Comments on

Wind Turbine Health Impact Study: Report of Independent Expert Panel

Prepared For:
Massachusetts Departments of Environmental Protection and Public Health.

By

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The author:

I have nearly 30 years experience in sleep medicine, founding and running one of the largest clinical sleep services in the UK. I have been accepted as an expert in sleep medicine by the UK criminal, civil and family courts. I have over 35 years experience in academic medicine. My Doctorate is a research degree (the basic medical qualification in the UK is MB, BS; an MD is awarded on the basis of research). I have served as an associate editor of a major medical journal and continue to review publications and grant applications on a regular basis. I have served on advisory panels for several major research studies and chaired a research ethics committee. I can therefore claim to be well versed not only in sleep physiology and sleep medicine but also in the scientific method.

For several years, I have been concerned about the effects of wind turbine noise on sleep and health. I have written a detailed major review, based on evidence given at planning inquiries in the UK, which is updated regularly and is made available on the internet as a service to those trying to prevent wind turbines being placed too close to human habitation. In addition to giving evidence before a number of UK planning inquiries, I was recognised as an expert in this area by the Ontario High Court and Environmental Review Tribunals. I have taken no payments for these services.

I am actively engaged in research into wind turbine noise, both in collaboration with Dr Nissenbaum, Maine, USA, and also on my own behalf in the UK. *BMJ* has recently published a peer-reviewed editorial on wind turbine noise by myself and Prof Alun Evans, an epidemiologist of Queen's University, Belfast.

I can therefore claim to be at least as well qualified as the medical members of the panel and, as they claim no prior knowledge of wind turbines, considerably more experienced in the matter of wind turbine noise and its effects on sleep and health.

Introduction

I have limited my comments to those parts of the report which consider health and sleep.

It is entirely appropriate for the Massachusetts' government to commission an independent review of wind turbine noise and its potential effects on health. The brief given to the panel is commendable in its breadth. It has to be presumed that the protection of its citizens is the primary duty of the Massachusetts' government and

this aim would be shared by the physicians on the panel. They would or should be mindful of the medical precept: "*Primum, non nocere, First, do no harm*" and also those of the Hippocratic oath. Modern translations such as that of Dr. Louis Lasagna, former Principal of the Sackler School of Graduate Biomedical Sciences and Academic Dean of the School of Medicine at Tufts University have been adopted by many US medical schools. Relevant sections include:

I will apply, for the benefit of the sick, all measures [that] are required, avoiding those twin traps of overtreatment and therapeutic nihilism.

I will prevent disease whenever I can, for prevention is preferable to cure.

I will remember that I remain a member of society with special obligations to all my fellow human beings, those sound of mind and body as well as the infirm.

They would, I hope, be mindful also of the precautionary principle and that absolute certainty may not required in order to take action to prevent harm. To use a legal analogy, the burden of proof should not be the criminal standard, beyond reasonable doubt, but the civil standard, the balance of probability.

The panel has indulged in an entirely paper exercise and does not seem to have visited a wind farm nor spoken with those claiming harm nor even those scientists working in the field with the apparent exception of Dr van den Berg.

I am surprised that a group of people with, generally, no previous experience in a subject, can nevertheless produce a report which claims to be authoritative in only three months with only three meetings. My own review lists over 100 references relevant to wind turbine noise, sleep and health, far more than are listed in this report. I conclude that this can only be regarded as a cursory examination of the subject.

This conclusion is supported by an examination of the literature cited or "reviewed" in this report. Some 25 pages of references and bibliography are given. There is considerable duplication between the lists. Many citations are incomplete and clearly have not been adequately read and researched. Relevant papers by Krogh, Butre, Harry and Kabes have been overlooked. The latter two are cited in my own review for which an outdated version is cited.

The panel could not find any literature on the effects of wind turbines on animals. A few minutes on the internet discovered a paper showing that 7 of 12 species of birds studied made themselves scarce around wind turbines (Pearce-Higgins, 2009). I conclude that the panel has not exercised due diligence in its duty of scrutinizing the literature.

In my opinion, the panel has failed in its duty and instead of reviewing the published data objectively with the principles set out above in mind, has adopted an approach which I can best describe as scientific nihilism. If the same "rigor" and "robustness" as they have applied to the literature on wind turbine noise, sleep and health had been applied to the dangers of cigarette smoke, smoking would still be permitted in public buildings.

The onus of proving safety falls on those introducing new forms of pollution, including noise pollution, into the environment. This is particularly the case where there is a clear causal link between the pollution and harm. The relationship between environmental noise and ill health is well established. The panel seems to have taken the opposite view that it is the responsibility of the public to prove harm using the most "rigorous" and "robust" evidence. This is a complete reversal of the normal burden of proof in such matters. They have singularly failed to note that there is no objective evidence that wind turbines are safe at the distances and noise levels permitted under current Massachusetts' guidance. Not a single study, merely conjecture and opinion. Great store seems to have been set by regulations by other jurisdictions but without any critical assessment of how they have been derived. Not one is based on any objective evidence of safety.

The duty of the panel, and the medical members in particular, was not to exonerate wind turbines but to protect the public. It is to be regretted that they have not done so. The report should be rejected.

Wind turbine noise sleep and health.

Wind turbine noise is a new source of environmental noise imposed upon previously tranquil countryside. It is clearly different from other forms of environmental noise, especially road, rail and aircraft noise with its impulsive character and low frequency noise component. It is clear also that A weighted, averaged noise metrics do not adequately describe wind turbine noise unlike many other noise sources, particularly traffic noise on which most work has been done. Reference to noise levels derived from studies of traffic noise such as the WHO recommendations is therefore inappropriate with respect to wind turbine noise. These facts seem to have escaped the panel.

