REPORT OF PROCEEDINGS BEFORE

GENERAL PURPOSE STANDING COMMITTEE No. 5

INQUIRY INTO RURAL WIND FARMS

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At Sydney on Monday 9 November 2009

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The Committee met at 5.30 p.m.

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PRESENT

Mr I. Cohen (Chair)

The Hon. R. L. Brown
The Hon. A. Catanzariti
The Hon. R. H. Colless
The Hon. C. J. S. Lynn
The Hon. L. J. Voltz
The Hon. H. M. Westwood

CHAIR: Welcome to the fifth public hearing of General Purpose Standing Committee No. 5's inquiry into rural wind farms. Today we are hearing evidence from an academic from Sweden's Halmstad University. I now welcome Dr Eja Pedersen. Thank you for getting up so early to talk to us today. If the connection drops out we will redial to connect you. Before we commence I will make some comments about certain aspects of the hearing.

I draw the Committee's attention to the highly sensitive microphones that are being used today. Whispered conversations and comments may be clearly audible to the witness and audience. I ask everyone to turn off their mobile phones for the duration of the hearing, including mobile phones on silent, as they interfere with the videoconference and Hansard's recording of the proceedings. I also ask Committee members to introduce themselves when asking Dr Pedersen a question so that it is clear who is asking the question.

Dr EJA PEDERSEN, PhD Environmental Medicine, Halmstad University, Sweden, affirmed and examined:

CHAIR: What is your job title and your employer if you are appearing in any representative capacity?

Dr PEDERSEN: I am a researcher in environmental medicine. I represent the research area, and I will try to set aside my personal opinions.

CHAIR: Before the Committee commences asking you questions, if you would like to make a short opening statement that would be very much appreciated.

Dr PEDERSEN: I have read the questions you gave me. You sent me six different questions that I have on paper. I also read some of the hearings you had before on this matter from 11 September. I would like to say a few words before we start. Could you please switch on to my pictures? Can you see my power point presentation?

CHAIR: Currently it is blank but we can see you and ourselves in the top right-hand corner. The actual presentation is delineated with a line around it but there is nothing showing as yet.

Dr PEDERSEN: So it is not working. It should be showing now because I can see it on the left. What I wanted to say is that there is a lot of information on the Internet about health and wind turbines. One has to remember that all of this is not based on scientific research; rather, by fear from people who are opposed to wind farms. My plan was to show this power point presentation. You can still not see anything?

CHAIR: Nothing is showing. Perhaps I could suggest that at a later stage you email the presentation to us if possible and we will distribute it to members afterwards. In the absence of that working, perhaps you would like to discuss the issues from your point of view.

Dr PEDERSEN: I would like to start with the definition of "health", because we need to have the same definition when we discuss this. The definition that we use is from the WHO from 1948, and it says, "Health is a state of complete physical, mental and social wellbeing and not merely the absence of disease of infirmity." That is a rather broad health definition but that is the one that is used since 1948 by the WHO. That means that we are not just talking about cardiovascular disease or things like that but also about wellbeing and health in the broader sense. My plan was to ask you if it is possible to start with question 5 instead of taking them in the order that you have suggested. If I can start with question 5, I think a lot of things will be clarified. Is that okay?

CHAIR: That is fine, thank you.

Dr PEDERSEN: I will not be able to answer questions 4 and 6 because they are not within my research field. Question 4 is about consultation and engagement, and question 6 is about compensation.

CHAIR: That is fine, thank you. If you would like to start by answering question 5, that would be an ideal place to start.

Dr PEDERSEN: I have to try to explain with words now what I have on my pictures. It is a little bit difficult, but the main model for all the work we do is that people are exposed to a stressor of some kind. In this case it is noise from the wind turbine or it could be light or just the turning movement. When you are exposed to a stressor you give some kind of response. It could be that you are annoyed or you are disturbed in your sleep.

This response in turn indicates that you could be affected physiologically if this goes on for a long time. So that is the main base for this research. You have a stressor, you get a response and the response indicates that you also have an effect on the body of some kind. That is not my idea. That is what all these people who work in this field has in their head when they think of this.

