who do not seek media attention or political engagement. Does that mean that there is a small number of people who are getting disproportionate representation?

Dr Hall: I am coming from a social research perspective, and so I will just talk to the method and the research. Firstly, the constraints of it are that 49 articles from 19 newspapers in the second half of 2010 were analysed so that put some boundaries around the data. More reasons for opposing wind farms than for supporting wind farms were identified in that set of data.

Senator URQUHART: I understand that there are a number of countries where the health impacts of wind turbines are rarely brought up as a concern. Are you aware of work on international community attitudes to wind farms?

Dr Hall: The 2012 report did cite a couple of academic journal article publications from other countries. There was a small amount. It depends on the country in terms of looking at the impact. A lot of the publications coming out of the United Kingdom do appear to be very similar to what is found in Australia in terms of community responses that are reported. In other countries such as Scandinavian countries—we did not actually include any there; there were not many that came out of it—in media reports, often that is a reference. Something I would point to is the structure of the wind farm—the number of turbines, the ownership of the turbines and the process by which wind farm developments are presented to community and other affected stakeholders does appear to be different. So that would be the context in which the differences may be based.

Senator URQUHART: I do have some further questions but they are around the health stuff so they may be better directed in questions on notice to the public health association.

Senator BACK: Thank you for your evidence. I wonder whether you were aware that Prime Minister Cameron, the day before the election last week in the UK, made an announcement that there would be no industrial wind turbines or wind farms proceeding in the UK unless there was widespread community—as in local community—support and that financial support would be withdrawn. Are you aware of that? You just mentioned the international context so I was wondering if you were aware of the current feeling in the UK.

Dr Smitham: We have not been following the particular policies that governments may announce from time to time. Our interest of course is around the technology—how it can be improved, what's is its cost competitive position in the whole energy sector. We acknowledge the very difficult position that the policy makers have in integrating technical positions and policy positions rather than exclusively considering technical positions alone.

Senator BACK: Since you mentioned it in context, I thought I would advise you that Prime Minister Cameron did announced the withdrawing of government support for wind turbines on land and in relation to people. If I could take you, Dr Hall, to your table 3 of 27 people. There are two columns, local support and local opposition. Are you able to tell us the distance from the wind turbines that each of the seven people represent in terms of local opposition or local support?

Dr Hall: Again, I note that this is a study from early 2012 with the evidence gathered in 2010 or 2011 so these are rather historical questions to be asking but I did conduct the research. Those two sets of stakeholders were selected based on the distance. It was not in stone but it was within 10 kilometres because that was considered either a distance that could be visually impacted or impacted by sound.

Senator BACK: Did you say 10 kilometres?

Dr Hall: Approximately 10 kilometres.

Senator BACK: So of the 27 who are in this group, I can establish four opposed so that is 20s per cent. It is obviously likely that those from the company, the local government and the turbine hosts would be local supporters—we do not know anything about the others. I ask in the context of evidence given to us yesterday, Dr Hall, in Cairns around the proposed Mount Emerald wind farm, to what extent do you think local communities should in fact have a say in the eventual location? We were told by the proponents that in a survey 70 per cent of people surveyed supported the proposed wind farm. We were told there were 400 in the survey group—you would have thought a very wonderful number. We then asked how many resided within 1.5 kilometres of the proposed wind farm and ironically the answer was 'zero'—there was nobody. We then extended it out from 1.5 kilometres not to 10, but to five kilometres and there were seven who actually work in favour between 1.5 and five—in other words, not impacted to any great extent, perhaps visually. Then there were 393 of the 400 residing outside five kilometres, and, on inquiry, the wider community was of no great benefit to us. A survey was then undertaken of those within the 1.5 kilometre range. I understand the vast majority, if not all, were surveyed, and they came up with a figure of 91.7 per cent opposed. Based on the work you have done, what impact, if any, do you think that result of 91.7 per cent in the affected area, as opposed to 393 not in the affected area, should have, from a social point of view, in terms of the decision to proceed with such a wind farm?

Dr Hall: Because I have not been involved in that survey and I do not have a copy of that survey and I have never seen such a survey, I think the questions that I can respond to are around appropriate survey design and

research questions and then the methods that are used and also the metrics that are used to measure support. There are a lot of dimensions under which you could analyse such a tool for gathering data. There is also the independence of who carried out that survey and who analysed it and who had access to the data. As a social scientist within CSIRO, there are a lot of dimensions that need to be considered when designing a survey that is going to be robust and used for providing data about something that is as delicate as a decision regarding development in a local community.

Senator BACK: Sure. This committee is charged to make recommendations to the Senate. If I could call on your expertise, what recommendations would you make, what sort of structure of a survey, what sorts of questions, what sorts of distances from a proposed wind farm—perhaps you could take on notice for us and maybe even give us a model survey format that we would recommend could be used in advising governments, state planning authorities, local governments and indeed potential operators so that, with the plethora now of new turbines to be installed in Australia, we actually get this right and we do not find ourselves in circumstances where 92 per cent of a population affected are opposed to it but are simply going to have to suck it up. Is that a reasonable request to ask of you?

Dr Hall: I would be very happy to take that on notice. You will notice at the end of the 2012 report it does start to talk about this concept of social licence to operate and the development of metrics which look at what would constitute support and where the power of the decision making lies. CSIRO has done further research into this concept in a range of technologies. I think that would be appropriate to provide to you as a question on notice.

Senator BACK: Thank you. That social licence to operate is something I, for one, will be particularly keen on your advice on.

Dr Smitham: I just wanted to add to Nina's reply that the whole concept of social licence does change over time and with different locations. It is a concept but it is not an absolute measure, so that, in comparing the research of 2012 in conceiving future studies, there will be changes that communities go through, and each community will have its own issues, its own special view, of the people who live there. I would just like the committee not to think that there is a simple expedient of a survey that gives an unequivocal answer. It is one of the tools and it is a framework for understanding the replies that people give to questionnaires when asked, but it will not give 'go or no go' criteria in decision making.

CHAIR: Are you aware that CSIRO own Windlab, a spin-off company?

Dr Smitham: CSIRO created Windlab and spun it off in around 2003. As far as I am aware, we do not retain any shareholding in that company at all.

CHAIR: CSIRO retain no shareholding in Windlab.

Dr Smitham: That is my understanding, yes.

CHAIR: Would you be able to confirm that for the committee, please, Dr Smitham, and take that on notice?

Dr Smitham: I can certainly do that, yes.

CHAIR: Are there any other questions from the committee? No one is responding that they wish to ask another question. There being none, I thank the representatives of CSIRO for their appearance here, today, before the committee. We will now call Australian Wind Alliance.

BRAY, Mr Andrew Phillip, National Coordinator, Australian Wind Alliance

de GROOTE, Mr John, Engineering Manager, Divall's Earthmoving and Bulk Haulage

PRELL, Mr Charlie, New South Wales Regional Coordinator, Australian Wind Alliance

[14:11]

CHAIR: I welcome representatives of the Australian Wind Alliance. Could you please confirm that the information on parliamentary privilege and the protection of witnesses and evidence has been provided to you?

Mr Bray: Yes.

Mr Prell: Yes. I would like to add that I am also a farmer from Crookwell.

Mr de Groote: Yes, it has been. I would like to add that I am also a neighbour to Gullen Range wind farm.

CHAIR: The committee has your submission. I now invite you to make a brief opening statement and at the conclusion of your remarks I will invite members of the committee to put questions to you.

Mr Bray: Thank you very much for the opportunity to come in and address the committee today. The Australian Wind Alliance is a not-for-profit community based advocacy group to promote wind power. We have over 450 individual members and over 10,000 online supporters. Our members are predominantly farmers, wind workers, community members and local businesses. We have covered many of the terms of reference in our submission and raised a number of new issues as well. Today I would like to speak more about this inquiry.

In Australia we have an urgent need to reduce greenhouse gas emissions from power generation. We have to embrace new sources of energy, and the renewable energy target wisely dictates that which is the cheapest one, which—right now—means wind power. It is the elephant in this room that many of the committee members are openly critical and, in some cases, hostile towards wind power. This is a matter of public record. It is clearly reflected in the terms of reference, which dwell on favourite topics of wind-farm opponents, such as power prices, subsidies et cetera.

On the other hand, the terms of reference show no interest in the positive contributions of wind power. What benefits do they deliver for regional employment, for farmers, how will ongoing policy certainty assist manufacturers, and what health and environmental effects from another generation sources, such as coal and gas, are avoided by the use of wind power?

It is a fair assessment to say that the terms of reference focus more on the negative side of the ledger than on the positive. There is a real-world question to be asked here. Whatever the committee's feelings may be about wind power, how is it we can roll out—particularly in light of yesterday's conclusion to the renewable-energy-target negotiations—wind power in regional communities in a way that benefits those communities and helps Australia towards cleaner energy?

Rural Australians could rightly ask why this committee is not concerned about the things that are more central to it—keeping rural centres thriving, keeping farms viable, providing jobs to keep families in town and dealing with climate risk to farms. The Municipal Association of Victoria recently described the $5 billion worth of wind farms waiting to be built in Victoria as the single biggest investment in rural Victoria. Is this the kind of thing that the inquiry is trying to get to the bottom of? Australians concerned about the efficient running of government and about unnecessary red tape—which I know is an issue dear to many of the members' hearts—could also ask why, after 11 governmental or statutory inquiries into aspects of wind energy over the last five years, we need another one right now? Many of the issues that this inquiry is now seeking to re-examine were covered in these studies and inquiries.

I do not want to suggest that winds farms should be beyond scrutiny. Obviously, they do deserve to be thoroughly and properly scrutinised, particularly in light of the future plans for the rolling out of wind power. By the same token, what we would like to see from this inquiry is a constructive approach, and I have witnessed some of that today already. If committee members are concerned about the impacts of wind farms, is there a way to fix those impacts, sort them out and improve the way that wind farms are rolled out, rather than just saying no? From our observations, a lot of opposition to wind farms stems from perceived inequality around the way that wind farm benefits are distributed. We would certainly like to see those kinds of thing investigated. Community engagement by wind farm developers has not always been as good as it should be. Is this inquiry considering ways to improve this?

I will leave my comments there and let Charlie and John take it.

Mr Prell: I will keep my remarks brief so I can answer some questions later. I am a farmer, and I do not need drought support. That is because I have a contract with a Spanish wind farm company, and that contract is more

secure, longer lasting and more sustainable than any taxpayer funded drought payments. The opportunity to receive these payments has turned my farm from a financially broken wreck into a viable business. Virtually every farmer that I have spoken to has been very supportive of this move and would love to host wind turbines themselves. For the last 15 years—and that is how long I have been trying to host turbines on my land—I have been actively involved in the debate over wind farms and the Renewable Energy Target. I recently participated in the GetUp! advertisement targeting the RET debacle, but I am not a political activist; I am a farmer. I am a farmer who has experienced the life-changing event of the prospect of hosting wind turbines, and I want to assist as many farmers as possible down this road to economic, environmental and ecological sustainability.

In relation to the level of information that is available to prospective hosts, such as me, it is becoming more and more comprehensive. I have actually contributed to that process through assisting the NSW Farmers to develop this document, which I suggest that you read if you have not, and I am happy to table that document to the committee. It is called *Wind Farm Guide for Host Landholders*. It addresses issues that you have canvassed widely today and in the past, and it can be used to assist landholders, neighbours and communities to come up with a constructive model for developing wind farms in rural Australia. There are plenty of other documents available; the Clean Energy Council has produced lots of documents.

I want to say that the vast majority of concerns expressed about wind farms are created by the current development and planning models used, not by the wind turbines themselves. You, yourselves, have alluded to that today. That inequity creates the jealousy that triggers most of the anti wind farm sentiments that you hear. As far as the national wind farm guidelines—that is, point (f) in your terms of reference—there are none that I am aware of, but the development of such guidelines would be a very welcome initiative. There are plenty of state and local government guidelines that could be used to draft such a document very quickly.

In finishing, I want to point out that if you do not believe in the science of the threat of climate change then we are all wasting our time. If climate change is not real, then we may as well just continue to burn the coal and the gas, and forget about wind turbines, solar energy and everything else that is renewable. If you do want to address climate change then wind farms work. They produce a heap of electricity, generally at times of peak demand, otherwise they would not qualify for the renewable energy certificates that you heard about this morning. If you care about regional Australia, you should be working on how to encourage wind farms' development, not how to stop them. Thank you.

Mr de Groote: I am the engineering manager for Divall's Earthmoving, a family owned earthmoving and civil contractor business in Goulburn which has been in the family for approximately 30 years. We employ 175 people. In some shape or form we have been involved with the construction of pretty much every wind farm in the Goulburn region. We started off as a quarry supplier, or wet hire of plant. We made a conscious business decision three or four years ago to target contractor status on these projects and we invested millions of dollars in machinery, engineering staff, administration staff, operators, truck drivers, concrete budgers, mechanics and more. That paid off for us. We managed to secure a contract at Taralga wind farm, which we are currently constructing. That is coming to an end and we are seeking new opportunities for our people in the Goulburn region. There are very limited alternatives for such a large workforce. We came with the philosophy that while other people came to the area to do work that we were perfectly capable of—fly-in fly-out and drive-in drive-out—we would target the market, and we saw that opportunity. This was based on a 41,000 gigawatt hour renewable energy target which had bipartisan support. It seemed a safe bet at the time. We are asking the committee today to look into alternatives for regional development, particularly in construction, if this does not proceed, if you are willing to stop this.

But there is another side to the coin. As a neighbour to Gullen Range wind farm, I concur with Charlie Prell and Andrew Bray that the delivery models are not perfect. Things need to change. Vast improvement needs to happen. Community consultation is lacklustre and needs to improve. That does not mean you have to stop these developments altogether; it means changes need to be made. You need to set strict rules for the corporate behaviour of developers—and I am pretty sure you people will be looking into this. However, the future is as bright as we allow it to be. I live in the community. I am a neighbour of a wind farm. I live within 1.7 kilometres of two towers, so I know what it is like. There is a lot of support for renewables in the country. I believe that the power of positive communication and solid commitments will mitigate the anti-wind farm movement, negative media reports and disgruntled communities. This is what we need to address. We need to maximise regional development, economic development for small business, and I believe this government stands for that.

