Emeritus Professor Colin Hansen
School of Mechanical Engineering
University of Adelaide

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Mr Michael Moore
CEO of PHAA

Dear Mr Moore

I am writing to correct some errors of fact that you have on your wind farm noise web site and in your media release of 10 November, 2013, on this subject. It is unfortunate that your media release and web site misrepresent a number of facts, thus misleading to the general public while seeming to be confidently expressing an expert opinion. By way of introduction, I have been working in acoustics and vibration for more than 40 years and am the author of a number of books and a large number of research papers on the subject. I have been working on wind farm noise since 2011 and in 2012 I was awarded an Australian Research Council grant for a project titled, "Quantifying the impact of wind farm noise on rural communities". I have also worked with the WHO on occupational noise and the resulting document which I helped put together can be found at:
http://www.who.int/occupational_health/publications/occupnoise/en/

The main issue I have is that of you mis-quoting the World Health Organisation's recommendations for acceptable night-time noise limits in a bedroom. I refer you to Table 5.4, page 108 and Table 5.5 on page 109 of the World Health Organisation, 2009 document titled "Night Noise Guidelines for Europe". The table is repeated in the executive summary. In the table you may notice that the levels referred to are "**outside**" noise levels, not "inside" noise levels as implied in your press release advertising your new web site. You will also see that below 30 dBA outside noise level, there will be no adverse health effects (based on the noise having a similar frequency spectrum to traffic noise if it is reasonably continuous in nature). For a 40 dBA **outside** noise level, adverse health effects will begin to become apparent in some of the population as shown in Table 5.4, page 108. As the attenuation of buildings subjected to traffic noise is generally accepted to be between 10 and 15 dBA, this translates to a noise level of less than 30 dBA indoors where people are trying to sleep. Thus your statement, "environmental noise disturbing sleep is a public health concern and the World Health Organization recommends night time noise be under 40 decibels" is misleading at best. Not only is it misleading, it is very sloppy reporting as there is no mention of this level being an A-weighted level or dBA, which has a completely different meaning. This error is also carried through into many of the FAQs on your web site.

There are several other facts concerning with wind farm noise that are mis-represented in the FAQs on your web site. These are listed below

1. In your FAQ, "Is there any evidence that wind farms are harmful to human health?", you write: "The reviews agreed that a small subset of people close to wind turbines find their noise annoying and that this could be a stressor leading to poorer sleep." This is a misrepresentation of the conclusions reached by many of the studies that have been done in

this area. Many other studies have shown a link between wind farm noise and sleep disturbance and your FAQ omits reporting these.

2. In your FAQ, "How much noise does a wind turbine generate?" you state: "Wind turbines in the 1.5 to 3.0 MW capacity range — the range typically used for onshore utility wind generation — produce between 100 and 106 decibels of noise at the rotor hub." Then you go on to state that this level decreases with distance so it will be 60 decibels at 140 m. When you quote A-weighted sound levels, it is important to use dBA to avoid confusion with unweighted levels. Also, the 100-106 dBA that you state exists at the rotor hub is not a sound pressure level measurement at the hub. It is a sound power level that is calculated from measurements made on the ground according to the relevant standard. This sound power level is then used to calculate the sound pressure level at various distances, which is what our ear responds to.

3. In your FAQ, "How much noise does a wind turbine generate?" you state: "At the closest houses, wind turbines will still be audible outside much of the time, but typically at 45-47 decibels, which is about as noisy as a quiet suburb or a conversation at home". As wind farm night time noise levels are set by regulators at a level that is intended to minimise sleep disturbance in the majority of the population, I presume this statement refers to night-time noise levels. I have done many outdoor noise measurements in suburban Adelaide and seen the results of measurements done by others, and unless the location is adjacent to a main arterial road, levels due to traffic noise typically vary between 25 dBA and 30 dBA. If the wind is blowing strongly and there are trees around, the noise levels will be higher but in these cases people usually have their windows closed and the higher frequency tree noise is not as intrusive as low frequency noise from wind farms. So your statement of 45 to 47 dB (I assume you mean dBA) being typical of a quiet suburb is simply not true or at best misleading, at least for Adelaide and I suspect for other Australian cities. When water pumping stations that produce low frequency noise are located in politically sensitive suburban areas in cities, you will find that the allowable external noise levels at the pump station boundary or at the boundary of the nearest residence are 30 dBA or less. So do you think people in rural areas deserve less consideration than suburban residents?