We have several aspects when it comes to wind turbines that is different from other kind of stressors. For one thing, if we go to sound, the sound is emitted from the wind turbine but then something happens on the way to the house, of course, so we have a sound emission or "immission", you would probably pronounce it, at the house that is not exactly the same as from the turbine. For one thing, the levels are lower with the distance, but the character can also change on the way. Then we have the situation with wind turbines which is not so common for noisy industrial things. They are in a rural area, and that means that we have to consider things like the terrain, the degree of urbanisation and meteorological factors as the noise is dependent on meteorological factors. Also the visibility that I will talk about later, because you have especially asked about that. Those are the situational factors.

Then you also have individual factors. Everybody is unique and we are differently sensitive to things. We are differently sensitive to noise, for example. You can just ask around among your friends and you will see that some people are very sensitive to noise and other people are not at all sensitive. Attitude plays a role. What I would like to stress is that expectations, that is the key word in this. What expectations do you have of your living and your area? If you buy an apartment in downtown Manhattan you do not expect it to be quiet and nice and green or so, but if you decide to live in a rural area then of course you have other expectations of the landscape. So that is something. So this noise emits from the wind turbine and comes to your house, and we are mainly talking about outdoor noise now. In some cases it can also move indoors but I found that is very dependent on what country you live in because people build their houses differently.

I did a study in the Netherlands and their windows are constructed so that the noise sometimes goes into the buildings. In Sweden we do not have that problem because our houses are so insulated and we also have triple glazing, for example. This noise can create, depending on the expectations and the situation, noise annoyance, of course, which is not so difficult to measure because you can just ask people. You can send them questionnaires and so on. Sleep disturbance could be one thing, if you sleep with your window open or if you have a not so solidly built house. Then we have various stress symptoms.

The problem with this is that all these connect and it could always be that it is the other way. You get annoyed by the noise but if you are stressed for something else in your life—it could be personal stresses like a death in the family or something like that; it could be stresses at your work, for instance—then you are more vulnerable to be annoyed by the noise. So this goes two ways, and that is very difficult to distinguish. It may be a political matter how much you take care of these individuals who have not as good coping strategies as other people have.

The main big studies we did were three what you call cross-sectional studies. You do not follow people around for a long time; you just do it one time. What we did was we did two studies in Sweden and one in the Netherlands. In these studies we calculate the noise from wind turbines at each person's house, and we also sent out questionnaires. I do not know, you are probably aware that there is a lot of debate about wind turbines so we do masked surveys. We send out the questionnaire that is about your living area. How is it to live in this area? Then we ask about everything so that we will not get an opinion poll; rather, a survey in this case. We ask about living environment, roads and everything like that and our questions about turbine noise.

We did two large studies in Sweden and one in the Netherlands. Altogether, we have almost 2,000 people in our database now. We really needed the pictures here. In the first Swedish study and in the Dutch study the landscapes were almost the same. It was very flat. We had tall wind turbines in an area with scattered houses, and that is almost the same in the Netherlands as in the first Swedish study. You see a increase of the annoyance with sound levels. In the second Swedish study that I have characterised as more complex terrain, hilly and some suburban areas, we did not have as much annoyance. I would like to have shown you some pictures because I think the situation in your area is quite different. We do not have these high mountains and we are not placing the wind turbines on the ridges. So I do not have any examples of that in my studies so I do not know anything about that.

What we did find, to summarise—I am looking through my pictures—is that wind turbine noise creates annoyance and sleep interruption. There is a connection with sleep and that is quite problematic because the question there was, "Are you awakened by any noise in your sleep?" This was not connected to wind turbines. It

may be from other research. The main source of noise disturbance for sleep is snoring from the person who sleeps in the same room as you. That is the main exposure. So you always have in Western society around 10 to 20 per cent that will answer a question like that: "Yes, I get disturbed in sleep once in a while". When we connected this with wind turbine noise we could see a little rise at the higher sound levels. So this is something we are going to look into more.

You have discussed, I see in the papers, a different way to calculate the noise at the houses and one is what you call the New Zealand standard. If you do this with the New Zealand standard then you have a little rise around 40, 45 for disturbance in Sweden and in the Netherlands it is about 45, if that helps you. That was the answer for question 5. Do you have questions for me?