Senator DAY: Thank you, gentlemen. I can tell you that most of the anti-wind farm sentiment is nothing other than the personal testimonies of people who have been made quite ill. We have heard from countless numbers of them, and I can assure you that that is where most of the anti-wind farm sentiment comes from. Most of your

evidence is about the economics of wind farms, that they create jobs and so on. But we have been hearing some very credible evidence from world leading scientists about the low-frequency infra-sound effects, which is the inaudible level of sound, not the audible level. If it transpires that this is the cause of these people having serious health effects, would that change your mind? Asbestos mining and the tobacco industry have also created a lot of jobs, but nobody would suggest that that compensates for the illness and sickness they have produced. So what is your reaction to this latest groundbreaking work showing the adverse health effects caused by sub-audible range sound, infra-sound?

Mr Bray: The claims about infra-sound causing health problems are not new. I am aware of the Cooper report, which you are talking about. Like all the people in this room, I am a layperson when it comes to health issues so I rely on advice from groups such as the NHMRC, who, as we have heard many times now, have found no credible evidence that wind farms cause—

Senator LEYONHJELM: Which they are currently investigating again. You do not think they should?

Mr Bray: I said that is what they have found. I think that is a matter of record.

Senator LEYONHJELM: So you disapprove of them looking over this again and conducting trials?

Mr Bray: I might just finish answering Senator Day's question.

Senator LEYONHJELM: It is a difficult question, I know.

Mr Bray: You have to look at where the doctors are on this. There is not a doctor in Australia who has diagnosed a case of wind turbine syndrome. The AMA is very clear that they do not see a connection. That is the advice that we go on.

Senator LEYONHJELM: That is not true—

Senator DAY: That is not correct.

Senator LEYONHJELM: They relied on the NHMRC.

Mr Bray: The other thing I would point to is evidence from people who live near wind farms with no problems whatsoever. I do not want to be misconstrued here. I have spoken personally to a number of the people you are talking about. I understand what is going on for them. I think they are in great distress and it is a very difficult situation. I certainly do not want to say that they are making stuff up; that is not at all what I mean. But the danger of only looking at these cases when considering whether there are health issues is that you miss the much larger pool of people who live near wind farms who have no health problems whatsoever. One of our members, Hamish Officer, who presented to your committee in Portland, lives 800 metres away from the nearest turbine, which is in the middle of the largest wind farm in the Southern Hemisphere.

Senator BACK: Isn't he about to shift? He told us he was relocating.

Mr Bray: I understand that is due to all sorts of other family issues. The point I am trying to make is that he lives there with his wife and two children and they have no health problems to speak of. They signed a letter with the operator to acknowledge the fact that, because they are closer, they are actually getting a higher dose of noise and infra-sound than—

Senator LEYONHJELM: Not everybody who smoked cigarettes got lung cancer. Not everybody who was exposed to asbestos got mesothelioma. Are you saying that, because somebody can live next to a wind turbine and not suffer adverse effects, nobody does?

Mr Bray: That is not what I am saying. I am saying that, if you were to take a study of people all around a wind turbine, you would find that the incidence of health problems is not high. I think you need to take that into account.

Senator LEYONHJELM: With cigarettes, the incidence of lung cancer was not high either.

Mr Prell: I am facing the prospect—and some would dread it—of living within 500 metres of three turbines, both up wind and downwind. I have been facing that prospect for 15 years. I have investigated this and spoken to people who live within that proximity of turbines—they do not come and go; they live there—in Europe, Australia and America. All of the people I have spoken to have said they do not suffer ill effects from the turbines. I would also point out to you that during the first 10 years of this century we had the millennium drought. We had a drought in Crookwell. Crookwell does not get droughts, but we had a bad drought. I suffered through that period—and still suffer now—from depression, anxiety, panic attacks, stress and nearly a marriage breakdown. That was because of the drought, not the turbines. I believe the turbines will alleviate this stress on me and my neighbours because my neighbours have the prospect of being part of the project that I am involved in. I think that is a critical component of this debate. The health effects that people blame on turbines are tragic. I

can empathise with that because I have experienced them myself, even though I do not have turbines. We need to address that issue, not turbines. The turbines are not the issue; the health effects are the issue. We need to sit down with those people and talk to them about what other issues there may or may not be in their lives that are making them ill either physically or mentally.

Senator LEYONHJELM: Talking to them will help them get better?

Mr Prell: Psychiatrists tend to talk to people. Counsellors talk to people.

Senator LEYONHJELM: When they move away from the turbines, when they are out of the range of the turbines, they feel better, they are not sick anymore. When they go back home again, they are sick again. So talking to them will get them out of that, will it?

Mr Prell: I am saying you cannot address the problems without talking to them.

Senator DAY: So it is psychosomatic?

Mr Prell: No, I did not say that. I said you cannot address the problems they are experiencing without talking to them. When we were in the middle of that raging drought, if we went to the beach for a week, the stress disappeared. But then we had to go back to the farm.

Senator DAY: The financial pressures, not the drought, were causing the stress.

Mr Prell: Which is caused by the drought, totally. I accessed interest payment relief from the federal government and the state government under the exceptional circumstances provisions that used to exist. That was a great lifeline but, without the prospect of changing my business due to hosting wind turbines, it was a poisoned chalice.

Senator BACK: Dr David Iser, in 2004, did diagnose that syndrome in both Toora and Waubra—just to correct that. Mr Bray, with respect, I would like to correct your comments with regard to industrial wind turbines. There are four major ones in Western Australia: Albany, about 10 miles out of town; Esperance, between nine and 10 miles out of town; Greenough wind farm, which is about 40 kilometres from Geraldton; and Meridian, which is about 25 kilometres from Geraldton. I have never spoken adversely about those four. I also am from the bush. The concerns I have are about the effects on health, including that of a host who appeared at Portland who has heavily relied on wind turbines in their retirement but has had to move away as a result.

The other point I want to make, which I think you would also relate to—is the deep concern in my home state about community cohesion. You and I both know that the two big pillars of a rural community are the Bushfires Board—the volunteer brigade—and the CWA. We have at least two communities in WA that are looking like they are being torn apart. Those are real concerns of mine. With those four examples in WA, there is not one recorded or even suspected ill-health effect. Why? Because they are donkeys' distances away from communities of people. So I am not opposed to them—I want you to understand that clearly—but I am opposed to these possible adverse health effects, and if planning can remove it, you will not get any complaint.

Senator URQUHART: I have a number of questions but I will put some of them to notice if you would not mind responding in that way. First of all, I want to talk about the RET. Mr Bray, I think you talked about that. It seems that we have now got an agreement on the RET, even though it is different to what was said prior to the election. There have been claims that the RET is a cost impost on consumers, but the RET review found that the RET will actually lead to lower electricity prices from 2020. What is your position on that?

Mr Bray: I would go to the bubbling that was done by ACIL Allen, the Warburton review, which found that the best outcome for power prices for consumers would have actually been to have increased the RET to 30 per cent by 2020. So the cut but we have seen, down to 33,000, will actually lead to higher consumer bills from 2020. I think that is what they have found.

Senator URQUHART: Professor Simon Chapman—I am not sure whether the you are aware of his work—did an exhaustive study of wind farm complaints in Australia and found that more than 64 per cent of wind farms generated no complaints and only 131 individuals across the country made a complaint about the other wind farms. Does this fit with your understanding of Australia's community acceptance of wind farms?

Mr Bray: Professor Chapman's study was a good deal more extensive than my knowledge. I have spent a lot of time around wind farms and wind farm communities, and it does sound similar to the impression that I get. Short of going out and doing exhaustive door-to-door surveys, that is my knowledge.

Senator URQUHART: He also found that the majority of complaints came after 2009, when the anti-wind farm groups added health complaints to their wider opposition to wind farms. Almost three-quarters of those complaints came from people living near six wind farms that have been targeted by those groups. Do you have any comments to make on the impact of these groups to the wind energy landscape in Australia?

Mr Bray: We cannot overlook the importance of expectation; that is, if a wind farm is going to be built near a community, what is their expectation of what will happen? Have they been led to believe that there will be health problems? Have they been led to believe that their property prices will drop? And there are a number of other things like that. I certainly know of some in Victoria—there are a number of permits that have been pending for some time, so projects have been in the offing for some years. With the communities in those areas, in some cases I know there are particular people who expect that they will suffer adverse health effects if a wind farm is built. I would have thought that is going to increase the likelihood of that being the outcome of that wind farm being built.

Senator URQUHART: The previous witnesses talked about making sure that communities were aware of a whole range of issues and of having proper credentialed information. Is that something that, from your point of view, should be put out there as well?

Mr Bray: Absolutely. And it is incumbent on developers to make sure that, when they go into communities, people are aware of what will happen. Groups like the Public Health Association can assist in that kind of thing. The wind farm guide from the NSW Farmers that Charlie mentioned before is important as well, but I also know that communities with new wind farms coming to them will often have opponents coming in from quite some distance away, giving them what they see is their version of it. In the end, people will weigh it up—who are they going to accept on this stuff? Hopefully there is good, solid and grounded information available.

Senator URQUHART: There has been a number of issues throughout this inquiry and also in submissions about the impact of wind turbines not only on wildlife but also on farm animals. Are you aware of how mortality rates from wind turbines compare to mortality rates from other sources such as, say, powerlines, roads or land clearing? Mr Pell, you might like to comment, as I am sure you are aware of some of the comments about farm animals and the causation of problems from wind farms.

Mr Prell: As a farmer I am very aware of that. I am very in touch with my animals. Every experience that I have had with my animals and with animals underneath turbines has been totally neutral, if not beneficial. There are colloquial stories of all sorts of negative impacts on animals, none of which has been proved. There is so much colloquial evidence in favour of no impact on animals, on bird life and on domestic animals and kangaroos—you name it.

Senator BACK: On bird life as well, Mr Pell?

Mr Prell: The number of birds that are killed by cars, in collisions with buildings and from cats totally outweighs the impact of wind turbines. The threat to animals of all types from climate change is way, way more than the threat of wind turbines. I went to Challicum Hills just near Ararat about 12 or 13 years ago and watched wedge-tailed eagles using the thermals from the wind turbines and dancing between the turbines, which I think were the first modern turbines constructed in Australia. I videoed it. If you want that video I will find it and send it to you. The impact of turbines on birds particularly but on wildlife generally is so negligible that it is not worth talking about. I strongly endorse Senator Back's comments that virtually all of these problems can be solved by decent planning processes, and there are no decent planning processes either at a national or state level in Australia at the moment. That should be a priority.

Senator URQUHART: What do you call 'decent planning levels'? What would your position be?

Mr Prell: Cognisant planning guidelines or legislation that commits wind farm developers and multinational companies to positive and constructive engagement with local communities, including giving equity in a project, whether it is solar or a wind farm, to that local community. And it is up to that local community then to sort out how that benefit is distributed.

Senator URQUHART: Mr de Groote, you made some comments about your business, which employs 175 employees, and you talked about regional development. I know that we have had lots of comments from regional areas—that is where wind farms are placed—about what that means to the community. I live in a regional area myself and I know how hard it is to find jobs in those areas. What would happen to your 175 employees if you had not picked up or taken the opportunity to work towards building some of these structures?

Mr de Groote: Initially we grew to that size to accommodate a market that was coming to the region. So we started off with about 120 people before all this renewable energy came to the area. We saw great opportunity to provide more employment to locals. Where it will head if that does not proceed or continue is we will have to find work further afield and take workers away from their families or we will have to reduce numbers, which obviously is not in the interest of our company. We have always been an organically grown company that does not employ people for a short term. We make commitments to families to employ them for a long period of time. They are locals. They live and spend money in the community.

If I may make comment on what needs to happen, and I can see the different points of view around this table, is we need to get rid of hyperbolic statements either way. I am sick and tired of it.

Senator LEYONHJELM: You want to 'get rid' of them?

Mr de Groote: I want to get rid of all the hyperbolic statements in the negative.

Senator LEYONHJELM: You want to control what people say, do you?

Mr de Groote: No, I do not want to control what people say.

Senator LEYONHJELM: The same as 'get rid' of them?

Mr de Groote: That is fair enough. What I would like to see—is that a better rephrase of words? I am not a politician; I am a civil engineer by trade so I normally do not mince my words—is the truth being out there. The developers are not completely telling the truth but the anti-wind farm lobbyists are not telling the truth either. I would like to see information go to the public that actually is the reality, is the truth. If you have a task to do, that is it.

Senator URQUHART: Thank you very much. I have been cut off so I will put some further questions on notice.

Senator XENOPHON: You raised the issue of life cycle figures for wind turbines. Does that take into account what appears to be thermal generators being on standby because if wind drops off they need to pick that up? Could you take that on notice?

Do you have any issue with there being adequate monitoring of noise levels from wind turbines so that if there is an allegation of disruption to sleep or health effects, there can be some objective basis for that to be measured? Whether it was db or infra sound at least there would be some adequate level of measuring so that it does not become 'he said' or 'the company said'. Surely that would be preferable and defuse a lot of this issue if there were an objective measurement. Do you have an issue with respect to that?

Mr Bray: In principle, no. Obviously it is a useful thing to have. However, we are not acousticians and they are quite complicated given you have got to—

Senator XENOPHON: I was saying rescue the measurements first.

Mr Prell: As a prospective host, I have no issue at all except that the current guidelines say that I am prohibited as a host from having the noise measured on my property because I am compromised.

Senator XENOPHON: To have it measured objectively—that is what I am talking about.

Mr Prell: Absolutely.

Mr de Groote: As a neighbour, I would encourage it.

CHAIR: I thank representatives of Australian Wind Alliance for their submission today and appearance here before the committee.

Mr Prell: Senator Madigan, would you like me to table this document?

CHAIR: That would be good. Thanks.

LANG, Mr Peter, Private capacity

[14:45]

CHAIR: Welcome. Thank you. Could you please confirm that the information on parliamentary privilege and the protection of witnesses and evidence has been provided to you.

Mr Lang: Yes, it has.

CHAIR: The committee has your submission. I now invite you to make a brief opening statement. At the conclusion of your remarks, I will invite members of the committee to put questions to you.

Mr Lang: Thank you for the opportunity to testify. I am a retired chartered professional engineer and a member of the Institution of Engineers Australia. My career spanned 40 years, mostly on large civil engineering projects but also managing energy research and development demonstration programs and providing policy advice. For the last 10 years before retirement, I ran my own project management consulting company.