The dismissal of the many thousands of anecdotal cases is entirely inappropriate. Such cases are the bedrock of epidemiological investigations and, as Phillips (2011), an experienced epidemiologist, points out, they provide *prima facie* evidence of a clear causal link between wind turbine noise and adverse effects. It is extraordinary that this paper is cited in the Bibliography but ignored in the text.

The essential dismissal of "annoyance" as an adverse health effect is perverse and runs contrary to a wealth of research showing that it is an appropriate and widely used method to assess the effects of environmental noise and is related to health. The conclusion that the annoyance responses are all related to other factors such as visual impact and financial interest is equally perverse and is contrary to the conclusions of Pedersen and her colleagues who undertook the research. Rather than a lack of financial interest being promoter of annoyance, it is more plausible that those with a financial interest in turbines suppress annoyance.

The panel seems to have varied in the level of "robustness" they have applied to different studies and different parts of studies. For example, on Page 36 in discussions of the first Pedersen paper, they note the size of the turbines but make no comment that they are much smaller than present models. Larger turbines produce more noise and more low frequency sound. The obvious conclusion would be that Pedersen's results may underestimate the effects but this is not mentioned. Ignorance or bias?

Likewise, they do not critique the use of calculated noise levels although there is good evidence that they frequently underestimate the actual noise levels. Every opportunity seems to have been taken to downplay adverse effects while ignoring those factors which could increase the risk.

This is seen also in the consideration of van den Berg's paper. While the original report was not published in a peer-reviewed journal, large elements of it have been so published as part of joint analyses in collaboration with Pedersen. It is clear also from the original report that there has been considerable internal review and it is appropriate to put it into the same category as journal-published material. Once again those parts of the manuscript dealing with adverse effects are heavily critiqued while those parts which do not are accepted uncritically. There is no critique of the calculated sound levels, nor the inappropriately high ground absorption factor used. The results on health, measured using the GHQ, are accepted uncritically with no recognition that the GHQ is too blunt an instrument for this purpose and that this element of the study was grossly underpowered to show any effect.

Consideration of Shepherd's paper is equally uneven. It is noted that there are no statistically significant demographic differences between the groups but is felt necessary to comment that the turbine group were slightly more likely to be university educated. The relevance of this critical comment is unclear as no explanation is offered as to why a university education is likely to make a subject more likely to complain of adverse effects from wind turbine noise. The comment seems to be designed purely to undermine the study rather than to offer informed criticism.

The dismissal of Nissenbaum's study, of which I am an author, is equally inappropriate. Granted it has yet to be published in a peer-reviewed journal but it was accepted for oral presentation at a major international conference on noise and health (ICBEN 2011) which involves an element of peer review. I believe that Dr Ellenbogen is aware of this having attended the conference. The data was also part of the evidence submitted to the Ontario Environmental Review Tribunal on the Kent Breeze windfarms where it was subject to intense review by experts for the Ministry of the Environment and the developers. I accept that this might not have been easily discovered by the panel but the conclusions of the tribunal have been widely circulated and should have been part of the material considered: "*… the debate should not be simplified to one about whether wind turbines can cause harm to humans. The evidence presented to the Tribunal demonstrates that they can, if facilities are placed too close to residents. The debate has now evolved to one of degree." (Case Nos. 10-121 and 10-122. p 207).*

Nissenbaum's study should also not have been dismissed because it is the only study to use specific sleep related outcome measures, the PSQI and the ESS, and shows convincingly that sleep is affected within 1.4km of turbines.

A surprising omission is any consideration of particularly sensitive receptors. The noise sensitive are only considered in the discussion on low frequency noise although they constitute about 15% of the population and tend to be found in quiet rural areas. People with autistic spectrum disorder, ASD, are particularly sensitive to noise, have poor sleep and, commonly, a fixation with rotating objects. Protection of the public includes consideration of sensitive receptors and their omission is regrettable.

The report's conclusions that all of the demonstrated effects are likely due to psychological factors such as dislike of turbines, seeing the turbines and a lack of financial benefit is perverse and is a gross exaggeration of the caveats expressed by the authors of the studies. The report compare their conclusions uncritically with those of Knopper and Ollson. A cursory consideration of this paper shows that it has been heavily criticised for it's cherry-picking of papers and the independence of the authors.

Conclusions

An objective review of the evidence, using the brief provided, would have noted:

1. The large numbers of anecdotal reports and simple surveys which together provide good evidence that wind turbine noise harms health at distances currently permitted in most jurisdictions.

2. The published evidence of research examining the effects on wind turbine noise on annoyance, sleep and health. All five main studies show objective evidence of adverse effects at distances currently permitted in most jurisdictions as do a number of lesser studies.

3. The probability of sensitive receptors and the need to give them due consideration.

4. The published opinions on setback distances of a number of acousticians and researchers with considerably more experience of wind turbine noise than the panel.

5. The lack of objective evidence that wind turbine noise does not have adverse effects at distances currently permitted in most jurisdictions.

6. The lack of objective evidence behind the guidelines in many other jurisdictions.

A diligent, objective panel, whose aim was the protection of the public and which complied with its brief, taking all these factors into consideration could come to one conclusion only, that the current guidelines permit industrial wind turbines to be sited too close to human habitation for the well being of the residents.

This panel has failed in its remit and this report should be rejected.

CD Hanning
15th March 2012

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