CHAIR: Thank you for that. With the sleep disturbance, and it is interesting that you raise the snoring issue, do you see it in terms of the wind turbines as being an actual physical disturbance or more a psychological disturbance for people who are perhaps not well disposed to the concept of wind turbines being in their living area or their greater living visual environment?

Dr PEDERSEN: I think it goes both ways. I think you can find both aspects. You can find people who were surprised that they were disturbed by the turbine. They were maybe in favour in the first one and then they got disturbed by it, and you can see the other people who have some kind of more not so well coping strategies for all kinds of stresses in their life who have difficulties to cope with stress and will get more stressed. That is all I can say about that.

CHAIR: Would you have any figures in your research? It is interesting to hear of people who did not expect to be disturbed but were in fact disturbed. Perhaps if questions are asked and you cannot provide the answer now perhaps you could take it on notice and provide the answers at a later stage. That would be quite appropriate.

Dr PEDERSEN: I did an interview survey—a qualitative study—and I did bring two quotes if you would like to hear those?

CHAIR: Yes, thank you.

Dr PEDERSEN: I have an example of two things. Because you have all seen one of the questions asked: Do people resign when they get the wind turbines or not? I have an example of that and I have an example of the other thing. One person is saying, "I saw it as a positive development. We didn't have any wind turbines here and because of that we did not know what they were. Then we got to know that it meant that every time you went into the garden or looked in that direction it was spinning. It just spins and spins. It gets irritating." That was one person.

I have another one: "It is nothing that I go round dwelling on because that is just how things are now and there is not much I can do about them. I can't shut them down. You might as well accept it. I would never take things to court. I'm too lazy for that." When I send you the PowerPoint presentation you will see the citation and you can see the reference and what article that is.

CHAIR: Thank you. You mentioned noise at the site of the wind power generator and you mentioned that the character changed often at the point of the house. Are you talking there of a physical character change not only, of course, decibel levels and distance, but is there a different type of noise that would hit a house, be it half a kilometre or a kilometre away? Is there something that we need to hear about that character?

Dr PEDERSEN: Yes, it is the physical change and maybe you should talk to a acoustician about that because the sound propagation from the turbine to the house, and we are in this case talking about distance where people live, maybe 500 metres and a kilometre or so, at generation and the thing that lowers the noise level is different for different frequencies. Wind turbine noise has a broadband frequency; it goes from very deep tones to very high tones, exactly like the wind in trees or the sea or something like that. The most natural sounds, except for birds, have this broadband sound and when it travels, the high frequencies attenuates faster than the lower frequencies.

The most troublesome in the wind turbine noise is the amplitude modulation. That means that the sound levels increase and decrease with the pace of the rotor blades and we get this swishing sound and this, of course, tricks the ear, because we were all equipped once in a while when we needed to be very careful when we walked

in the woods a long time ago, whenever it was, and we walked around there and if there was a change in sound then we should certainly pick it up, not just with our ears but with our whole body, to get ready—should we run or should we fight. That is the basic physiological thing here. And if there was a change—it could, of course, be a tiger stepping on a stick—then we should pick it up like this. So this change that goes on all the time is troublesome for people and of course this change also changes with the distance because of physical reasons. That is why wind turbine noise is more troublesome than other types of more even noises.

CHAIR: I will pass to Mr Colless now for some questions.

The Hon. RICK COLLESS: The question I have relates to a terminology we have in Australia that we call "not in my back yard". People, while they may be generally sympathetic to the concept of wind power, would prefer not to have it in their immediate locality. Do you think that that is a real issue and is that something that may well lead to some of these health issues that have been raised as being perceived rather than real?

Dr PEDERSEN: There has been a lot of research about this "not in my back yard" issue when it comes to wind turbines. Professor Maarten Wolsink has written a lot about that and he states that this is not applicable really on wind turbines because if you get a fair and equal process then this phenomenon did not appear. I can also say that in some of my research it is more complicated to just refer to this "not in my back yard". I am looking for what Professor Wolsink said because I have brought that with me also.

