

NOISE RADIATION FROM WIND TURBINES INSTALLED NEAR HOMES: EFFECTS ON HEALTH

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The report was published in January 2012 and is specific to wind turbine noise guidelines in the UK.

Conclusions

The experience of families internationally show conclusively that when wind turbines are built in proximity to houses, the environmental noise pollution adversely impacts on people's health.

Wind turbines emit noise with many characteristics – pulsating noise, intermittency, tonal qualities, amplitude modulation and low frequency noise – which singly or in combination merit special attention and limits because of observed, unwanted impacts on health, according to the World Health Organizations' guidelines.

These findings are reflected also in the pilot studies conducted during the past few years by physicians in the UK, the USA, and in Australia, where results indicated that families are suffering from various degrees of negative health and sleep issues because of environment noise from wind turbines.

Despite evidence-based research studies that demonstrate a relationship between the adverse impacts of environmental noise on health, some governments – including that of the UK – have instead opted to follow the advice of acoustic engineers from the wind energy industry. This approach favours industrial development, constructing wind turbines in proximity to homes and other sensitive facilities, to the detriment of public health.

Although acoustic engineers and engineers involved with wind turbine design acknowledge that predicting acoustic radiation from wind turbines is imprecise, with variable and often doubtful results, the UK Government continues to foster self-regulation by the wind energy industry. This has led to the current situation, with inadequate standards of protection from environmental noise pollution for neighbouring families.

As governments encouraged more wind turbine installations, and with more constructed near homes and communities because of inadequate guidance, complaints about noise increased. Several governments have responded and recently imposed stricter regulation on the wind energy industry after assessing community and family complaints and health issues, as well as by assessing current evidence-based research and reports on environmental noise and its injuries to health: Denmark lowered allowable wind turbine noise emissions, including stricter regulation on low frequency noise, both outside and inside homes and other facilities and areas; the State Government of Victoria, Australia, increased set-back distances to a minimum of 2km between a wind turbine and a residence; and Japan has initiated an epidemiological study of the impacts of wind turbine noise on people.

Moreover, the WHO reports – Guidelines for Community Noise, Night Noise Guidelines for Europe, and the Burden of Disease from Environmental Noise, along with evidence-based research findings, indicate that the inaudible effects of noise (e.g. low frequency noise), as well as the audible, may have significant impacts on people. Current UK guidance is not only out-dated, it does not include these recent guidelines from the World Health Organization. Indeed, UK guidance does not incorporate methods that reflect how humans perceive and react to sounds and noise, especially dose-exposure-response relationships. These have a relationship to how noise affects health and sleep and a sense of well-being.

Furthermore, because the UK Government, through its agencies, ministers and civil servants, is aware of issues with wind turbine noise guidance, there are potential human rights violations, because those with health complaints apparently related to wind turbines constructed in proximity to their homes have been ignored in their efforts to seek changes, controls, or redress. Furthermore, recent UK Planning Legislation closed a route that had been available to ordinary families seeking recourse in order to protect themselves from environmental pollution. Noise conditions are unwieldy, and difficult and expensive to enforce; thus, people are exposed to unremitting environmental noise, with the consequent injuries to health and loss of amenity, through no faults of their own.

Meanwhile, the World Health Organization reports and medical evidence offer methods and guidance that deal effectively with industrial environmental noise and offer a degree of protection to the public's health, if Government would choose to respond to the science of the matter, rather than to political and economic expediency.

Recommendations

Although the underlying mechanisms are not yet fully understood, when wind turbines are built near homes, it is undeniable that their noise causes a constellation of unwelcome effects, with varying degrees, on health, sleep, and health quality of life.

Further study may reveal the cause/effect, dose/exposure relationships, but as these are undetermined, the precautionary principle should apply in order to protect the public health. Preventive proactive policy functions to preserve the public's health, whereas reactive palliative responses are often inadequate, not to mention, too late.

Although government agencies and the wind energy industry and their consultants contend that the adverse health effects are conjecture or negligible or 'mere' annoyance, one may also argue that their calculations are based on models that make unproven assumptions about what sounds are or are not annoying to people. Wind turbine noise calculations were not tested on subjects in field study scenarios. Furthermore, leading acousticians disagree on the methodologies to measure, analyse, predict, and prevent wind turbine noise. Current guidelines rely on calculations that are based on variables that result in imprecise and inaccurate predictions of actual wind turbine noise and how people living nearby perceive the noise.

Therefore, wind turbines should not be sited near homes, communities, or other sensitive facilities, e.g. schools, and residential homes for special populations, such as the chronically ill or aged. The precautionary principle should apply.