I would like to highlight the three most important recommendations I made in my submission and the addendum that I sent in for the submission. First I need to state a few key figures from Dr Wheatley's analysis and explain the implications of them. Wind turbines supplied 4.5 per cent of the NEM's electricity in 2014 and avoided 3.5 per cent of the emissions. Therefore wind was 78 per cent effective at avoiding emissions in the NEM. Wheatley estimated that, if wind's share doubles while all else remains unchanged, wind will be about 70 per cent effective in the NEM—so down from 78 per cent to 70 per cent. Under the current RET legislation, wind's share of electricity would need to reach about 15 per cent by 2020. At 15 per cent share, wind may be about 60 per cent effective, assuming all else equal and a linear trend. The significance of this is, if effectiveness was not taken into account in the RET estimates of abatement costs, which I understand is the case, the abatement cost for 60 per cent effectiveness would be about 67 per cent higher than the RET review estimates. So, if this is correct, the RET review estimates are way underestimates. Therefore my first and most important recommendation is that the CO_2 abatement cost estimates in the RET review should be re-estimated, taking CO_2 abatement effectiveness into account.

Moving onto my second most important recommendation, Australia does not collect the data needed to estimate CO_2 emissions accurately at the frequency needed to estimate the emissions avoided by wind energy. Therefore my second most important recommendation is that the phase 2 study proposed by Wheatley and me be conducted. I propose the scope of work includes four stages. The first is: collect the required extra data from the generators—not all of them, probably about 20—redo the analyses of the emissions avoided and the CO_2 abatement effectiveness using the more complete data set and quantify the uncertainties. Re-estimate the CO_2 abatement cost stated in the RET review, after we have got these better data, and then publish the analysis method, the model and the data. That is my second recommendation.

Regarding my third and most important recommendation, I have written emails to CER and other agencies requesting guidance on how wind farm proponents, economists and others should estimate the amount of CO_2 avoided by wind energy. The replies reveal that there appears to be little or no understanding in these agencies about CO_2 abatement effectiveness. Consequently, they do not recognise (1) the relevance of it in estimating CO_2 abatement cost; (2) that the effectiveness is likely to decline further as wind's share of electricity increases; and (3) the implications for what the CO_2 abatement cost is likely to be by 2020 under the existing RET. Therefore, my third recommendation is that the CER and other agencies should provide guidelines on how to estimate emissions avoided by wind energy; require that economic analyses of abatement cost take the CO_2 abatement effectiveness into account; and enforce penalties for misinformation about the amount of emissions avoided by wind energy. Thank you for this opportunity to present.

Senator LEYONHJELM: Just to prove that politicians do not know all that much, I do not understand your paper. I am sorry. I do not understand it. There are a couple of points in it where I just want to know whether you have got them right or whether I have got them wrong, so I just want to check that, and then I want you to dumb it down so that even a senator can understand it.

Mr Lang: I will try.

Senator LEYONHJELM: On page 2 of 36—you have several submissions here—you have said:

… wind generation … is projected to supply about 15% of electricity by 2020 …

So the target is 20—

Mr Lang: No, wind.

Senator LEYONHJELM: Yes, I know. You are saying that by 2020, with the new RET, it will be 23½ per cent or something like that.

Mr Lang: Not the new RET, because this was written before the new RET was agreed. The RET as it was was projecting that about 26 per cent of electricity would be provided by wind and solar, basically, and some bio—so about 27 per cent. Some of that is in the small RET. Some is in the large RET. So wind, according to the RET review and my reading of those charts—

Senator LEYONHJELM: That is the Warburton one.

Mr Lang: The Warburton report—that is right. My reading of the charts there was that that implied about 15 per cent of electricity would have to be provided by wind throughout Australia. I should also say that my figures and my report are about all of Australia, whereas Wheatley's is just about the NEM. That is an important point to make.

Senator LEYONHJELM: We have done some back-of-the-envelope calculations here. Based on 17,000 gigawatt hours of additional renewable capacity that is to be established by 2020 under the new 33,000 target, if that were all wind—it obviously will not be, but the vast majority of it will be, it looks like—that could add up to between 3,000 and 4,000 new wind turbines. I think I understand your conclusions—that the abatement cost goes up the more we rely on wind—but I really do not know how you get from today to that, so take me through it.

Mr Lang: Okay. With the NEM now, about 4.5 per cent of its electricity is generated by wind. If the RET were not changed, that has to go from 4.5 per cent to 15 per cent. As you increase the amount of wind, the amount of emissions saved per megawatt hour of wind decreases. Now the wind is saving about 78 per cent of the emissions from the electricity displaced. A megawatt hour of wind displaces a megawatt hour of generation from other sources, but it does not displace all the emissions from the other sources. At the moment, according to Wheatley's study, it is displacing about 78 per cent of them. He estimates that, if we double the 4.5 per cent to 9 per cent, with everything else left the same—so we could just double it now overnight—then the effectiveness would drop from 78 per cent to 70 per cent. I have projected that linearly down to 15 per cent, and that would mean that we would only be about 60 per cent effective. My figures in my submission are all based on other international studies before Wheatley's report, but they show the same sort of thing. In ERCOT in Texas, they were about—

Senator LEYONHJELM: I am still being dumb here. If you have a megawatt hour of electricity generated from a wind tower and a megawatt hour of electricity generated from coal or gas or something like that—a straight substitution—and the megawatt hour generated by coal or gas produces a certain amount of CO_2 emissions, for a wind turbine there is none in generation but there is some in construction?

Mr Lang: No, that is not important. That is tiny.

Senator LEYONHJELM: Why is it only 78 per cent, and why is it going down?

Mr Lang: First of all, why is it only 78 per cent? There are a number of reasons. I was expecting this, so I will try and read them out to you. Actually, it would be better to ask Wheatley all this, because he has done the job of defining these numbers. There are four major biases. One is ramping. That is like when a taxi is going through the town changing its throttle. You use more fuel for the same distance than if you are just running steadily. When the wind is coming on like this, the thermal power stations, coal and gas, have to throttle down, throttle up and throttle down. The second one is that, with wind coming on and off, some generators shut down for a while and then start up. That is enormously expensive. It costs about $100,000 every time you shut down a coal-fired power station and restart it. They are also kept on spinning reserve. They are just sitting there waiting to have to take load if the wind comes on. I think Hamish Cumming explained this in a previous hearing. The next one is the auxiliaries. The auxiliaries is the power used in the power plant. Some of that is being used for lights and all sorts of things whether the power plant is supplying electricity or not. Others are proportional to the amount of electricity supplied. But all the analyses are done based on it just being linear. As the wind power goes up, the thermal power stations generate less, but the amount of auxiliary power is not reduced. The last one is transmission—the transmission powerlines for the thermal power stations. The thermal power stations tend to run at much more capacity all the time. The powerlines are of a size that they are mostly occupied, whereas the wind still has to be able to take the peak power. A lot of the time it is generating much less. Most of the time it is generating a hell of a lot less. The powerlines, when the wind is blowing a lot, are not displacing as much.

Senator LEYONHJELM: I think I get it now. Thank you very much.

Senator URQUHART: When you were going through your recommendations, were they the ones that are contained in your submission?

Mr Lang: They are a rewrite. They are not all of them.

Senator URQUHART: They read quite differently. I was just wondering whether they were additional.

Mr Lang: I did not read them from there. I thought it was no good saying: 'Remove the RET.' Here are the most important ones that I think could have the biggest effect.

Senator URQUHART: Will you provide that as an extra submission?

Mr Lang: I can provide all that.

Senator URQUHART: In your paper you regularly refer to a carbon emission reduction figure of 53 per cent. What is the source of that figure?

Mr Lang: That is from Wheatley's original analysis in Ireland. That really is, in my opinion, the gold standard. It has been going on for 20 or 30 years, but his is absolutely the best.

Senator URQUHART: Is it taken from an expert analysis of the Australian market?

Mr Lang: No, that one is from Ireland. So this is the first one that has been done like this in Australia—this one that he is going to report on later.

Senator URQUHART: Yes, but this 53 per cent is actually from Ireland.

Mr Lang: From Ireland—and if you read that report you will see that their electricity grid is very different to ours, with much more gas, so we will not get as low. At the same amount of wind proportions, wind share, we will not get as low, because we have much more coal.

Senator URQUHART: But you talk about the 53 per cent in there—

Mr Lang: Yes.

Senator URQUHART: so are you suggesting that there is a deficit within the national electricity grid here?

Mr Lang: A deficit? I do not understand that bit.

Senator URQUHART: You are talking about the 53 per cent. Are you saying that the figures are different to what we understand them to be from the Australian perspective?

Mr Lang: The figures for Australia are different from ERCOT and Ireland and the Netherlands.

Senator URQUHART: Yes. So why is it that you have used that 53 per cent in here, if it is not—

Mr Lang: I did not have Wheatley's report when I submitted this. I think Wheatley's report went in on the last date in May, and mine went in on 23 March. I did not have access to these numbers then.

Senator URQUHART: But you talk about the RET review in your document. One of the sentences is:

If the economic analyses do not take effectiveness into account, and if effectiveness decreases to 53% by 2020, the estimates of abatement cost would nearly double to $60-$136/t CO2 with effectiveness included.

Are you talking about the Australian market there?

Mr Lang: Yes, I am talking about the Australian. What I have done is that I have said: in the absence of any numbers for Australia, the best I can do is to plot a chart from international studies. That chart that comes out first, figure 1, has first of all a study of many, many of these ones, so it is a literature review of many such studies from all over the world, and that is the curve. But critiques of that curve show that it was too low. There were misunderstandings and things like that of all that previous data that he had summarised. So the shape of the curve is right, but the curve is too low. But then there has been ERCOT by Kaffine—

Senator URQUHART: Yes, which you have picked up here as well.

Mr Lang: Yes. There is a very similar proportion of wind in their electricity to what we have got, and it is also rather similar in that they have a lot of coal—not as much as us; they have more gas than we have. So ERCOT are very similar to where we are now, but the Wheatley one of Ireland is similar to where we will be by 2020, and that is my point. But the thing is that the 53 is too low because we have more gas. Now we have the numbers because Wheatley has done them. Now we have them.

Senator URQUHART: But are you suggesting in your report here, if we just stick to the figures that you use, that, with the use of wind, the grid would be deficient in that number?

Mr Lang: I do not know what you mean by 'deficient'.

Senator URQUHART: Well, it would be less. You are saying that it is going down—

Mr Lang: Yes.

Senator URQUHART: and there would be electricity generation, so it is going down. Maybe, like Senator Leyonhjelm, I may not understand what you tried to put across here.

Mr Lang: I think I had better explain figure 1 to you.

Senator URQUHART: Explain to me that graph there.

Mr Lang: Okay, sure. On the left-hand axis, there is the CO_2 abatement effectiveness, and on the bottom is the wind generation's proportion, so it goes from zero to 20 per cent. Before the change in the RET that happened today or whatever, we were projecting that about 15 per cent of Australia's electricity would be generated by wind by 2020.

Senator URQUHART: So this was based on the 41,000 gigawatts, was it?

Mr Lang: Yes, on the 41,000 gigawatts, so about 15 per cent, and that is my interpretation of the Warburton report. I actually asked the department of industry to tell me what the correct number was, and they never got back to me. Forget the blue curve because it is too low, but we have ERCOT there as similar to now—

Senator URQUHART: Which is the little green—

Mr Lang: The little red one is the ERCOT—

Senator URQUHART: Sorry, the red one, yes.

Mr Lang: up there at about 4½ per cent. And we have Wheatley at 17 per cent. It is the green one. So that is for Ireland. Draw a line through those two and look at it at 15 per cent, and that is roughly where we would be, except that Ireland are a bit lower than we will probably be because they have more gas. They have a higher proportion of gas.

Senator URQUHART: Is that it? Time is up. Can I provide you with some questions on notice?

Mr Lang: Absolutely.

CHAIR: Lastly, Senator Day.

Senator DAY: You mentioned that the amount of CO_2 generated in the manufacture, production, installation and maintenance of wind turbines was—

Mr Lang: Very small.

Senator DAY: What about the payback? How much CO_2—we have conflicting evidence. Some say 18 months, some say 18 years.

Mr Lang: For CO_2 or dollars?

Senator DAY: CO_2 abatement—for the payback of CO_2. In other words, with regard to the amount of CO_2 used in the manufacture, installation and so on it takes 18 years for the wind turbine to actually abate the equivalent amount of CO_2 that is required in its own installation.

Mr Lang: I can take it on notice, but it is not the way I would answer it. What I would basically say is that wind energy is not sustainable. It cannot provide enough energy to support modern society and its own regeneration. That is based on a proper German study, well critiqued. What we are saying is that wind and solar cannot produce enough energy through their life to sustain modern society, so they are entirely dependent on fossil fuels or nuclear to keep them going.

Senator DAY: I will put it on notice. My question was actually: does it save or abate enough CO_2 to sustain itself, let alone the rest of the world?

Mr Lang: I will have to take it on notice.

Senator DAY: Thank you.

CHAIR: Thank you, Mr Lang. There being no further questions, we will now suspend to take in camera evidence. This will require us to clear the room. The committee will resume after the afternoon tea break, which we will not be having due to the fact that we are running behind and we have the other teleconference calls later.

Proceedings suspended from 15:06 to 15:32

JACKSON, Mr Doug, Executive General Manager, Group Operations, AGL Energy Ltd

SPREE, Mr David, Manager, Government Affairs, AGL Energy Ltd

TROMPF, Mr Jeff, Head of Renewables, AGL Energy Ltd

CHAIR: Could you please confirm that the information on parliamentary privilege and the protection of witnesses and evidence has been provided to you.

Mr Spree: It has.

CHAIR: Thank you. Please note the committee has your submissions. I now invite you to make a brief opening statement, and at the conclusion of your remarks I will invite members of the committee to put questions to you. We are on a very tight time schedule and we have your submission, so if you could make it very brief the committee would appreciate your assistance so we can go to asking questions.

Mr Jackson: Let me begin by saying AGL Energy Ltd welcomes the opportunity to make a submission to the Senate committee today regarding wind projects in Australia. By way of background, AGL is one of the largest energy retailers in Australia, with nearly 3.8 million customers. We are the nation's largest generator of electricity from a range of source, including coal, natural gas, hydro, wind and solar, to supply both families and customers in businesses across Australia. AGL has invested more than $3 billion in renewable energy generation, making it the largest operator and developer of renewable energy in Australia. AGL has also recently announced its greenhouse gas policy and publicly committed to closing all of its coal assets by 2050.

In relation to wind, AGL has a portfolio of wind farm assets which includes the Hallett and Wattle Point wind farms in South Australia, which comprise five operational wind projects, generating about 500 megawatts of wind power. In Victoria, we operate the 67-megawatt Oaklands Hill wind farm and the wind farm at Macarthur in Victoria's Western District, with another 420-megawatts capacity. Macarthur itself represents a capital investment of almost $1 billion and is the largest wind farm in the Southern Hemisphere.