His finding is that the planning stage of wind turbine projects should be carried out so that it is perceived as objective, transparent and fair, and if that is so then there will be not this NIMBY phenomenon. But I have not looked into this; this is not my research. You have to distinguish between the attitude and the health here because they are two aspects. Even if though they are connected so that if you are opposed to wind turbines you are more likely to be annoyed. But, of course, you do not know what comes first: Are you annoyed and that is why you do not like wind turbines or you do not like wind turbines so that is why you are annoyed? It is difficult to say which is the first one.

There was one question from you about this statement that people are less opposing the wind turbines after they have been raised. Was that a question?

The Hon. LYNDA VOLTZ: Yes.

Dr PEDERSEN: That is from his research: that is quite correct. Not so much when it comes to big wind farms but when it comes to small wind farms and one or two turbines. I will send you the reference too so you can look it up yourself. What happens when there are no people who know about this planning and have an attitude like this, then they get to hear that there is going to be a wind farm in their area, people are very negative from the go set and then after they are raised they are more positive. But that is the attitude to that question. The actual impact, I would say we are quite good at this stage to calculate the noise emission, to describe for people what the noise will be like.

We can, of course, take care of flickers—the light that appears when you have the sun behind the rotor blades, so it will be like a blinking light. We can take care very easily of that because we just turn it out a few minutes: we will stop the turbine. I think it could be predicted quite well how the noise and light will affect you.

The Hon. RICK COLLESS: With the annoyance factor, does that manifest itself as a real health issue or is it more something that is perceived by those people that are annoyed by the turbines being there?

Dr PEDERSEN: At this time we cannot distinguish between that. I would say it is a very large individual range here. If people already have worries of something else, another worry would lead to bad health, of course.

The Hon. ROBERT BROWN: In the two studies that you did were you able to establish the general age of the technology that was in use in the wind farms? The reason why I ask the question is if you have a look at some of the submissions we received from the wind farm proponents and we referred to studies in Europe, generally they say things like it is old technology and the current turbines are much more quiet, there is no gearbox noise, it is only blade noise. How old were the particular wind farms in the vicinities of the people whom you studied?

Dr PEDERSEN: They were all different ages—up to 10 years or even more. But you have to remember that they were all what we call upwind wind turbines so the rotor blades will be in the upwind direction and that, of course, makes a difference. But I do not think there are any downwind turbines operating nowadays—maybe in California in the desert areas there—so they were quite different, and I agree that this machinery noise that was heard from the old ones especially, it was not so high actually when they were operating but more when they were seeking wind. When there was very little wind they were seeking the wind like this and that would make a mechanical noise. This is not common at all nowadays. So I agree on that statement that that was different. But our people live at the distance that the mechanical noise was not at all dominating; it was the noise from the rotor blades, the turbulence by the rotor blades, so that it is the same as for the new turbines.

The Hon. ROBERT BROWN: You describe the terrains as being flat in both sites with scattered houses. Was there much vegetation on the sites or was it like farmland with no vegetation?

Dr PEDERSEN: On these two studies that we saw the most annoyance it was farmland. The second study in Sweden when we had less annoyance, there were more trees and bushes, yes.

The Hon. LYNDA VOLTZ: I seek some clarification. You said some of the houses were within 500 metres of wind turbines. Was that the closest distance the turbines were as part of the study?

Dr PEDERSEN: No. I think the closest one lived 280 metres.

The Hon. HELEN WESTWOOD: If I could just expand on the answer you gave to Ms Voltz? Did your study find a significant difference in the impacts on health at a particular distance from the wind turbines?

Dr PEDERSEN: Yes. As we calculated the noise at different places for each person, we saw a decrease in sleep disturbance and annoyance with higher sound levels. That also means that people who live further away who had not so high sound levels had less annoyance and less sleep disturbance because the distance is connected with the sound levels. The further away you live, the lower the sound levels, but we cannot distinguish between sound levels and distance because they are so dependent on each other.

The Hon. HELEN WESTWOOD: Was there a particular distance where the difference was significant? I ask that because one of the suggestions we have had from submissions and witnesses is that wind turbines should be no closer than two kilometres to a residence and others are suggesting that 500 metres is sufficient.