The guidance for and the methodology to measure wind turbine noise should be straightforward and easily applied by local planning authorities and environmental health officers and – importantly – enforceable by them without delays. Denmark has introduced guidelines for wind turbine noise that reduces previous allowable levels; noise must now remain below limits both indoors and outdoors, and the guidance includes audible noise as well as inaudible noise, such as low frequency noise. Denmark's guidance also acknowledges that background noise does not mask wind turbine noise. Therefore, background noise is not a basis for setting audible noise levels. These standards comply with the WHO reports and their findings; the UK should do no less.

The dBA measure noise from the wind turbine(s) should not exceed levels in the bedroom at night with the window partly open, of not more than 30 dBA L_{Amax}, nor within amenity areas around the home where the limit will be L_{night}, outside, 30dBA, or as prescribed by the World Health Organization's research updates on environmental noise.

Regarding amplitude modulation (AM), the guidance must not exceed the parameters set in Planning Appeal Decision APP/Q1153/A/06/2017163,S.20: "20.a. A change in the measured LAeq, 125 milliseconds turbine noise level of more than 3dB (represented as a rise and fall in sound energy levels each of more than 3dB) occurring within a 2 second period.

20.b. The change identified in (a) above shall not occur less than 5 times in any one minute period provided the LAeq, 1 minute turbine sound energy level for that minute is not below 28dB.

20.c. The changes identified in (a) and (b) above shall not occur for fewer than 6 minutes in any hour."

[See Hulme, APP/Q1153/A/06/201163]

Public health policy for the environmental noise of wind turbines should link directly to the EC Environmental Noise Directive, and the WHO Guidelines for Community Noise, Night Noise Guidelines for Europe, and the Burden of Disease from Environmental Noise. These are reports by independent, international, multidisciplinary panels with expertise in their fields. As guidance is updated, national guidance should change to reflect current knowledge and practice.

To evaluate these guidelines and their implementation for national application, the UK Government should empanel an independent committee, based on the WHO model, i.e. comprised of medical experts independent of the wind industry, in sleep medicine, physiology, psychoacoustics, and epidemiology, and to consult with acousticians as deemed necessary. Although acousticians or medical experts working within or as consultants to the wind energy industry would be welcome to submit comments, they would have to recuse themselves from participation in devising guidance and methods. The panel should be led by the Public Health department of State, not by an agency such as DECC, whose objectives differ from those departments whose primary objectives are health protection and disease prevention.

Because prediction of wind turbine noise is an uncertain process, the principles with Lord Reay's bill, "Wind Turbine Minimum Distance from Residential Premises", presented to the House of Lords, should be adopted as a matter of urgency, but with these reduced set-backs, which accommodate more recent research and guidance, e.g. the Danish EPA guidance 2011, the State of Victoria, Australia guidance, the WHO Burden of Disease from Environmental Noise 2011.

Wind turbine heights (to blade tip)

Setback between nearest residence to the wind turbine height; up to 25m - 1km; 25m-35m - 1.5km;
35m-100m - 2km; Greater than 100m - 3km

[Lord Reay. Wind Turbines (Minimum Distances from Residential Premises) Bill [HL] 2010-11
<http://services.parliament.uk/bills/2010-11/windturbinesminimumdistancesfromresidentialpremises.html>]

These should be considered minimum set-back distances depending upon, e.g., local terrain, the size of the array, terrain, blade flicker, and agricultural and community needs. As part of the application process, noise background levels should also be measured indoors, in rooms used by families or other sensitive facilities, e.g. the sitting/living room, other communal rooms, the study, as well as bedrooms, with the window of that room open.

Compliance testing and enforcement of conditions are essential; it is common practice in industrial situations. This is vital because noise prediction may need recalculation. The hours of operation may require limits or possibly shutdown during the night or in certain meteorological conditions.

Ongoing compliance with guidance and conditions is the responsibility of the wind turbine owners. A warranty should be provided to the local authority that certifies that the wind turbines will not exceed the prescribed noise emission levels. If the noise exceeds the allowable limit, then the wind energy company must close down the site until the Environmental Health Officer approves a plan for amelioration that will most likely meet the original conditions. Alternatively, the developer may arrange to purchase all neighbouring properties exposed to the environmental noise pollution, at their fair market value prior to the wind turbine scheme, plus compensation for moving home.

The local authority must also accept responsibility to investigate noise complaints.

To reiterate, the precautionary principle should prevail. Either locate wind turbines further away from homes and communities, or invoke a moratorium, in order to protect the public's health. The policy and the practice should be proactive, not reactive.