AGL is also Australia's second-oldest publicly listed company and has been operating in Australian communities for over 177 years. With that experience, we recognise the development of infrastructure in communities is contentious. We acknowledge that some residents in areas where we operate are not supporters of our projects. We are also aware that some people who live close to wind turbines are experiencing a number of health issues. While we understand that the most recent NHMRC study found that there is currently no consistent evidence that wind farms cause adverse health effects in humans, we do feel for these people. We develop our wind farms with the principle of doing the right thing. We also strive to comply with the best-practice regulatory standards which are informed by the best available scientific advice. Our decisions always comply with regulatory standards.

We are focused on improving how we engage in local communities to address concerns about our projects. That said, rural wind farms properly planned and developed provide positive economic benefits in the communities in which they operate. The economic benefits of wind farms to local regions are just not confined to the initial investment. In fact, projects continue to revive the rural economies in which they are located. Wind farms provide reliable income for land owners, direct employment opportunities for locals and flow-on employment for local businesses through the provision of products and services, both to the project and its employees.

In 2010, AGL commissioned a study which confirmed that the regional economy in South Australia benefited greatly from the construction and operation of AGL's Hallett group of wind farms. The study found that for, every direct job created, three indirect jobs were also created. AGL is proud of its renewable investment energy portfolio and its wind farm investments in the rural economies that they support. While we are proud of our investments, we are also listening. We know that some community members do not share our views about wind farms. AGL is more than willing to work with NHMRC researchers and like bodies to ensure that appropriate standards, based on objective criteria, are in place.

In conclusion, we believe the wind industry is vital, providing both economic and environmental benefits. The economic benefits are especially impactful in rural communities. We are listening to our stakeholders. We care about what our stakeholders think and we do want to do the right thing. We are prepared and fully support ongoing research into concerns for the good of the industry and the good of the nation. Thank you.

Senator XENOPHON: Chair, can we get a copy of that opening statement? Has that been provided to us?

Mr Jackson: Yes, we can provide that.

Senator XENOPHON: It just might be useful to refer to it.

Senator LEYONHJELM: Mr Jackson, or one of your colleagues, I was encouraged by your opening statement. In fact, I think I am a customer of AGL myself.

Mr Jackson: Thank you.

CHAIR: Are you declaring an interest?

Senator LEYONHJELM: No, they probably offered me the best deal, I would say. You are probably aware of the Pacific Hydro's study at Cape Bridgewater in Victoria, done by Steven Cooper?

Mr Jackson: Yes, we are.

Senator LEYONHJELM: It had indicative suggestions that there may be a connection between something to do with the turbines and the way people are feeling. Is there any interest from your part in repeating that sort of study at any of your farms?

Mr Jackson: AGL absolutely wants to participate in ongoing research, whether it is Steven Cooper's or other research. It needs to be sanctioned and accredited and met through rigorous scientific approach. We are absolutely supportive of that approach.

Senator LEYONHJELM: So you would be happy to participate on that basis?

Mr Jackson: Yes.

Senator URQUHART: As AGL is both a wind farm and a power station operator, I am interested in your opinion on the work of Dr Joe Wheatley, who is actually going to appear later, which he says proves that carbon emission reductions have been over-reported by up to 20 per cent. Do you have any comments to make on this claim or on Dr Wheatley's report?

Mr Jackson: While it is true that we operate many types of energy stations—coal, hydro, gas, wind, solar et cetera—I am not familiar with this work you have mentioned, and I would not be able to comment on the validity of it.

Senator BACK: Perhaps we could ask you to take it on notice and comment on it. It is a submission to this inquiry.

Mr Jackson: All right.

Senator LEYONHJELM: One of the things we senators have been discussing today amongst ourselves is the consequences of the increase in the Renewable Energy Target. There will be 17,000 gigawatt hours of additional capacity that could be constructed between now and 2020. Let us assume that that is all wind turbines, and assume that they are the ones that seem to be going in most commonly now, which is three to five megawatts. Tell me if you think that assumption is wrong. How many turbines do you think that would amount to?

Mr Jackson: I have not done that research into how many more wind turbines would be needed. I think the common size today is about three megawatts, the current generation. Five megawatts perhaps is the leading edge. I do not know of any in Australia at this point. I think on the RET policy we support it. We think it is a good policy that this parliament has recently put in place, but it does need some complementary policy, we think, to be even more effective—things such as our greenhouse gas policy, allowing a transition to a decarbonised world; we would be supportive of that as well.

Senator LEYONHJELM: I guess the point I am getting to is that I would like you to take on notice the question of how many turbines. Let us suppose that AGL has built 17,000 gigawatt hours of capacity itself. How many turbines would that amount to? Now, we have heard evidence, including from some of your farms—and you have probably heard this too—that some people are adversely affected when they are within a certain distance of those turbines, although not everyone; I acknowledge that it is not universal. My question to you, then, would be: given that number of turbines being constructed—and I assume that they are not all AGL's, but a substantial proportion of them will be—what implications does that have for the number of people who believe that they are adversely affected by the turbines?

Mr Jackson: I would have to take that on notice.

Senator XENOPHON: I have just a couple of questions. You may want to take this on notice. Submission No. 87 by Frontier Economics talks about the most effective way of reducing greenhouse gas in the context of RET, and they have proposed a low—Mr Spree is nodding; hopefully that means that you have read the submission—

Mr Spree: Not particularly; I am acknowledging—

Senator XENOPHON: You are just nodding. You are doing a Noddy! You would be good in politics, then, standing behind the Prime Minister or the opposition leader. I am not being disparaging. Perhaps you could

consider whether you think there is merit in that in terms of reducing the price of power to consumers but still getting a commensurate if not greater benefit in terms of greenhouse gas reductions. The other issue is that the Australian Solar Council is highly critical of the deal that has been done in that it would squeeze out solar and arguably squeeze out new hydro. Do you have concerns in respect of that? It seems to me that solar and hydro do not have the same community concerns and impacts of wind, given the community concern that has been expressed in the course of this inquiry and more broadly.

Mr Jackson: We will take that on notice.

Senator XENOPHON: I have just one other question. I know time is very short. Perhaps I could put it on notice. Do you support adequate monitoring of data from wind farms in terms of their noise emission, including audible and low frequency noise in order that communities can have accurate access to information?

Mr Jackson: AGL supports accredited research in this area. In fact, at the Macarthur wind farm we have—

Senator XENOPHON: No, that is not my question. Do you support ongoing monitoring?

Mr Jackson: We do. We did eight times the required amount of monitoring at the Macarthur wind farm, as an example. We are prepared to continue to monitor and do what is right.

Senator XENOPHON: And access to communities about infrasound, low frequency noise and in terms of audible DV noise?

Mr Jackson: Absolutely—in terms of accredited research, yes.

Senator XENOPHON: Thank you.

Senator URQUHART: A recent AGL working paper said that 75 per cent of existing thermal plant in Australia is past its useful life. Does this create some urgency in developing an energy mix that will serve Australia into the future, and is it an inevitable reality that Australia will have to move from fossil fuels and to transition to a low carbon economy?

Mr Jackson: I think the fact that 70 to 75 per cent of existing fossil-fired assets are past original design life is true. There is a need to transition from heavily intense carbon emissions to a lower carbon form of intensity. That does not mean not coal; it just means that lower forms of intensity. Action is required.

Senator URQUHART: Is that why AGL will be shutting down all of its coal plants in the next 35 years?

Mr Jackson: We are preparing for a decarbonisation transition.

Senator DAY: On notice, can you provide us with a list and summary of which AGL-owned and operated wind farms have been subject to audible and sub-audible complaints and reports of adverse health impacts. And what your response was, and what you have done about it.

Mr Jackson: Yes, we can take that on notice.

Senator BACK: At point 6, your final paragraph, you speak about how the granular level data for AGL's own power generation assets disproves the theory that as penetration of wind power in the network increases there is a material increase in coal burned at thermal power stations. Can you supply us with your coal feed data to back up that contention, so that we can understand it a bit more clearly.

Mr Spree: I am not sure that data is available, but we can take it on notice. We can provide public NGS data with regard to our own emissions background.

Senator BACK: Could you assist us further with your power purchase agreements—is that possible in terms of confidentiality and whether it would assist us?

Mr Jackson: There are commercial agreements which would have some NGAs associated with them, so that—

Senator BACK: Even if you were to redact those components that were commercial-in-confidence?

Mr Jackson: I might take that on notice.

Senator BACK: Thank you, gentlemen.

Senator DAY: We heard evidence earlier that it is technically scientifically impossible for renewable energy to provide Australia's energy needs, yet you say that you are moving towards decarbonisation and closing your coal-fired fossil fuel. Can you provide us with some calculations to substantiate your claim that that is possible.

Mr Jackson: Yes, we could. But there are new energy solutions, other things that are not in there in the current generation profile that will be invented over the next 20 to 30 years. That is why it needs to be a transition to allow new technologies to emerge that do not exist today, or that can be refined and become more mainstream in the future.

Senator DAY: Assuming they are invented, I suppose.

Mr Jackson: Naturally.

Senator DAY: Do you include nuclear energy?

Mr Jackson: AGL does not have a particular position on nuclear energy. We do not have experience in our company today at this point, so we do not consider it currently.

Senator DAY: So that is not part of your calculation for your decarbonisation program?

Mr Spree: We have a commitment to decarbonising our fleet by 2050. We have not set out the mix of what that should be; we think it should be put together by the market. The market will respond accordingly to that decarbonised pathway. As Doug said, it will be a mixture of technologies—technologies that are not available now. As we have seen even over the last five years, solar energy has revolutionised power generation for homes, and we would expect that similar technology will come along.

Senator DAY: Are you saying that, for example, if Australia's needs are 150,000 gigawatt hours you could provide calculations to say that wind and other forms of renewable energy could meet that demand?

Mr Jackson: I am not certain that AGL has done calculations of the national economy. We have done our own views of what we would do in our own generation mix. I would not say we have done the work to understand the Australian economic outlook that would drive most of that demand.

Senator LEYONHJELM: Is Thorium on your agenda?

Mr Jackson: I do not understand.

Senator LEYONHJELM: Obviously not.

CHAIR: There being no further questions of the committee at the table—

Senator URQUHART: Put them on notice.

CHAIR: Yes, people could put their questions on notice. I thank you, gentlemen, for your appearance here today before the committee. We now call Infigen Energy, Mr Jonathan Upson.

UPSON, Mr Jonathon, Senior Development and Government Affairs Manager, Infigen Energy

[15:51]

CHAIR: Welcome. Could you please confirm that the information on parliamentary privilege and the protection of witnesses and evidence has been provided to you.

Mr Upson: Yes, it has been.

CHAIR: The committee has your submission. I now invite you to make a brief opening statement. At the conclusion of your remarks I will invite members of the committee to put questions to you.

Mr Upson: Thank you. One aspect of being on the other side of the world is that it is easy to see what others on the planet are not doing. Let us take electricity generation as an example. There is a rapid transformation away from coal and nuclear power—after Fukushima—to low-carbon emission technologies, including wind energy, taking place right throughout the planet.

According to Bloomberg, more money was invested world wide, building renewable energy generation plant than all fossil fuel generation plant combined—coal, gas and nuclear. More money was spent on renewable energy last year. Clean energy is not only mainstream it is also the leading form of electricity generation plant being built world wide. Renewable energy is not alternative energy. Building another coal fired generator is alternative energy. Don't take my word for it—AGL and EnergyAustralia have already publicly said they will not build another coal fired generator in Australia, at least not with CCS.

Wind energy has had one of the most sustained and rapid growth rates of any industry on the planet. According to the Global Wind Energy Council, 15 years ago there were only 13,000 megawatts of wind energy installed world wide. That is about three times what we have installed here, in Australia, now. Three years later, wind generation doubled. Three years later, it doubled again. Three years later, it doubled—again. Three years later it doubled yet again. And three years later the exponential growth finally slowed down to only 50 per cent, partly due to the GFC. This is phenomenal success, by any measure. I challenge you to think of another good or service that has had such a long-running and rapid growth rate.

Last year the entire electrical generational capacity of Australia's national electricity market was matched around the world by the building of new wind farms. And how is Australia doing? We have installed just a bit over one per cent of the world's wind turbines. In fact, 14 countries have more wind energy installed than Australia. Five countries have over five times as much wind energy installed than we do, even though we have one of the largest—and the windiest—countries on the planet. Australia is not in any way, shape or form the proving ground for wind energy. Wind farms have been operating for decades overseas and the industry has been extremely successful.

So when you hear witnesses tell stories about the problems with wind energy, I would respectfully ask you to consider: if wind energy is really that bad, then why has it grown so rapidly? What is wrong with China, India, Germany, Spain, the United States, France, Italy, Sweden, Portugal, Denmark, Poland, Brazil and Canada? Why have these countries been encouraging the building of so much wind energy? I look forward to answering your questions.

CHAIR: Thank you, Mr Upson.

Senator CANAVAN: We have had a couple of hearings. This is our third day of hearings. You may characterise them as stories but the evidence I have heard from people who feel impacted seems very genuine. I cannot myself make a judgement on whether they are legitimate complaints or not. The main concern I have is that the wind turbine operators who have appeared before us have been very dismissive of the complaints. They have been very dismissive of Steven Cooper's recent work. In light of Mr Cooper's work and some of the work that we have seen from overseas and heard today, what are you and your company doing to ensure that there is not a reasonably foreseeable chance that you are imposing adverse health impacts on people?

Mr Upson: Thank you for the question. We are concerned that there are some neighbours near our projects who have health symptoms, and that is regrettable. We encourage those people to see their healthcare professionals in that regard. However, we are guided by the current science and, again, independent peer reviewed science in particular that there is no electrical or acoustical energy from wind turbines that has a detrimental impact on humans.

Senator CANAVAN: Do you have any plans or have you given any thought to funding a study like Dr Cooper's in your communities?

Mr Upson: I guess there are discussions in that regard. One thing we have done—

Senator CANAVAN: So you have not ruled it out?

Mr Upson: Certainly not. We are fine with the NHMRC doing further studies. Further studies are a good thing. We have nothing to hide. We are not worried about those. We will participate in independent, credible, qualified research, which we have done in the past. For example, the New South Wales Environment Protection Authority approached us a couple of years ago. They wanted to do acoustic testing at our wind farms. They were doing it by the way of coal-fired generators and gas-fired generators as well, which we think is certainly worthwhile doing. They did audible and low-frequency testing, and we said, 'Fine.' It involved an expense on our part. We had to turn the turbines on and off. So there was a cost to us, but we were happy to cooperate in that research.