4. In your FAQ, "How much noise does a wind turbine generate?" you state: "Most of Australia's wind turbine setbacks are based on achieving 35-40 decibels of noise at night in the closest bedrooms. This is in line with World Health Organization standards for average night time environmental noise. Again, this is not correct. The WHO recommended levels of 40 dBA are for outdoor noise, not noise in people's bedrooms.

5. In your FAQ "Does audible noise harm health?" you state that "Humans typically are exposed to noise constantly, at all frequencies and at peak volumes of well over 100 decibels throughout their lives." This statement is at best misleading. Presumably you mean A-weighted levels or dBA, as that is what wind farm noise guidelines and the allowable industrial noise of 85 dBA are written in terms of. Very few people are exposed to 100 dBA and louder without having to wear ear muffs or ear plugs, apart from those who frequent night clubs, most of whom, as a result, will suffer substantial hearing loss as they age. In any

case, how many people do you think are exposed to these sort of peak levels when they are trying to sleep (you do use the word “constantly”)? I was wondering if you realised that minimising sleep disturbance is the main reason for the allowable levels of industrial noise experienced in the community being set as low as they are.

There are a number of aspects of wind farm noise that should appear in a well-balanced web site and which are missing from yours. These are listed below.

1. The character of wind farm noise varies significantly from traffic noise on which the WHO document is based. Wind farm noise as experienced at residences some distance from the wind farm is dominated by the low frequency part of the spectrum which people find much more intrusive and annoying. Also this low-frequency energy is less attenuated by house walls and roofs than energy that is spread over the mid-frequency range, such as traffic noise on which the WHO outside noise level recommendations are based.

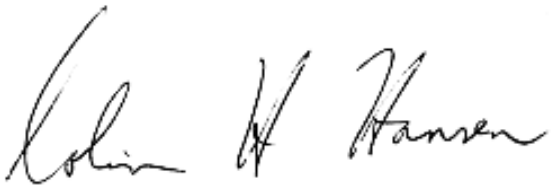
2. The WHO recommendations are for urban and suburban Europe, where general background noise levels are much higher than they are in rural Australia and consequently, people in Europe are generally able to live with higher noise levels without being annoyed.

3. Wind farm noise levels that are reported as a result of compliance checking represent a regression line fitted to over 2000 data points on a plot of measured noise level vs wind speed at hub height. Each data point represents a 10 minute average sound level measurement. As wind farm noise is well known to fluctuate in level by many dB, it is apparent that the maximum noise levels experienced by residents are well above the level that is reported from the testing. Even the 10-minute average noise levels can be 10 dB above the level determined from the regression analysis for many 10-minute periods. During these 10-minute periods, the maximum noise levels can be even higher. This is important in the context of the WHO document, which discusses the level of noise needed to disturb a sleeping person. Wind farm noise generally varies much more than traffic noise and thus the difference between reported average levels and maximum levels is likely to be greater for wind farm noise. Also, the WHO document makes no mention of fitting a regression line to data that effectively ignores the importance of the higher values. Nevertheless this is what is done in wind farm compliance checking.

4. The use of a regression line to fit measured data (noise level vs wind speed at hub height) makes no sense for characterising noise at residences, as the wind speed at a residence often bears no relation to the wind speed at hub height, especially at night when wind shear is often the greatest.

5. The WHO document referred to previously on page 99 does suggest an upper limit for allowable transportation noise of 42 dBA for single events. The WHO document states, “on the basis of the present available evidence we propose to assume that NOAELAmax = 42 dB(A) and set a health-based night-time noise limit that does not tolerate transportation noise events with LAmax > 42 dB(A)”. Current guidelines in Australia for wind farm noise do not mention this allowable upper limit for a single wind farm event.

The above comments leave me wondering whether your organisation is really interested in protecting public health or whether it is a platform for wind farm developers to attempt to influence the general public.



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