

## Position paper on wind turbines and public health

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## **Position Paper on Wind Turbines and Public Health**

### **HSE Public Health Medicine Environment and Health Group**

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## Summary

Carbon based energy systems are driving climate change. Wind energy is a core element of Ireland's response to the EU Climate and Energy Policy Framework for 2020 to 2030. The international surge in wind farm development in recent years has led to concerns regarding potential public health impacts. Published scientific evidence is inconsistent and does not support adverse effects of wind turbines on health. However, adequate setback distances and meaningful engagement with local communities are recommended in order to address public concern.

## The Issue

Ireland needs secure sustainable and competitive energy. Ireland relies heavily on fossil fuels and has the 4th highest dependency in Europe on imported fossil fuel at an annual cost of over €6 billion<sup>1</sup>. The impact of energy policy on health and wellbeing is increasingly recognised by health, energy, climate and environmental stakeholders around the world. The world's energy needs are growing rapidly. Over the next twenty-five years, population and economic growth are expected to cause global energy needs to increase by approximately 50%. Fossil fuels are projected to continue to be the dominant source in energy supply meeting 80% of the projected increase in demand to 2030. Carbon based energy systems are driving climate change as well as causing direct harm to human health and wellbeing. Climate change is one of the most significant and challenging issues currently facing humanity. In 2014, the EU published the Climate and Energy Policy Framework for 2020 to 2030, which includes targets for greenhouse gas reduction and increased use of renewable energy. In Ireland, renewable energy constitutes a core element of the Government's overarching energy policy<sup>2</sup>.

Over 200,000 wind turbines have been installed worldwide over the last 30 years. In June 2016, the Irish Wind Energy Association reported that there were 206 wind farms operational in the Republic of Ireland<sup>3</sup>. With the international surge in wind farm development in recent years there has been considerable attention generated by advocacy groups, concerned individuals and the media on the potential health impacts from exposure to the sound emitted by wind turbines.

Observational and case studies have described a broad range of health effects claimed to be associated with wind turbine noise including headaches, migraines, sleep disturbance, negative effects on psychological well-being, and others. Annoyance is the impact most frequently linked to wind turbines in peer-reviewed studies. Various causes of annoyance have been described, including the sound of wind turbines, unique characteristics of wind turbine noise and visual disturbance of the landscape. Individual characteristics, such as noise sensitivity, attitudes to wind turbines and financial implications may also influence the perception of wind turbine noise<sup>5</sup>.

Examining whether wind farm emissions may affect human health is complex, as both the character of the emissions and individual perceptions of them are highly variable. The emissions of greatest concern include noise (including infrasound), shadow flicker and electromagnetic radiation.

A number of comprehensive evidence reviews have been conducted in recent years in order to examine the effects of wind farms and wind turbines on human health. While a range of effects have been reported anecdotally, there is no published scientific evidence to support adverse effects of wind turbines on health. However, there is a lack of high quality evidence investigating possible relationships between wind farms and health outcomes, and further research is required<sup>5-15</sup>.

### **Noise**

There is no direct evidence that exposure to wind farm noise affects physical or mental health. While exposure to environmental noise is associated with health effects, these effects occur at much higher levels of noise than are likely to be perceived by people living in close proximity to wind farms<sup>4</sup>.

Infrasound is sound that is lower in frequency than 20 Hz per second, the "normal" limit of human hearing. There is no direct evidence that considered possible effects on health of infrasound or low-frequency noise from wind farms.

The World Health Organization states that 'There is no reliable evidence that sounds below the hearing threshold produce physiological or psychological effects'.

### **Shadow Flicker**

Wind turbines, like other tall structures, can cast long shadows when the sun is low in the sky. The effect known as 'shadow flicker' occurs where the blades of a wind turbine cast a shadow and the rotation of the blades causes the shadow to flick on and off.

There is insufficient direct evidence to draw any conclusions on an association between shadow flicker produced by wind farms and health effects.

Flashing lights can trigger seizures among people with a rare form of epilepsy called photosensitive epilepsy. The risk of shadow flicker from wind farms triggering a seizure among people with this condition is estimated to be extremely low.

### **Electromagnetic Radiation**

There is no direct evidence from which to draw any conclusions on an association between electromagnetic radiation produced by wind farms and health effects.

Extremely low-frequency electromagnetic radiation is the only potentially important electromagnetic emission from wind farms that might be relevant to health.

Limited evidence suggests that the level of extremely low-frequency electromagnetic radiation close to wind farms is less than average levels measured inside and outside suburban homes.

## The Solution

Further research is required to investigate the effects of wind farms on public health. Large-scale prospective cohort studies would be most informative for identifying potential health effects of exposure to wind turbine noise; further cross-sectional studies are unlikely to contribute meaningfully to the current limited evidence base.

The Wind Energy Development Guidelines were published in 2006 by the Department of Heritage, the Environment and Local Government<sup>16</sup>. These guidelines advise that best practice for developers is to consult with local residents in the pre-application consultation process. Draft revisions to the guidelines were published in 2013 for public consultation; over 7,500 submissions were received in response to the consultation and the guidelines remain in draft format. The revisions included more stringent day and night noise limits for future wind energy developments, a mandatory setback distance of 500 metres from the nearest dwelling and the complete elimination of shadow flicker between wind turbines and neighbouring dwellings. Minimum setback distances are applied internationally not only to manage noise emission from wind farms but also to preserve visual amenity and to reduce the general impact on neighbouring properties. In some jurisdictions, the setback distance is a multiple of the height of the wind turbine; for example, in Northern Ireland, best practice states that a separation distance of 10 times the rotor diameter to occupied property should be applied, with a minimum distance of not less than 500 metres. Commercial scale wind turbines are large structures and tip heights can range up to 150 metres. The developer of a wind energy project should engage in meaningful, structured and extensive consultation with the local community at an early stage in the planning process, in order to minimise misinformation, anxiety and community division.

Overall, scientific evidence of adverse impacts of wind farms on health is weak or absent. However, many studies of wind turbines and health have limitations and it may well be that our understanding of types of noise and types of sleep disturbance is not comprehensive. Anxiety and annoyance in itself, may lead to reduced quality of life and stress related health effects. International experience with uncertainty in environment and health issues such as this advocates a precautionary approach. We therefore welcome efforts to address concerns of local communities through revised national planning guidelines. In light of the uncertainties involved, evidence on what makes risks more acceptable to those most likely to be affected should be considered<sup>18</sup>.

Ireland needs a secure sustainable energy supply but all energy sources, whether fossil fuels, nuclear or renewable, have costs and benefits to society, though not always spread equally throughout society. Public engagement and consultation is required in relation to energy, renewable energy and planning policy.

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