Senator CANAVAN: If the government were of the view to fund further research, you would be supportive of that? Indeed, would you support some kind of levy on the renewable energy industry to fund that research, as is done in other industries?

Mr Upson: I cannot say that we would be overjoyed at paying a levy. I think one of the things you have to concern yourselves with here is that we are in an electricity market. There are many different technologies that generate electricity. Wind energy is one of them. I would put to you that, of all the electricity generating technologies, the technology that is most likely to have health impacts is clearly not wind farms; it is clearly the burning of coal.

Senator URQUHART: Can you outline for the committee the impact of wind energy on wholesale and retail electricity prices in Australia. I am not sure whether you were here, but we heard from Mr Peter Lang, who referred to Mr Wheatley's report, about the cost and use of electricity. I am just wondering whether you can comment on what that means—the impact of wind energy.

Mr Upson: There are two impacts on power prices of the Renewable Energy Target Scheme. The first one is a very small impost on electricity bills. Part of the job of the Queensland Competition Authority—the last remaining electricity price regulator in the NEM—is to assess every year the allowable pass-through cost, as we put in our submission, of the Large-scale Renewable Energy Target Scheme. Their last determination found that the average cost for a residential house is $2.25 a month. That is the impost of the RET scheme. However, that is only half of the issue. The other half of the issue is that building new wind farms lowers the wholesale price for electricity. It is not, as Dr Moran said, because you are adding more supply; it is because you are adding more supply of low-marginal cost generation that underbids the coal- and gas-fired generators. That is why we lower wholesale electricity prices, not because of the addition of capacity.

Not only did the government's RET review find that lowering the RET scheme would end up increasing electricity prices in the medium to long term, it is not an outlier study. That study did not surprise us at all. It surprised some MPs, I think, but it did not surprise us because there were five other studies that came up with the exact same answer, and that is because it is an effect that, again—not just in Australia but overseas—has been happening for 10 or 15 years as well, so it was not unexpected; it was always going to happen here. So the net impact of the lower wholesale price that generators get paid, which then flows through to lower retail prices, counter balances the impost on the retail bills. The Warburton review found that if you lowered the RET scheme, you would get a small decrease for the next couple of years but a much larger increase in the medium to long term. On a net present value, lowering the Renewable Energy Target scheme would actually result in higher electricity prices.

Senator URQUHART: A lot of the comments and a lot of the concerns raised around this inquiry have been about the health impacts of wind turbines. Are you aware of what the peak medical bodies around the world say on this matter? Also do you know whether or not any case of wind turbine syndrome has been written up in a reputable medical journal?

Mr Upson: I am not aware of any government, scientific, medical or regulatory organisation in the world that has come to the conclusion that wind turbines have a detrimental impact on health.

Senator LEYONHJELM: We have heard evidence that would suggest some people are affected by wind turbines under some circumstances. It would appear that science on this is evolving. It may not be a single turbine; it may be only turbines acting in concert, together or synchronised—all those various possibilities have been raised. What has been confirmed though is that some people are sick. Stephen Cooper's study with Pacific Hydro in Victoria has established a link—tentative admittedly—between the wind turbines themselves and the effect that people are at detecting. It seems to me that this might be the canary in the coalmine. I accept your point that you rely on concrete evidence. But do you think that there may be an emerging liability issue in tort that you may have to deal with in future?

Mr Upson: Regarding the canary in the coalmine question, my opening statement kind of addresses that. Australia cannot be the canary in the coal mine. We are way behind the rest of the world in installing wind energy. It is virtually impossible that we could find something industry that has not already happened in Europe, unless you think that somehow or other a wind farm in Australia is different to a wind farm in Europe even though we use the same turbines.

Senator LEYONHJELM: There are similar sorts of complaints overseas as there are in Australia, not as many perhaps. I have not done an analysis of numbers. I guess the answer to my question though is 'no'.

Mr Upson: With regards to Mr Cooper's study, we, to be honest, have to rely on the scientific method of getting articles accepted for publication in scientific journals through official, formal, peer-review processes. Mr Cooper, to my knowledge, has never had a paper on wind turbines published in a technical journal. He has never had one peer reviewed and published in a technical journal and that is a problem. Because you can do a study and come up with whatever but if you do not actually subject it to the critique of your peers through the formal process then it is just a study, just an opinion. His Portland study, to be honest, I do not think could ever be published in a scientific journal. There are too many fatal flaws.

CHAIR: Mr Upson, I believe you are a mechanical engineering graduate?

Mr Upson: That is true; thank you.

CHAIR: I assume you are aware of the engineers' code of ethics which, in general terms, requires that engineers do not cause harm to human health. Is that right?

Mr Upson: I have to say: I was not aware of that, but it does not surprise me that there is, in a code of ethics like that; so I will accept that.

CHAIR: You said, in oral evidence to the New South Wales parliamentary inquiry in 2009, that the planning and noise pollution guidelines and standards were designed to protect people from sleep disturbance and annoyance. In light of the fact that there are many people who we have heard from across the country who say that they are suffering from adverse health effects—sleep deprivation et cetera—do you think that the current statutory requirements and regulations protect these people?

Mr Upson: It will probably please you to know that New South Wales has absolutely the strictest audible noise requirements in the world. They have the strictest standards in the world that we are aware of. It is an audible noise standard. They are in the process of implementing a low-frequency noise requirement as well on wind farms. So, as to whether it is adequate or not, since they have the strictest rules in the world, I would say they do.

CHAIR: Okay, let us say we acknowledge they are the strictest. But does that necessarily mean that they are world's best practice?

Mr Upson: It would mean that, in that list of countries that I read you before, which all have looser noise regulations, they should be having a lot worse problems than we are. That is what that would suggest.

CHAIR: But the problem is that, in spite of the fact that you say they are the most stringent rules and regulations, people are still claiming to have health effects and annoyance and sleep deprivation. What we are trying to establish here is: what needs to be done to remedy this situation so that people—the general public; the people who are suffering—have a greater sense that they are being listened to and that there are stringent guidelines in place for the development of wind farms? You keep referring to overseas, but history tells us that there are things that have been put forward to the public around the world in the past that we thought were no problem to human health and, years later, we have found that they are. So I put it to you: do you believe that we should have a precautionary principle and look after the people who possibly are being affected by these turbines and get to the bottom of what is happening?

Mr Upson: I think that one of inferences is this. For example, asbestos was brought up earlier; asbestos causes a particular illness that is peculiar to asbestos. It did take a while, but they were able to establish that. But the No. 1 concern you talk about, sleep deprivation, is actually the No. 1 health complaint in Australia. When people are at their GP, that is their No. 1 concern. Whether they live next to a wind farm or not, that is their No. 1 issue. So it is very difficult. The question is: is there a causal relationship between the turbines and that? As I said before, is there an acoustic or electrical energy from the turbines that is then directly causing that illness? As I said, the science has measured the acoustic energy which we are focusing on today; infrasound, low-frequency sound, has been measured countless times. The EPA in South Australia did a very thorough infrasound study. That is an independent organisation—nothing to do with the wind energy industry. They measured infrasound inside houses and outside houses. The lowest infrasound reading they came up with was actually in a house neighbouring a wind farm. So the infrasound is all around us. We are affected by infrasound all the time. Wind turbines do

produce infrasound; that is true. But every peer-reviewed scientific study has shown the infrasound level is orders of magnitude below the level that humans can perceive, let alone causing detrimental health impacts.

Senator DAY: Could I just butt in on that? We had evidence from Dr Andrew Bell—are you familiar with his work? He claims that you cannot measure infrasound and that we do not really understand just how the ear copes with infrasound. So it is just not possible to measure it. All you can do is accept the overwhelming evidence that people are affected by it. I would just invite you to read his evidence, say, from this morning's hearing.

Mr Upson: First of all, it is absolutely possible to measure infrasound. I think what he was saying—I was actually here—was that the effect it has on the ear is difficult to measure. But infrasound can absolutely be measured. In this scientific journal, *Acoustics Australia*, there is an article published—again, formally peer reviewed, unlike Mr Cooper's work—where they measured infrasound of wind farms. They found the level to be around 60 to 65 decibels on the G scale, which is the appropriate scale for infrasound, compared to the world-recognised limit of 85 for the limit of perception. You might think, 'Well, 65, 85 is pretty close to the limit,' but you have to remember that the decibel scale is a logarithmic scale and that 65 is actually 100 times less than 85. So this study showed that, in order to have enough infrasound generated from wind turbines that someone would actually perceive, they would need 100 turbines within 300 metres of their house. That is how far we are below the infrasound perception level. Obviously, we cannot build 100 wind turbines within 300 metres of a house, but that is actually what the science is saying would be needed for the infrasound level from a turbine to actually be perceived.

CHAIR: Mr Upson, I note your disparaging tone with regard to the work that Mr Steven Cooper did, but do you acknowledge that the terms of reference for that work were directed by Pacific Hydro and that in fact the six affected residents in the close proximity to the turbines set the parameters of that research? Yes or no? Did they or did they not?

Mr Upson: I was not involved in the research, so I am not—

CHAIR: I can tell you that the six people set the parameters. I am sure that, had Mr Cooper had the opportunity to involve more people in the study, that would have been the case. But they were the parameters set by Pacific Hydro. The committee has commended Pacific Hydro on allowing that work to be done.

As Senator Leyonhjelm alluded to earlier, that was Pacific Hydro's direction. It is an indicator of what may be there and that we need to do further research. We heard evidence yesterday where adequate funds are not being allocated to investigate this matter and to find out what is going on.

Senator DAY: Just a quick one. I believe that you are aware that David and Alida Mortimer, who live near your Lake Bonney wind farm, have invited you to conduct a similar study?

Mr Upson: Yes, we received, I believe, an email from David Mortimer just last Friday and we will consider his request.

Senator DAY: He is a candidate for a study, inviting you to do that. Given your earlier comments that you are willing to participate, one would have thought that would be an ideal opportunity for further study?

Mr Upson: There are issues with that as well. For example, if we do a study and we pay for the study, we get a consultant and he does the work and it shows that there are no issues, I can guarantee that that will not satisfy our opponents. They will just say, 'Oh, you picked a consultant to do the job you wanted.' It would be a lot more effective for everyone if studies were done by independent, qualified and credible sources, not funded by the industry.

CHAIR: So would Infigen Energy support independent, eminent, multidisciplinary Australian research with a public methodology?

Mr Upson: In concept, yes.

CHAIR: In concept—so you are putting conditions on support. I am saying: would your company support independent, eminent, multidisciplinary Australian research with a public methodology, so it is all out in the open?

Mr Upson: That research has been done by the NHMRC.

CHAIR: No, Mr Upson, the NHMRC does not conduct research.

Mr Upson: They have had a request for expressions of interest to do research such as you are suggesting.

CHAIR: But we also heard evidence yesterday that, as I said, funding of half a million dollars is not adequate to conduct research.

Mr Upson: It is true. The Canadian government spent over $2 million on a study that was concluded just last year, and it was much broader; it was a huge study and, I think, a credible study. That study seemed to have all the ingredients that you would want in a study; I think it was over 1,500 homes as I remember, with 70 different wind farms, measuring all kinds of things. The basic results of that study were, again, that they found no relationship between sleep disorder, heart disease, dizziness or whatever and the operation of wind turbines and wind turbine noise.

Senator LEYONHJELM: I have just one final question. I have been given some information in relation to nondisclosure clauses in your contracts with your wind turbine hosts. I gather you wrote to the secretariat of this inquiry saying:

Infigen has no wind farm contracts in place with clauses that would preclude landowners from raising issues about any perceived noise or health issues with planning authorities (or media outlets).

I have an extract from an Infigen contract in relation to Lake Bonney and Flyers Creek in which it says:

The Lessee agrees to keep confidential and not to disclose, divulge or make known at any time to any third party any information not in the public domain concerning the Lessee or the operation of the Wind Farm or any part of it …

Are they compatible statements?

Mr Upson: I think this came up after the inquiry that Senator Madigan chaired in 2013. We did respond to a question on notice in that regard. I am happy to send you a copy of our response. In the interests of time, I could read it, if you like.

CHAIR: Excuse me, Mr Upson. I did not chair any inquiry in 2013.

Mr Upson: Wasn't it the excess noise—

CHAIR: No, there was no inquiry that I chaired. This is the only committee I have chaired.

Mr Upson: I am sorry. I wrote that letter to Senator Doug Cameron, chairman of the Senate Standing Committee on Environment and Communications, so there was an inquiry of some sort. I am sorry if you were not the—

CHAIR: No.

Mr Upson: Were you on the committee? You might have been on the committee. I am sorry. You may have just been a committee member.

Senator LEYONHJELM: I am not sure what you are taking on notice, because what we have is a statement from you in an email to Carol Stewart, from the Department of the Senate here, saying:

Infigen has no wind farm contracts in place with clauses that would preclude landowners from raising issues …

Then we have an extract from an Infigen contract from Lake Bonney and Flyers Creek wind farms which says:

The Lessee agrees to keep confidential and not to disclose, divulge or make known at any time … any information not in the public domain concerning the Lessee or the operation of the Wind Farm or any part of it …

That would appear to contradict your statement. Are you taking it on notice? What are you doing?

Mr Upson: I am happy to read from my response to that question, which came up in February 2013, if you would like.

Senator LEYONHJELM: All right, we will leave it as a question on notice.

CHAIR: In light of the fact that there are no further questions, thank you, Mr Upson.

Senator URQUHART: Sorry, just to clarify, there are. I will put them on notice.

CHAIR: There will be questions put on notice, tabled and provided to you by the secretariat. We thank you for your appearance here today before the committee.

MORTIMER, Mr Shane John, Elder, Guumaal-Ngambri People

[16:19]

CHAIR: I welcome Mr Shane Mortimer. Could you please confirm that the information on parliamentary privilege and the protection of witnesses and evidence has been provided to you.

Mr Mortimer: Yes, it has.

CHAIR: The committee has your submission, and I now invite you to make a brief opening statement. At the conclusion of your remarks I will invite members of the committee to put questions to you.

Mr Mortimer: Thank you, Chair. Wynu kaugo Guumaal dhawarra Ngambri mitang. You will not be able to understand what I have said. If I were Chinese, Taiwanese, Lebanese or Portuguese, you would have a translator here who could deal with that, but you do not. Such is the ingrained racism in this country. The name 'Canberra' is derived from Ngambri people, whom I represent. As a senior male elder of the Guumaal nation Ngambri people whose allodium extends from Orbost, Victoria, up the spine of the Great Dividing Range to Werriwa near Goulburn, I represent the allodial people of land upon which a great many industrial wind turbines are planned to be constructed.