Dr PEDERSEN: Yes, I think it is good thinking but I cannot say a special distance, because sometimes we have one small wind turbine and then the noise was not so bad at a distance of 300 metres or 400 metres. In other cases we have big wind farms and you get the noise problem maybe already at—not until 600 metres or 700 metres. It depends on the size of the wind farm and the noise emission of course. When you say this with the distance, it is good thinking in another way because of the visual impact that you also asked about. What about the visual impact? I have only talked about the noise now. Should I say something of the visual impact?

The Hon. HELEN WESTWOOD: Yes, please?

Dr PEDERSEN: Because it is a large influence. If we have two areas, we have calculated the same sound levels for these areas and if you cannot see them, you have less annoyance than if you can see them. Do you follow me?

CHAIR: Yes.

Dr PEDERSEN: Why is that? You can think about that. There are two explanations for this. One is that people do not spend their outdoor time in that direction, as we think they are, in the direction of the wind turbines. Maybe they have their outdoor equipment on the other side of the house; for example, the barbecue or whatever they have in their garden. When they are spending time outdoors, they would not see the wind turbines, but that also means that the noise will be hindered by the house. So the noise levels that we have calculated for them are not as high at the place where they actually spend their time. So not seeing them could, in this case, mean not being exposed to much noise and therefore not being annoyed.

That is one explanation. The other one, I think, is important to consider. It is that we are all equipped with senses: eyes, for instance, and ears. This also goes back to the time when we were in the woods seeking food; hunting. If we are stimulated in two of these senses at the same time—maybe we hear the tiger but we do not really react first, but then when we see the tiger at the same time as we hear it, then we will run. It has to do with the multi-modal effect—two senses. It is like one plus one will be three, not two. This multi-modal is special for wind turbines compared to other noise sources because often you do not see the other noise sources.

The Hon. LYNDA VOLTZ: When you said the house was shielding, is that also true for vegetation?

Dr PEDERSEN: No. Vegetation makes the wind turbines not visible, but it does not take away the noise. It has to be a solid construction to terminate the noise.

The Hon. LYNDA VOLTZ: So the correlation is probably more the first one where you are getting a physical structure impacting on the noise as opposed to the fear and flight reaction where you are not seeing it, you are not hearing it and you are not making the link?

Dr PEDERSEN: I am sorry; I did not follow you there.

The Hon. LYNDA VOLTZ: The second one is the fear and flight reaction, where you physically see something and hear it and you react because there is more than one sensory perception?

Dr PEDERSEN: Yes.

The Hon. LYNDA VOLTZ: Vegetation would therefore impact on the data as it shields you physically in that you cannot see it and therefore it is limiting that reaction?

Dr PEDERSEN: Yes. Trees will take away this multimodal effect because then you would only hear it but not see it, yes.

The Hon. CHARLIE LYNN: Going back to the definition of health and wellbeing, are there different types of landscapes more suitable than others. For example, if the landscape is deemed to be relatively worthless; for example, desert as opposed to landscape that is perceived to be beautiful rolling hills, trees and so forth, so that when you put these wind farms up there, they are seen by many to be a blight on the landscape, maybe even for those who cannot hear them but they can see them on a distant mountain and what was once beautiful to them is now permanently disfigured. Is that an issue?

Dr PEDERSEN: Yes, certainly. That is a very interesting question, I think. I think there are two levels on this. One is the cultural level where we all can agree on what is a beautiful landscape and what is not a beautiful landscape. If this landscape that we consider as beautiful is destroyed in our opinion, of course we would not feel so good about that. Sweden is a country where people spend a lot of time outdoors and they are very aware of recreational areas and care about them. People also have summerhouses and these areas with summerhouses, of course it is not so suitable to put them up, but this is one level. I think that is not so difficult to find out what is good and bad.

