

This is a brief, largely non-technical, submission from Dr Neil I Smith to the Senate Community Affairs Committee on the social and economic impact of rural wind farms. At the end is one technical matter which is most important in relation to acoustic measurements associated with wind farm studies.

I hold a Bachelor of Science degree awarded in 1966, an Honours degree in Electrical Engineering (1969) and a Ph.D. in Electrical Engineering (1981) from the University of Adelaide.

The business of this inquiry is of the utmost importance. Wind farm proliferation has continued for far too long in this country (and others) without there being adequate consideration of health issues and adequate scientific research being performed.

I wish to state from the outset that I am of the opinion that it is of the utmost importance that the public and the private sectors in Australia invest heavily in renewable forms of energy such as wind and solar in order to reduce our dependence on those forms of power generation which increase the concentration of carbon dioxide in the atmosphere. If renewable energy systems are not pursued with the utmost commitment by our political and community leaders the world is threatened with the most dire consequences of human-induced climate change.

But it seems that the currently most-favoured technology (based on investment to date) is the wind turbine farm of some tens of horizontal-axis three-bladed rotors mounted on towers tens of metres high and sited along ridgetops in thinly-populated (but certainly not deserted) rural areas. Such wind farms are proliferating with what seems to me (for a number of reasons) to be undue haste.

### **Health effects.**

Firstly, it is indeed becoming apparent that indeed there are adverse human health effects of these wind farms. I won't go into this - other submitters with expert medical knowledge will be informing the committee. There has been grossly insufficient research into these matters, and it must be remedied.

Furthermore, some companies involved with wind farm developments appear to be actively denying any adverse health effects when in some cases they know them to be true. The imposing on farmers who lease land of confidentiality agreements which prevent them speaking publicly against any aspect of the arrangement is a symptom of this. The situation is reminiscent of tobacco companies maintaining for decades that cigarette smoking was harmless to health, whereas it is now widely accepted that the habit causes lung cancer and several other diseases. The more that wind farms proliferate under such perverse conditions the greater will be the eventual cost of remediation.

### **Are wind farms really what we really need most?**

Secondly, I feel that large-scale private sector investment and government support for wind farms of this type is largely misdirected. Australia has vast resources of sunshine, including in areas in close proximity to the existing electricity grid. A series of large-scale solar thermal power stations incorporating molten salt storage have the

potential to generate much larger and much more constant amounts of energy than wind.

Wind farms are very time-variable energy sources, and while their output does indeed offset some generation from fossil-fuel-fired stations it is hard to see them providing for even one dispatchable coal-fired station actually to be decommissioned (unless there is concurrent large-scale investment in pumped-hydro storage of the energy opportunistically generated by the wind farms. This investment is not occurring).

Whilst the prioritising of generating technologies is not really the subject of the inquiry, a wider appreciation of the alternative options at the Government level (as informed by scientific and engineering opinion) and consequent slowing of wind farm proliferation could ease concerns with the health-related (and economic) effects of wind farms.

### **General conclusions**

From the last section it will be apparent that I am not the greatest enthusiast of wind energy in Australia. However I recognise that wind farms will always be part of our energy mix. They can contribute usefully.

But given that concerns are indeed emerging of adverse health effects it is crucial that we act as a caring society and do all the appropriate scientific research and adopt the appropriate engineering solutions (including re-siting) to ensure that the health of Australians is safeguarded.

Wind farm operation and expansion must not proceed willy-nilly as it presently appears to be doing. It appears this results from two inadequately-controlled drivers – one, climate-change activists are so concerned to replace fossil fuels with renewables that many will blindly support *any* such systems and are only too eager to gloss over possible adverse side-effects, and, two, the wind farm industry seems to have the bit between its teeth and is making money hand over fist (with, predictably, the same emphasis on morals as the nineteenth-century robber barons).

### **Infrasound and the dB(A) scale**

I would like to make just one technical point. Representatives of the wind industry will undoubtedly tell you that wind turbines do not emit sufficient noise to cause any adverse health effects at the sort of spatial ranges that exist between the turbines and people's houses.

The assumption being made is that “noise” can only be troublesome if it is “heard” by the most usual process of the human ear, that is, by the response of the inner hair cells of the cochlea. This leads to noise measurements commonly being made by transducers (microphones) whose frequency response is deliberately rolled off in a way which mimics this “normal” response of the ear. This is the “A-weighted” scale, and it ensures that any very low frequency vibrations if present would have to be enormous to register at all.

Wind farm impact studies, in common with virtually all industrial noise studies, will have been done using such a scale. Very low frequency vibrations of the air (“infrasound”) will thus not be measured and will be assumed either not to occur, or not to matter (because they will not be heard) if they do.

However, several studies (e.g. [1]) show that that the ear can respond to infrasound via a completely different mechanism involving the cochlear outer hair cells. It may not be “hearing” but it does not mean that infrasound cannot be detected by the human body and that it can have no effects on health.

A-weighting may be quite appropriate when studying many industrial noise sources for which infrasound is not in fact present. But for wind turbines it appears that some of the health effects *are* in fact due to emitted infrasound, not conventional “noise”. It is therefore most important that in any scientific studies this frequency component be properly measured in the field with the appropriate equipment, rather than (as vested interests would clearly prefer) hiding it by appealing to A-weighting as the established acoustic “standard”.

Reference [1] Alec N. Salt and Timothy E. Hullar “Responses of the Ear to Low Frequency Sounds, Infrasound and Wind Turbines” *Hearing Research* vol 268, issues 1-2, 1 September 2010, Pages 12-21.