There has been no due diligence carried out by governments at any level or developers of industrial wind turbine infrastructure on our land. We are the owners of the allodium. There has been no permission from our people to construct industrial wind turbines on our land. The Crown does not have and cannot provide evidence of having attained the allodium over our land. I have written a letter to the Queen and have no response. Our allodial entitlement is to everything below the ground to the core of the earth and everything above the earth to the stars. There has been no war declared on the Guumaal nation. Therefore, we have not surrendered allodium.

Since the beginning of time we have not bequeathed our allodium to anyone but our Guumaal bloodline hereditary people. We have not sold our allodium. Our allodium has not been exchanged for anything such as blankets and beads. We have not received compensation for our land, a small portion of which includes this Australian Capital Territory. The Crown's title to land in Australia is known as radical title. Radical title is burdened by our allodium. Therefore, the Crown's radical title is void ab initio. This means void from the beginning.

I submit that this select committee support my submissions and inquire on the lawfulness and validity of wind turbines in the Australian Capital Territory, the Capital Wind Farm and proposed Collector Wind Farm in New South Wales and others elsewhere throughout Australia, when common-law native title, not native title under the Native Title Act, is just conveniently ignored. The lawfulness of wind turbine approvals is relevant to the whole question of the lawful effects of wind turbines. The documents I submit to this select committee are relevant to the Australian Capital Territory and New South Wales question of unlawfulness of approving existing and future wind turbine proposals. The effects of wind turbines cannot be disjointed from the lawfulness of approvals. Lawfulness of approvals must be considered first, according to law, and then the lawful effects under legislation monitoring the effects of wind turbines.

In my submission to this select committee, reinforced by my submitted documents and demonstrated legal challenges against the unlawfulness of New South Wales approvals for wind turbines approved by direct racial discrimination against me, I urge this select committee to seek immediate legal advice from the Commonwealth Attorney-General and independent advice, because the Attorney-General has not bothered to even inquire on common-law native title rights with wind turbines, and engage independent advice from Bret Walker, Senior Counsel, in Sydney.

In Shane John Mortimer v Goldwind Australia Pty Ltd, case No. 266757 of 2012, the recent case I took against the New South Wales approvals for wind turbines was that neither the New South Wales government nor the proposal proponent dealt with my common-law native title rights according to law in any lawful way, as is my constitutional guarantee not to be racially discriminated against by the Crown in the right of the Commonwealth and Crown in the right of New South Wales—not native title as applied and, in my submission, misunderstood as a property right requiring proof under the Native Title Act, but existing common-law native title as declared to have been always existing and recognisable by the common law of Australia as a property or incidence of property as commonly known and accepted by all other Australians. See, as an example, the High Court case, Western Australia v the Commonwealth native title case in 1995 and how the High Court invalidated the then section 12 of the Native Title Act as ultra vires—beyond power. This was the only section of the entire Native Title Act that was held to be invalid. My individual common-law native title rights exist outside of the Native Title Act and must be dealt with according to law outside of any applicable to the Native Title Act.

As the Mabo case stated, property is susceptible of ownership and must be owned by someone. I have claimed my inheritance according to law, influenced by international law and protected by the Australian Constitution—the same rights as all other Australians. The Crown must prove its title like anybody else.

There are extra constitutional requirements in the ACT above and beyond the land in New South Wales due to section 125 of the Australian Constitution. The ACT is but an agent of the Commonwealth and can only enjoy the rights and interests over the land in the seat of government that the Commonwealth enjoys. The Commonwealth has no property rights in accordance with section 125 of the Constitution but exclusive rights of jurisdiction of the territory granted by New South Wales in accordance with the two founding seat-of-government acts: Seat of Government Acceptance Act 1909 and Seat of Government Surrender Act 1909. The Commonwealth received no proprietary interests over or under the soil in the seat of government because of the constitutional terms of section 125 of the Constitution—the terms under the two founding 1909 seat of government acts above from both Commonwealth and New South Wales. Quick and Garran, the constitutional experts in 1901, whose views are often referred to in High Court cases, reinforce this in their interpretation of section 125.

The relevancy of my submission is in relation to wind turbines where government is promoting unlawful racial discrimination by ignoring my common law, native title, race and interests. I have attempted to bring this point forward in my New South Wales case. I have documented evidence in my submissions that proves that the ACT government holds no title to any land in the ACT, complements of freedom of information by Eva Coe in 2006. The issue of the impact of infrasound from industrial wind turbines on human health will, in time, be a class action akin to asbestos and tobacco.

There is the denial by the University of Sydney's School of Public Health Professor Simon Chapman that infrasound from industrial wind turbines impacts human health when so much peer reviewed written evidence has been produced over the past 30 years to say that it does. Until now, it has been a vexing issue. Professor Simon Chapman also denies that he has been paid to push the development of industrial wind power stations. Here is what Professor Chapman said on 2 February 2014 at 10.20 pm and filed under 'wind energy, wind power':

> ‘Since I began writing and speaking about wind turbines and health in 2010, it has become common for those who do not agree with me to say or insinuate that I am somehow being paid by the wind industry or agencies acting for it. This is completely untrue and I have said this repeatedly to journalists and interviewers whenever the question has been asked. Those who continue to make this claim, particularly from the supposed protection of anonymity, are either ignorant about my lack of competing interests or are knowingly lying.
>
> ‘I, nor anyone acting for me, have ever sought or received any research funding, “unrestricted educational grants”, hospitality, or shares or any other consideration from any wind energy company or agent acting for them.

A bit of a Freudian slip there. Presumably he meant 'I or anyone acting for me'. Or did he?

He continues:

> ‘I have a tenured academic personal chair in public health at the University of Sydney where I have worked continuously since 1986. My salary is paid for entirely [by] the University where I have teaching, research and research scholar supervision responsibilities.’

The 'research competing interests' statement was created on 23 March 2013. On 2 February 2014, it states:

> Yet …
>
> Chapman spoke at the New Zealand Wind Energy Conference, 3 April, 2012.
>
> … … …
>
> Chapman spoke at a Community Consultative Committee meeting for AGL Energy.

Professor Chapman, who has a PhD but is not a medical doctor, vehemently denies the health effects of infrasound on people living near industry wind turbines. The University of Sydney Senate is stacked with industrial wind turbine interests.

CHAIR: Excuse me, Mr Mortimer, are you going to read the whole statement?

Mr Mortimer: I have just one more bit, Mr Chairman, if I may. It has come to light that there are among the fellows of the Senate at the University of Sydney those with ties to wind energy. You have a list of them there. Professor Chapman personally and viciously vilified Waubra Foundation CEO Dr Sarah Laurie, who is a medical doctor. He condemned Dr Laurie's research into the impact of infrasound on people living near such industrial developments as wind turbines, mines, high-speed rail and other so-called sick buildings, like the National Gallery of Australia, where the high incidence of breast cancer in people working in certain areas of the building is beyond coincidence.

I will leave this here with you. I have some documents to support my submission to you that I would like to hand up, if I may. There is a petition to the Governor-General. The purpose for this is to point out to you that

nowhere is there any response to common law native title rights. Nowhere was there any response from the Queen when I sent her a letter about our allodial title and common law native title rights. There is a copy of the writ of quo warranto that guarantees me a response, but yet I get nothing. There is a letter from Max Moore-Wilton, the secretary then of the ACT Chief Minister's department, saying that the ACT owns no land in the ACT and they are only charged with managing land. Why are they investing money in wind turbines? There is a letter from the minister for home affairs. There is a submission there from Quick and Garran—their version of the annotated Australian Constitution, section 125. My letter to the Queen. The Supreme Court of New South Wales case of Mortimer v Goldwind, with the Gullen Range wind farm. In the common law division of the Supreme Court of New South Wales, where not one mention of common law native title appears in the Justice Penfold's findings. Nothing. Why are my native title rights ignored.

CHAIR: Thank you, Mr Mortimer. Are there any questions?

Senator LEYONHJELM: No questions. The complaint is outside the terms of reference. That is the reason I have no questions.

Senator URQUHART: Do you want to respond to Senator Leyonhjelm's comment that what you have said is outside the terms of reference?

Mr Mortimer: Senator Leyonhjelm, you said that my complaint was outside the terms of reference?

Senator LEYONHJELM: I am interested in your complaints, but the committee has specific terms of reference. That is really what I am referring to.

Mr Mortimer: I believe I am within the terms of reference of what you are speaking about. Is the law not within your terms.

Senator LEYONHJELM: That is not the issue; it is the terms of reference.

Mr Mortimer: Can you repeat the terms of reference to me?

Senator LEYONHJELM: Have you seen them?

Mr Mortimer: Yes, I have. I do not recall the exact wording off the top of my head, and obviously you do not, either.

Senator URQUHART: I can ask you a couple of questions while Senator Leyonhjelm is looking that up. I want to talk to you about the cultural heritage concerns you have raised. Do you think there is a gap in the approvals process in this respect. I think I could take that as a 'yes' given your submission, but I do not want to verbal you. But if you do, what changes would you like to see?

Mr Mortimer: In response to your first question, yes, there is a gap. It is not a gap; it is a gulf.

Senator URQUHART: What changes do you think need to be made?

Mr Mortimer: The change that is meant to be made is that, in order to approve these wind turbine constructions, or any other construction for that matter, the government needs to go back to the actual owners of the land, because the Crown does not have good title in this land.

Senator URQUHART: Is it the government or is it the proprietors of the wind farms?

Mr Mortimer: The proprietors of the wind turbines need to do their due diligence on land title. They are not doing that. There is no reference to land title whatsoever. The only reference to anything Aboriginal is if they do some sort of archaeological investigation; and even then—as you will see from the example in the documents I have handed up—the fellow who did the inspection said, 'The grass is too long; there's nothing to be found,' for which he gets paid thousands of dollars.

Senator URQUHART: Okay. I just want to go to one other area that you spoke about in your opening statement, but it is also in your submission. You raised the fact that Professor Chapman has spoken at a number of wind conferences and events. I am not sure what your concern is there, because he has done significant academic work in that field. Again, I do not want to put words in your mouth. Are you suggesting that experts should not talk about their fields of expertise at relevant events?

Mr Mortimer: No, I would not suggest that at all, not for a minute.

Senator URQUHART: Okay. Can you just tell me what your concerns are about that?

Mr Mortimer: Yes. Who funded him to be there? Who paid for his time to be there? Did the university pay for it? Who paid for it?

Senator URQUHART: Okay. You have also referred to 'cancer' in your submission, but I am not quite sure what you mean in the context of wind turbines. Are you suggesting that wind farms cause cancer? What are you referring to there?

Mr Mortimer: No, I did not. The word 'cancer' obviously means something to you. But I referred there to a sick building, the National Gallery of Australia, and the incidence of cancer there because it is a sick building.

Senator URQUHART: Right.

Mr Mortimer: It is very well known.

Senator URQUHART: I just wanted to clarify that—

Mr Mortimer: Breast cancer in particular.

Senator URQUHART: because I was not sure what you were actually determining there.

CHAIR: Senator Leyonhjelm?

Mr Mortimer: Can anybody remind me of the terms of reference?

Senator LEYONHJELM: I have some questions for you, Mr Mortimer.

Mr Mortimer: Thank you. The terms of reference include:

the implementation of planning processes in relation to wind farms, including the level of information available to prospective wind farm hosts …

That is good. That is beaut. But, in the planning processes, they are not doing any due diligence on native title under the act and/or common-law native title.

Senator LEYONHJELM: Yes. That was the point I was going to raise with you. It has just been drawn to my attention that the state governments have consideration of cultural issues, the kinds you were raising, as part of their planning processes. Now, your complaint is, essentially, that that is being disregarded. In fact, there was a recent example where the construction of a wind farm disturbed a burial site, as I recall, and it was very poorly handled, based on the information I have heard.

Mr Mortimer: My word.

Senator LEYONHJELM: Yes. So you are quite right to raise that issue. Referring back to Senator Urquhart's question earlier, I could not see where you fitted into the terms of reference for this inquiry until that one was drawn to my attention. I now see. The question is: what would you like this committee to recommend in relation to that? Essentially it is a question of the state governments not doing what their own procedures say.

Mr Mortimer: State governments, local governments, federal governments: none of you do any due diligence on common-law native title. Just to explain it to you in simple terms, the Crown's title to land in this country is 'radical title', a common-law term—

Senator LEYONHJELM: Yes. I understand the legal background to it.

Mr Mortimer: and the common-law term for our title is 'allodial title'.

Senator LEYONHJELM: Yes, I understand the legal background.

Mr Mortimer: Okay.

Senator LEYONHJELM: Let me make this acutely relevant. The government has just announced it has done a deal to change the RET to 33,000 gigawatt hours by 2020. That means 17,000 gigawatt hours of new renewable energy—potentially, if they can build it—will be constructed in the next five years. A lot of new wind turbines will be constructed. Some of them already have planning approval. Some will require planning approval. In terms of improving the process and taking into account your concerns, what do you think should occur?

Mr Mortimer: Not a single turbine should be built from this day forward until such time as the issue of common law native title is addressed with regard to any of those development.

Senator LEYONHJELM: That is very emphatic. Right.

Mr Mortimer: It is a matter that will come back to bite you. Unless you address this issue, you have a big problem. It is time this country grew up and faced up to its responsibility. Perhaps you should ask the Crown why they have conned the people in this country. Why have they deliberately deceived the people of this country into believing that they have clear title on this land when they do not? That has been proven in the High Court over and over again. Even as late as last week in the High Court there was the Queensland government versus Congoo.

Senator LEYONHJELM: We are running out of time, but a quick question: let's suppose there was a moratorium on construction of turbines as you suggest. Then you said 'until such time as'. What would such time be? There is a government determination to encourage renewable energy. There is a wind industry out there with

billions of dollars they want to spend on these turbines, so they want to get on with it. At what point would you consider that, in your view, they should get on with it? Under what circumstances?

Mr Mortimer: Let me put it this way: the coal fired power stations are not going to go away in a hurry. They still will be there when these turbines are built because they rely on them to back them up. My guess is that it is not going to make an iota of difference in terms of carbon whether there is a turbine built between now and in 50 years. But the point of the matter is they do not have a legal approval to be constructed until such time as they get permission from the owners of the land. We have never given up our title. We did not sign a treaty. Show me evidence of this government or any previous government acquiring the allodial title to the land in this country.

CHAIR: There being no further questions, I thank you for your attendance here today.