But then there is the individual level and in one of my studies I found that people living in the rural areas—and this is in Sweden; I do not know about Australia and people living in rural areas there, but I found that there were two different expectations of the landscape. I try to say that clearly because I think it is rather interesting. One expectation of the landscape was that it was a place for economic growth and technical achievement. People actually have their income in the landscape, of course. These people were indifferent to the exposure from wind turbines. They thought of the wind turbines as objects placed outside their territory. They said, "Well, their neighbours can do whatever they want. If they want to grow carrots, have cattle or if they want to put wind turbines up, they can do what they want on their land. I'll do what I want on my land."

Then we have the other category of people, who said, "I think this place should be a quiet and peaceful place suitable for restoration", and noise, flickering light and rotary blade movements reached into their homes, and they sometimes felt violated. This could be summarised that they felt an intrusion into privacy. They put up a fence but the fence does not help for noise, light and things like that. They thought the wind turbines came into their private life. These are two different approaches originating from different expectations of the landscape.

The Hon. TONY CATANZARITI: Are there various sizes of turbines in the area where your studies were conducted and if so, what sizes were they?

Dr PEDERSEN: There were all different sizes because they were put up at different times. The smallest one in the Swedish study was 600 kilowatts and in the Dutch study, 500 kilowatts, and they were up to two megawatts. Two megawatts is still the most common one put up in Sweden today.

The Hon. TONY CATANZARITI: What about in height?

Dr PEDERSEN: The height differs from 30 metres for the small ones—I do not have the figures in my head—but they are commonly 80 or 90 metres for the ones that are two megawatts.

CHAIR: In your report on wind turbines: Low-level noise sources interfering with restoration—and I appreciate you did mention earlier the mechanical noise often with the turning or finding of the wind—you said quite clearly:

> While an increased risk of ischaemic heart disease is generally found for occupational noise around 85 decibel and such like over transportation noise above a daytime average of 65 to 70 decibel …

Do you have any information at all that a specific link of any physical problems can occur with the wind turbine noise similar to what you are describing there?

Dr PEDERSEN: No, there is no such link. I could not promise of course, but I am quite sure that such work has not been done and such link cannot be connected. What you need to do is longitudinal studies and look at a group of people who did not have the wind turbines and then they put up wind turbines, and follow them for 30 or 40 years. That has not been done. A study will probably just catch a few people. It is a very large individual variation here and there are no connections like the ones you are suggesting. Why I put that in the paper is to get some proportion of this matter.

CHAIR: Are you aware of Dr Nina Pierpont and her work on health impacts of wind turbines and, if so, do you have an opinion on this research?

Dr PEDERSEN: That is a tricky question. Yes, I am aware of the research and I would rather not comment on it.

The Hon. ROBERT BROWN: In your paper on page 3 there is graph, which shows the percentage increase in proponents broken up into various categories of "did not notice", "noticed but not annoyed", "slightly annoyed", "fairly annoyed", and "very annoyed" as the sound pressure level increases. It is interesting that amongst those categories of people who were "very annoyed" or "fairly annoyed", or even the ones who were "slightly annoyed", the graph is fairly straight line and fairly low level until it reaches a point of about 38 dB(a), and then it starts to increase exponentially. When you look at the people who either were not annoyed at all or were only slightly annoyed, at that point it actually flattens off.

Dr PEDERSEN: Yes.

The Hon. ROBERT BROWN: Is there any explanation for that?

Dr PEDERSEN: Not really. There were not so many people in that noise category so there could be something wrong. I did some research after the one you are referring to and one interesting thing is that, when you compare Sweden and the Netherlands, in Sweden we have a regulation that there should be no noise above 40 dBa at 8 metres per second wind speed—this is all dependent on the wind speed. When it is 8 metres per second at 10 metres height it should not be more than 40 dBa. We have this rise just before 40. In the Netherlands they have a similar rule but it is 45 dBa, and the rise occurs just before 45. You could say that maybe the noise gets more aggressive at that time, so you get more people that are very annoyed and not so many who are slightly annoyed.

The Hon. TONY CATANZARITI: When we are talking noise and decibels, at what level does noise interfere with health?