WHEATLEY, Dr Joseph, Private capacity

[16:48]

Evidence was taken via teleconference—

CHAIR: Welcome. Information on parliamentary privilege and the protection of witnesses and evidence has been provided to you. However, I remind senators and witnesses that parliamentary privilege does not apply to countries or persons outside of Australia. The committee has your submission, and I now invite you to make a brief opening statement. At the conclusion of your remarks I will invite members of the committee to put questions to you.

Dr Wheatley: Thank you. My professional background is in physics theory and more recently in statistical computing. Recently I published a peer reviewed article on wind power and its ability to avoid CO_2 emissions. The report that you have in front of you arose because I was asked by the association for research of renewable energy in Australia to look at the NEM. This type of calculation is interesting because it looks at the grid as a whole, not just one component of it, and tries to assess the operational savings when you have wind power being generated compared to when you do not have wind power being generated.

We looked at the calendar year 2014, and our main findings were that in 2014 wind power generation provided 4.5 per cent of all energy generated on the NEM but it reduced emissions by a lesser amount—by 3.5 per cent. So the effectiveness is the ratio of 3.5 to 4.5, which is about 80 per cent effective, and we would argue that is a significant loss of effectiveness.

The main reasons for that are twofold. First of all, wind tends to displace lower emissions gas and even black coal plants over brown coal plants, which have higher emissions. That is the first obvious thing that is going on on the grid. The second effect is part-load efficiency cost. When the wind is blowing, coal plants tend to operate under part load, which is less efficient, and therefore they have a higher emissions intensity during those periods. They are the primary mechanisms that are going on that came out of the calculation. We suggest on the basis of the calculation that, if wind capacity were doubled from current levels—say from 4.5 per cent to nine per cent—effectiveness would fall to about 70 per cent. You would only get 70 per cent of the emissions reduction that you naively expect from wind power.

It is a long and complicated calculation, so I will very quickly run through some of the main features of it. If you have the report in front of you, you can refer to the pages I reference. The date is five-minute generation data from 256 generators which were connected to the grid in 2014. They are archived by the market operator AEMO. Look at page 9, figure 2.1. This shows a summary of the generation on the grid by fuel type. Black coal is the main source of fuel, and it is load following, so it has a daily variation in output. Brown coal is less correlated with demand; it is more baseload plants. Look at the bottom panel of figure 2.1. In green you can see the wind generation. Wind power has its own dynamic. It is not correlated with demand; it is dependent on weather. It is not under the control of the grid operator. In the jargon, it is not dispatchable generation. You can see figure 2.2 on page 11. It shows the same information plotted in a different way. This shows wind power generation, hydro generation and gas generation plotted against total system demand. If you look at hydro and gas, you can see that they are correlated with total system demand; so, as the amount of gas generation increases, the system demand increases. As for wind in the top panel, you can see there is no correlation at all between wind generation and system demand. Basically, the thermal systems—coal and gas—have to respond to whatever wind power is on the grid at a particular time.

The job to calculate emissions savings is to link generation to emissions for each generator. For the purposes of this report we chose the simplest possible model, which is a linear model linking emissions and generation. We built a linear model for each of the 151 thermogenerators, which were connected to the grid. Approximate parameters for this model are available through the public domain from ACIL Allen. When you look at total emissions calculated in this way, for 2014 they were approximately 170,000,000 tonnes.

If you look at page 19, figure 2.8, this shows a plot of the emissions intensity for the grid as a whole, plotted against generation for wind, hydro and gas. You can see the centre panel shows that the emissions intensity for the grid, tonnes to two per megawatt hour, falls quite strongly as the amount of hydrogen generation increases. If you look at wind generation, the top panel, the emissions intensity also decreases when the amount of wind generation increases but the relationship is a lot weaker than it is for hydro. It is also more diffuse. In fact, it looks quite like the bottom panel for gas generation. So you can see already, from this raw data, that wind is less effective in the space of CO_2 compared to other renewable sources like hydro. The job really is to calculate an accurate number for the emissions avoided to wind.

The method of doing this is a statistical method. What you do is correlate emissions for each power station with total system demand, with total outages that are on the grid at a particular time, with total wind generation on the grid and, for reasons explained in the report, also with the Basslink flow from Tasmania to Victoria. This model gives quite a good account of the emissions. It enables you to predict what emissions would be in the absence of wind generation, so you can calculate emissions avoided. We find emissions avoided of 6.2 million tonnes in 2014. This is less than it would be if effectiveness were 100 per cent. Emissions avoided would have been eight million tonnes. So this is how we arrive at the 3½ per cent emissions avoided figure.

Some limitations and caveats about this report are: it is obviously based on quite a simplified emissions model and approximate parameters from the consultants. Really, it should be done with more accurate emissions parameters. For instance, if you look at page 36, figure 4.2, it shows emissions avoided by power stations in 2014. If you look at this graph you can see that emissions savings are concentrated in a small number of power stations. The emissions parameters for these power stations really need to be determined accurately. In fact, it turns out that 80 per cent of emissions savings that arise are from just 12 power stations. We need more detailed data on those power stations to come up with a very reliable number.

In summary, even though the amount of wind generation on the grid is relatively modest, at the moment—at about 4½ per cent—we have strong evidence that effectiveness is reduced from 100 per cent. We think that is quite significant for policymakers, because this number is likely to form further as wind capacity increases. I do not think anything I have said here will be surprising to any power engineer. What this method does is put all these different effects together, in a single framework, and you can come up with actual numbers for emissions avoided. That summarises my report.

ACTING CHAIR: Thank you very much, Dr Wheatley. Are there any questions?

Senator URQUHART: I think we have probably five minutes for questioning and I have a number of questions, Dr Wheatley, but are you happy to take them on notice if I cannot get through them?

Dr Wheatley: Yes.

Senator URQUHART: Thank you. In your report you assert that emissions are not being fully offset by wind farms. Can you run us through your hypothesis?

Dr Wheatley: Basically you have a number, the grid average emissions intensity—what the emissions intensity would be if there were no wind on the grid. That number is about 0.91 tonnes $C0_2$ per megawatt hour. So if there was no wind blowing in Australia in 2014, emissions intensity would have been about 0.91 tonnes CO_2 per megawatt hour. Then we can calculate what the actual emissions were in 2014 due to wind. That number turns out to be about 0.71 tonnes CO_2 per megawatt hour. That is less than the grid average emissions intensity and that is what this loss of effectiveness means.

There is no reason why effectiveness should be one. In principle the effectiveness could be larger than one. It could be less than one, it could be zero, it could even be negative. Really it is a matter for monitoring and calculation to decide how well it actually operates. To give you a very simple example, supposing you had a grid which had a lot of coal power and some gas generation. And supposing that the wind only displaced the gas plant. In that case, effectiveness would be a lot less than one because gas has a much lower emissions intensity than coal. Therefore, there is no reason in general why effectiveness would be 100 per cent. In general it is going to be something different, and it is a matter for investigation and empirical calculation to decide what it should be. What has been seen on other grids is that the more wind you put on, there is sort of a law of diminishing returns. As you put more wind on, it forces the thermal backup plant to operate less efficiently and effectiveness starts to drift away from the ideal. When I started doing this calculation I did not know what the answer was going to be, and I was quite surprised that this relatively modest amount of wind effectiveness was already reduced to about 80 per cent. There are two reasons but one of the main reasons is that the brown coal plant in Victoria is not displaced. There is probably more displacement of the black coal plant in New South Wales by wind power than there is displacement in Victoria.

Senator URQUHART: You published a similar study in 2013 in the *Energy Policy* journal.

Dr Wheatley: Correct.

Senator URQUHART: Who funded that research?

Dr Wheatley: That was pro bono work.

Senator URQUHART: What has been the response to the Irish paper within the academic community?

Dr Wheatley: Most have just found it very interesting. It is not the only paper that has shown this. Other papers have found similar things. There is debate around the precise numbers but I do not think anybody disagrees with the phenomenon.

Senator URQUHART: Have any other researchers gone on to test your assumptions and findings?

Dr Wheatley: Yes, there have been calculations on a different basis. The Sustainable Energy Authority of Ireland, for instance, did a similar calculation using a different method—using something called a dispatch model. They did it not for the same year and so on, but they found very similar results. I do not think there is any dispute that effectiveness is generally less than one. There is some argument about what the real number is and how important that number is.

Senator URQUHART: Thanks, Dr Wheatley. I will put the rest on notice to you.

Dr Wheatley: Okay.

Senator LEYONHJELM: The Clean Energy Regulator is on the record as saying that emissions reductions can only be modelled as it is too hard to provide empirical evidence of reductions. What are your thoughts on that?

Dr Wheatley: I think you can do a very good job. I do not know exactly what data is available in Australia, unfortunately. The best data is direct fuel consumption data at a high frequency. I suspect at least some of that data is available. I think you can do a very good job of understanding the emissions avoidance and I think it is worthwhile calculating that. There is no difficulty in principle. The quality of the data is really the main limitation on it. I would definitely encourage the Clean Energy Regulator to do this. This is a number that people should be calculating every year and I do not think anybody really is doing it. It would be a shame if we find out in five years' time that we spent all this money and we did not really get the bang for our buck that we thought we were going to get. I would argue that is happening in Ireland already to some extent and it is already happening in many places in Europe at the moment.

Senator LEYONHJELM: The argument we heard from Mr Lang earlier, who cited your work as well, was that because of the spinning reserve if wind generation increases to 15 per cent of the grid this will have implications for grid stability. Is that what you are referring to about Ireland and the rest of the world or is it something else?

Dr Wheatley: No, it is not grid stability. You can make the grid stable. That is not the problem. You can invest enough in infrastructure, interconnection and so on to make the grid stable. It is basically what the backup plans do. If a power station is operating at its optimal load, it is highly efficient at that load. If it cycles in response to a lot of wind generation, it will spend more time under part load, where it is less efficient. Basically, some CO_2 per megawatt hours are higher under part load than they are at optimal load. That eats into the effectiveness of wind power. The more you put on, the more that effect becomes important. There are also other effects like ramping and so on, which may be what Mr Lang was referring to.

In this report, the facts we have captured are the selective displacement effect, which is that wind actually tends to displace more flexible graft plants rather than the less flexible coal plants, and also the part-load efficiency cost. There may be other effects which I believe are smaller, which my report does not capture. But grid stability is a separate issue from the actual emissions statements.

CHAIR: There being no further questions, I thank you for your appearance here today and submission, Dr Wheatley.

FORDE, Mrs Kim Anne, Private capacity

[17:10]

Evidence was taken via teleconference—

CHAIR: I welcome Mrs Kim Forde, via teleconference from Ireland. Information on parliamentary privilege and the protection of witnesses and evidence has been provided to you. However, I remind senators and witnesses that parliamentary privilege does not apply to countries or persons outside of Australia. The committee has your submission. I now invite you to make a brief opening statement and at the conclusion of your remarks I will invite members of the committee to put questions to you.

Mrs Forde: My name is Kim Forde and I live in Queensland. I am an environmental professional with more than 25 years experience and 15 years direct experience working with the energy generation sector in the renewable field. I run my own consulting business and provide environmental systems and community support advice across my region. I was the environmental manager for renewables for Stanwell Corporation in Queensland for more than eight years, based in North Queensland, and supervised the environmental and community elements of the approval, construction and operation of the Windy Hill wind farm, for seven years, and the Toora wind farm in Victoria, for two years. I have maintained my association with Windy Hill and with the renewable energy sector and for the last three years I have provided assistance to RATCH Australia for providing community information with regard to the Mount Emerald wind farm. Therefore I feel that I have a voice of reality and experience to understand the impact, both environmental and community based, of wind farms on communities that they are in. I am happy to answer any questions you have.

Senator URQUHART: I have a few questions. If I do not get through them all are you happy to take them on notice?

Mrs Forde: I certainly am.

Senator URQUHART: Thank you very much. What would be the cost to the Australian economy and environment if we delay moving to renewables?

Mrs Forde: I believe it would be a significant cost. There has been a laid out process of transitioning to potentially one hundred per cent renewables that I have been involved in discussions since 2002. The potential was that we could be completely self-sufficient by 2020. I believe there will be an increased cost associated with the delivery of renewable energy from the traditional means and, as assets get older, certainly as the coal assets get older, the cost of increasing to supply from those traditional means will far outweigh the costs of moving to a newer more efficient technology, purely and simply because the cost of transport and approval and ongoing supply of fuel will be considerable. The huge benefit of renewables of course is that once you build them your cost of fuel is almost minimal and if we build them in regional communities close to those people who are using them you have a much more resilient supply, shorter transmission lines and the ability for the community to be involved in driving the demand, in what sort of fuel sources they use and in how those are operated in a way that benefits the community, that holds the cost down, and that invests in refreshing the technology as it is appropriate. That is a real benefit to community and Australia as a whole.

Senator URQUHART: I want to take you to a section in your submission in which you talk about the Mt Emerald wind farm, in Cairns. You said:

> A small group, of less than 10 very vocal people, and one local Councillor who failed to declare her vested interests and membership of said group, have helped delay this particular project for almost 4 years. They were responsible on 2 occasions of forcing their way into public meetings set up as information sessions for the general community with bull horns, waving banners and bringing along a group of 'rent-a-crowd' agitated young farm workers into areas where families, children and older residents were trying to get reasonable answers from proponents, and their technical experts, to their questions.

We have heard comments and evidence from witnesses today about how important it is to get the facts and for communities to actually have adequate information. Professor Chapman has found links between community concerns about wind farms and the degree of anti-wind-farm activity in the region. Do you have any further comments to make on that?

Mrs Forde: I agree with Professor Chapman significantly. I can give you an example. On one of the days we had an open day. A lovely women there who spoke to me said, 'I am so concerned about this wind farm. The noise they make. I cannot sleep at night. They are so noisy.' I said to her, 'But the wind farm isn't there yet.' She said, 'But the community group told me that they are so noisy they are like a jet engine.' I said to her, 'Please come and visit a wind farm. Have you been to one?' And she said, 'No, she had never been to an operating wind farm and neither had most of these people been to an operating wind farm to actually find out what it was like.' The fear and concerns of that poor woman. She is just one example I am giving. I think it is evident in a lot of

different places. The people's concerns are preyed upon. Certainly the fragile are preyed upon to increase fear and uncertainty, and their families then build on their concerns, and this is based on no experience. There was evidence of worries about noise, about land values, about impacts on birds and bats, about viability of farms and farm operations that have no basis in the evidence I have seen from the operating farms I have worked at. I do have concerns about the accountability of groups who are anti-wind farms. They do not seem to be held responsible for the fear they cause and the impacts they have on individuals.

Senator DAY: We were in Cairns yesterday and we had a whole roomful of people who testified that their properties had become unsaleable. So, to suggest that there is no evidence to substantiate their claims about land values is simply not true. To go back to your anecdote about the lady who had never seen a wind farm, did you actually take her to visit a wind farm.

Mrs Forde: Yes. What we did was have an open day at which groups of people were invited to come, including the protest group, and including this lady and her family—

Senator DAY: You took them to Windy Hill, I presume.

Mrs Forde: Yes, we went to Windy Hill.

Senator DAY: Do you think that is a fair comparison, given that Windy Hill turbines are 60 metres high and the proposed Emerald Hill turbines are 135 metres high, and that Windy Hill were 0.6 megawatts and Emerald Hill are three megawatts or more. The significant difference between the two—

Mrs Forde: Considering that we were standing underneath them, the evidence of the noise was, I think, a very valid comparison. We were having a normal conversation while standing literally at the base of the turbines.

Senator DAY: We are not talking about—

Senator URQUHART: Sorry, I just have a couple of questions I would like to finish.

Senator DAY: We all have.

Senator URQUHART: Sorry, I thought you were just going to clarify a point.

Senator DAY: We are just doing question after question because we are out of time.

Senator URQUHART: The comment was made that you had a follow-up question and I thought it was coming back to me.

Senator DAY: It was following up from yours. It was my turn. Getting back to the noise factor, we have heard all the evidence about inaudible sound, infrasound, which has been the main subject of the complaint. That seems to be the analysis by a number of scientists. I have stood underneath one of these wind turbines and whilst the audible noise is not particularly unpleasant, the infrasound, the sub-audible sound, is what seems to be generating the most concern. Do you have a comment on that?

Mrs Forde: It is my experience, and in the research that I have read. In my personal experience, I have had no personal negative impact of infrasound. The research that I have found is that there is as much or more infrasound generated at a beach, or under normal operating conditions of wind through trees, as is ever likely to be found at a wind farm. That is my own personal research and experience. That is my personal opinion. I believe that the infrasound, or the perception of the impact of infrasound, has blown out of all proportion—again, from people who have fears about the wind farm.

Senator URQUHART: I wanted to talk about the New Zealand research. I am not sure whether you are familiar with that, but there have been links that have been found between exposure to antiwind messages and people's perceptions of the impact of wind turbines on their health. Are you aware of that research?

Mrs Forde: I certainly am, and I agree that the perception of the exposure to antiwind messages certainly leads to uncertainty. I am actually in Ireland at the moment, and I was at an Irish wind farm in the south of Ireland yesterday speaking with people about exactly this process. They were talking about the fact that they have almost no protests here against wind farms and they find it quite amusing that in the places where there are new wind farms being proposed, places like Australia, there is a protest against it—where there is a protest group or people with an interest, or some perceived interest, in preventing them happening. Whereas here, where people have an alternative to wind—potentially nuclear—these people go, 'We want wind. We can't see a problem with it. We have them.'

The wind farms that I was at yesterday are of an equivalent size and distribution to Mt Emerald. It was one of the reasons I went: to have a look at what they look like, to hear them and to talk to the community. They have been in operation for five years and the community has no concerns.

CHAIR: I note here in your submission to the Senate inquiry that you are an environmental professional. What are your actual qualifications?

Mrs Forde: I have a degree in environmental science, planning approvals and environmental management, and I also have a bachelor's degree in education, which is one of the reasons why my focus is about community information and education.

CHAIR: You have no qualifications in acoustics?

Mrs Forde: No, sir, I have not. I have a lot of experience in talking to them, being a part of an operating wind farm team. My experience in that is purely practical, rather than theoretical, apart from a number of two- or three-day courses to allow me to understand what is required in terms of acoustic monitoring and how to read and interpret and understand the reports that I get back from them.

CHAIR: You were a consultant to RATCH-Australia?

Mrs Forde: Yes.

CHAIR: Thank you. Being that there are no further questions from members of the committee, I thank you for your appearance today before the committee, Ms Forde. We will now call Dr Christopher Hanning.

HANNING, Dr Christopher Douglas, Private capacity

[17:25]

Evidence was taken via teleconference—

CHAIR: I welcome you today via teleconference from the UK. Information on parliamentary privilege and protection of witnesses and evidence has been provided to you; however, I remind senators and witnesses that parliamentary privilege does not apply to countries or persons outside of Australia. The committee has your submission, and I now invite you to make a brief opening statement and at the conclusion of your remarks I will invite members of the committee to put questions to you.

Dr Hanning: First of all, thank you for staying late to accommodate me. It is a pleasure and a privilege to give evidence before such a distinguished committee. I have set out in my submission my views on the effects of wind turbines and the noise they create on human sleep and health. The only addition I would make to it would be to say how sad I am that it has taken so long for the evidence to be taken seriously and for actions such as your committee to take place. That concludes my statement.

Senator LEYONHJELM: Dr Hanning, would you describe yourself as an expert in sleep disorder?

Dr Hanning: Yes. I trained in medicine in the UK. I spent about 30 years starting and then running a sleep disorder service in the UK. Although it is a service I created, I think I can say justifiably say it is one of the leading services in the UK. I retired from the National Health Service seven years ago, but I have stayed very active in this field. And, yes, my expertise has been accepted by various courts and environmental tribunals and other such organisations.

Senator LEYONHJELM: In your submission you say 'Australian regulations on wind turbine noise are not fit for purpose'. Why do you say that?

Dr Hanning: I say that because clearly people are being harmed by the application of those standards, so they are too generous to the wind developers and not protective enough of the nearby residents.

Senator LEYONHJELM: The NHMRC's information paper that was released earlier this year, do you have any views on that?

Dr Hanning: Yes, I have set them out in my submission. They reviewed a selection of the literature. They applied, in my view, evidential standards that are far too high given the state of knowledge and the need to take preventive precautionary action. They came to conclusions grudgingly that there was a problem within 1.5 kilometres, but in my view they did not apply the precautionary principle properly. They instead applied what I would call the reactionary principle, applying standards that are far too high.

Senator LEYONHJELM: This debate of precautionary-reactionary has underpinned many of the submissions. You say in your conclusion:

> It remains the case that there is no credible research showing that wind turbines have no effect on sleep and health at the set back distances permitted under Australian guidelines.

The windfarm proponents say it is the other way round: they say there is no credible research showing that wind turbines have an effect on sleep and health at the setback distances. How do you address those two approaches?

Dr Hanning: I would say the wind industry is simply wrong. There are a large number of papers, which I set out in my previous submission and in the present submission, in which there is credible evidence of harm by wind turbines on humans put at the distances permitted by Australian regulations.

Senator LEYONHJELM: You noted that Steven Cooper's research results at Cape Bridgewater were consistent with the Kelley and NASA research from 30 years ago. You also noted that Bob Thorne had studied Cape Bridgewater wind farm in 2012 and 2014 finding wind sleep quality and adverse health effects on the residents. Were you surprised at this consistency?

Dr Hanning: As I say, I am not aware that there has been any study where an independent body has looked at health effects in a neighbourhood of a wind farm and not found any adverse effect. Obviously, it has all been anecdotal reports which have significantly led to the research, but nobody has taken, as it were, a random wind farm and studied it and said, 'Look, there's no response here.' It has not been done.

Senator LEYONHJELM: The proposition has been put to us—and particularly to me—that it is not wind farms per se that are the issue; it is infrasound from any source. It has been characterised in various ways. We will be hearing evidence from people who believe infrasound is adversely affecting them from a power station and a coalmine. What are your thoughts on that? Do you have anything to add to that?

Dr Hanning: No, I think that is outside my area of expertise. I have expertise in sleep medicine, not in infrasound.

Senator LEYONHJELM: We have heard from witnesses who have said that sleep disturbance is a very common phenomenon. It can arise from multiple causes and, obviously, not everybody who is within 1½ kilometres of a wind farm suffers adverse effects, and that the adverse effects that are claimed are being wrongly attributed to the wind farms. Do you have a view on that?

Dr Hanning: Firstly, they are quite correct. Sleep disturbance is quite common in the community. That illustrates the fact that there is a range of abilities to sleep and withstand things that will potentially affect your sleep, how easily you are awakened or how easily you are disturbed. That is well recognised, and about 15 per cent or more of the population are poor sleepers and about the same proportion who are noise sensitive. The studies that have been done show that the closer you are to a wind farm, the more likely you are for your sleep to be disturbed. That does not say that everybody is going to be disturbed. Those who are sensitive are going to be disturbed. It is important to note that those who are sensitive are a part of the normal population. They are not in any way abnormal. They are not putting it on. They are—in the same way that some people are tall, some people are tall and some people are good sleepers—poor sleepers. They deserve just as much respect and consideration as anybody else.

Senator LEYONHJELM: This sensitivity in poor sleepers is part of the normal distribution of the population?

Dr Hanning: Yes. In a normal distribution, there are very robust sleepers who are very difficult to disturb. There are people who are poor sleepers whose sleep is very easily disturbed. That is life.

Senator LEYONHJELM: Thank you.

Senator URQUHART: Do you have any qualifications in acoustics?

Dr Hanning: No.

Senator URQUHART: Have you ever had a wind farm development proposed near where you live?

Dr Hanning: Yes. If you read my submission, you would see that I live about 1½ kilometres from the Low Spinney wind farm.

Senator URQUHART: I have read your submission. I just wanted to get that on the record, Dr Hanning. When was that?

Dr Hanning: That was about five years ago now.

Senator URQUHART: When did you start your research into the potential health impacts of wind turbines?

Dr Hanning: About the time that the Low Spinney, which is our adjacent one, was proposed. It was preceded by another one a few kilometres south of us and medical colleagues, knowing of my interest and expertise in sleep medicine, asked me to help them in opposing the wind farm.

Senator URQUHART: So it was prior—

Dr Hanning: That is when my interest developed.

Senator URQUHART: Sure. The committee has heard that there are some countries which have a high density of wind farms where there are very few reports of concerns about the health impacts of wind turbines. Do you think there is something different about Australian wind farms or Australian people?

Dr Hanning: I doubt there is anything different about Australian people. As you pointed out earlier, I am not a acoustician; I do not know whether it is related to the type of turbine that is installed from the different manufacturers, the height of the towers, the density or the way they are set out. What is quite clear is that people are disturbed by these wind turbines, and their sleep is disturbed and their health affected.

Senator URQUHART: But are they any more disturbed than the general population? My understanding is that there has been a recent study on the incidence of different symptoms across the population and that study found that about 25 per cent of people report sleep problems regardless of where they live. I think you touched on that when Senator Leyonhjelm asked a question.

Dr Hanning: That is correct. Sleep disturbance and poor sleep is common in the community.

Senator URQUHART: Are you aware of any work that shows that the percentage of people reporting sleep problems in close proximity to wind farms is actually higher than in the general population?

Dr Hanning: Yes—the Nissenbaum study from the States that I was involved with. The closer you got to the wind turbines, the more likely your sleep was to be disturbed.

Senator URQUHART: So that is a US study?

Dr Hanning: There is evidence for that.

Senator URQUHART: Are there any others that you are aware of?

Dr Hanning: There was a recent review that has been drawn to my attention, by Anouk Honore, from Oxford and the States, that came to the same conclusion: the closer you are to the turbines, the more likely you are to be disturbed. That was a systematic review.

Senator URQUHART: If you would not mind, Dr Hanning, could you send the names of those studies to the secretariat, because I had a little bit of trouble hearing.

Dr Hanning: I can do that, yes. I could probably send the actual papers.

Senator URQUHART: That would be fantastic. Thank you for that.

There has been a lot of work by Professor Chapman here in Australia; he has pulled together a number of documents where people have complained about wind turbines, or where people believe that wind turbines are responsible for a number of conditions—more than 200, in fact. Those include bronchitis, cataracts, cold sores, dental infections, epilepsy, leukaemia, fungal skin infections, lung cancer and multiple sclerosis amongst that group of 200. Do you believe there is evidence that those sort of things are caused by a proximity to wind turbines?

Dr Hanning: The areas where we have most evidence are in annoyance and health. The other things you claim—I too would be sceptical as to whether they were directly related to the wind turbine noise emissions. However, sleep is a very important human activity and we know that if you have poor sleep it has all sorts of effects—increasing risk of blood pressure, increasing risk of obesity, increasing risks of cancer. Could there be an indirect effect? Yes. Are there direct effects? I doubt it. But having your sleep disturbed is a serious matter.

Senator URQUHART: Yes.

Dr Hanning: Whether these other effects occur or not is irrelevant. We have very good evidence that sleep is disturbed and that is a health issue.

Senator URQUHART: Yes, and I do not think there is any dispute about the lack of sleep and the effects of that. It is just about what the causes are I guess. I think you mentioned you are aware of the work of Steven Cooper.

Dr Hanning: I have looked at Steven Cooper's work, yes.

Senator URQUHART: So do you believe that the study he has done shows that there is a link between wind turbine activity and health impacts?

Dr Hanning: My reading of the study is that it gives good evidence that there is a causal link between the noise emissions and the health effects reported by the residents. It is a very small study but, because of the detail, I think it is very important.

Senator URQUHART: So you are saying there is a causal link. Do you think that the absence of any medical data or any medical experts in that study raises concerns?

Dr Hanning: The study is what it is—it was a study of those individuals and it set out to measure the noise levels, and it did that successfully. What Dr Cooper was able to do was constrained by the people commissioning the study. I am sure that, had he been permitted to do other investigations, he would have done so. Does it concern me? No. It just means that further research is necessary which would include more people and different health outcome measures.

CHAIR: I note in your submission to the committee you speak about vilification and denigration of people who make comment on this issue. Are you aware of any other industry that attracts such attacks to the same level?

Dr Hanning: I was using it as an exemplar of what Michaels had originally described. Certainly I think in the past the tobacco industry has been active in that way.

CHAIR: Are you aware of any other work similar to Steven Cooper's that has identified or looked into a possible link between infrasound and possible sleep disturbance?

Dr Hanning: Not in sleep disturbance that I am aware of. Schomer's work from the States has suggested a causal link between infrasound and some symptoms. The amount of work on infrasound and sleep disturbance is very small, with or without wind turbines.

CHAIR: Thank you, Dr Hanning. There may be questions put on notice for you, Dr Hanning, from the secretariat.

Dr Hanning: I would be happy to respond to them if I can.

CHAIR: Thank you. On behalf of the committee, I would like to thank all witnesses for appearing today and for their cooperation with this inquiry.

Committee adjourned at 17:44