Dr PEDERSEN: That is an interesting question because noise comes and goes all the time with the wind, as I said. If we calculated this the New Zealand Standard way, we would say the annoyance rises

somewhere around 40 dBa—a little bit before 40 in Sweden and a little bit later in the Netherlands. We get a larger amount of the population that are annoyed. I do not know if you aware of other noise policies. There are always some people that are annoyed; even if you take the lowest levels of noise there will always be 10 per cent of people annoyed. Take traffic noise as an example. I think politicians try to find a level where you still have this 10 per cent and not more. In the studies we have done we see a rise a little before 40 in Sweden and a little after 40 in the Netherlands.

The Hon. HELEN WESTWOOD: If you have looked at some of the submissions we have received and perhaps some of the transcripts of our hearings you will see we have had quite a lot of reference to wind turbine syndrome. I wondered whether any researchers of healthcare professionals in either Sweden or the Netherlands, where you are doing most of your work, have identified that syndrome, and whether there is any known treatment for that syndrome.

Dr PEDERSEN: These are quite delicate questions when it comes to other people in the research field. I have not found any wind turbine syndrome. For me it is nothing I have seen. I think you must think very carefully about how these results are presented to you. The common way within the research society is that you get funding from a solid economic research place and you do your research and then it is published in what we call peer review journals. That means that at least two, often three, well-known researchers within the field have really looked into what you have done, made changes, and said, "You cannot publish this" or "You can publish this." You have to distinguish between these two.

Another thing I was approached about was vibroacoustic disease. I do not know if you have been told about that. I can say something about that, because that is physiological and we know about that. Vibroacoustic disease is something that appears with very high vibrations for people who are working with special machinery, like really heavy industry machinery, and the vibrations will be so heavy their cells will be disturbed. There is no way that this could be in the case of wind turbines so I do not know why that is brought up as an issue. It does not have anything to do with wind turbines.

CHAIR: We have at least one more question. How are you placed for time? Is it okay to extend this hearing for a few minutes or are you pressed for time? I appreciate that we are five minutes beyond what we had agreed.

Dr PEDERSEN: I enjoy this and I have the time. My colleagues have not come yet to my work.

CHAIR: We have the luxury of being at the end of the day and you have the pressure of being at the beginning of the day. Perhaps we will have one more question.

The Hon. ROBERT BROWN: Here in New South Wales the planning authorities seem to have set the levels for measurement of noise at sites such that the development is constrained by a noise level rating at the boundary or at the residence of 35 dBa, or 5 dBa above ambient, whichever is the lower of the two. Comparing that to the European standards you were talking about, would you call that precautionary or is it not enough to make a difference between, say, New South Wales—

Dr PEDERSEN: Yes, it is precautionary. I can comment on some things there. You have to be very clear what you mean by 35 dBa. Is that at a special speed or when is it? Is it an average? The one thing I think they do wrong both in Sweden and the rest of Europe is that they cannot communicate to the public what we mean by 35 dBa. The sound will differ all the time. The limit is one thing but when you communicate it to the people who are living there I think it would be good to say that when it is windy, when it is 10 metres per second, for example, it will be this level, and when it is 8 metres per second it will be this level. People think they are cheated on because they say, "Someone said it wouldn't be more than 35dBa" and the developer will say, "This is just when it is 8 metres per second, now it is 10 metres per second, so now it is more."

It has a lot to do with communication. You also have to remember the amplitude modulation when you say it should be in relation to the background sound because if you have amplitude modulation it is much easier to pick up the sound even if you have high background levels—the swishing sound. That is why alarms go "Wah, wah" because you can pick up the noise even if there is background sound. You have to think about how relevant this is in relation to the background sound.

CHAIR: Dr Pederson, it has been a very worthwhile and interesting interview process. It is fantastic that we are able to have this face-to-face discussion, which I think has real value. It is the first time this

Committee has done it in New South Wales and I think it has been invaluable to get your perspectives on these matters. If it is okay with you, there may be some other questions that have arisen from our discussions today that the staff will be able to send you. If any other thoughts come to you after we hang up, please feel free to send us other comments if you feel something has been left out. I would like to thank you very much for your participation and the effort you have made. It has been very effective communication.

Dr PEDERSEN: Thank you.

(The witness withdrew)

(The Committee adjourned at 6.24 p.m.)