

NOISE GENERATED BY WIND TURBINES AND HUMAN HEALTH

Noise is considered one of the main challenges for the wind industry in Europe and can restrict sites availability for wind farm development. When it comes to public support, noise is a significant consideration and often presented as harmful to human health. There are two main concerns: 1) chronic sleep disturbance and 2) stress resulting from constant noise and shadow flicker.

Numerous studies have investigated the effects of noise from wind turbines, both in terms of infrasound and higher frequencies, on residents living in the proximity of wind farms. Below is a summary of recent studies:

- Health Canada/Statistics Canada –HC: “[Wind Turbine Noise and Health Study](#)”, March 2016
- Mcunney, Mundt, Colby, Dobie, Kaliski and Blais–CanWEA (MIT): “[Wind Turbines and Health – A Critical Review of the Scientific Literature](#)”, 2014
- Environmental Health Sciences Research Center at the University of Iowa College of Public Health, Iowa Policy Council and Iowa Environmental Council: [Wind Turbines and Health](#), 2019
- [Long-term Finnish government-commissioned study](#) conducted by the Technical Research Centre of Finland, the University of Helsinki, the Finnish Institute of Occupational Health and the Finnish Institute for Health and Welfare, 2020

Health Canada, in collaboration with Statistics Canada, and other external experts, conducted a Community Noise and Health Study to better understand the impacts of wind turbine noise (WTN) on health and well-being. A cross-sectional epidemiological study was carried out between May and September 2013 in southwestern Ontario and Prince Edward Island on 1238 randomly selected participants (606 males, 632 females) aged 18-79 years, living between 0.25 and 11.22 km from operational wind turbines. Response rate was 78.9% and did not significantly differ across sample strata.

- *Self-reported health effects (e.g., migraines, tinnitus, dizziness, etc.), sleep disturbance, sleep disorders, quality of life, and perceived stress were found to be not related to WTN levels.*
- Visual and auditory perception of wind turbines as reported by respondents increased significantly with increasing WTN levels as did high annoyance toward several wind turbine features, including the following: noise, blinking lights, shadow flicker, visual impacts, and vibrations.
- The observed increase in annoyance tended to occur when WTN levels exceeded 35 dB and were undiminished between 40 and 46 dB. Beyond annoyance, the current study does not support an association between exposures to WTN up to 46 dB and the evaluated health-related endpoints.

The CanWEA study “Wind Turbines and Health –A Critical Review of the Scientific Literature”, accumulated data from 8 separate surveys in Netherlands, Denmark, Germany, Sweden, New Zealand, Poland, USA & UK. The total size of analysed sample was 4,095.

The CanWEA study –summary results state the following:

- Infrasound measures near wind turbines does not exceed audibility thresholds,

- There is no convincing evidence to directly link wind turbine noise (including infrasound and low frequency sound) to any well-defined disease,
- Associations exist between wind farm noise and annoyance,
- Noise levels have been shown to account for only a modest proportion of annoyance,
- Annoyance seems more strongly related to individual characteristics, attitudinal factors, visibility of wind turbines and financial considerations than to the noise from wind turbines,
- Annoyance associated with wind farm noise shows a consistent small to medium adverse effect on well-being,
- More work is required on wind turbine noise characterisation.

The **lowa joint statement** concludes the following:

- There is no authoritative evidence that sound from wind turbines represents a risk to human health among neighbouring residents,
- The only causal link identified is that wind turbines cause annoyance (and ultimately well-being as described above),
- Given the above and the well documented negative health and environmental impacts of power produced with fossil fuels, development of wind turbine is considered a net positive benefit to human health.

This joint statement also points to two studies which have shown that misinformation about wind turbine health effects can actually cause people to experience symptoms:

- Crichton, Fiona et al. [Can Expectations Produce Symptoms from Infrasound Associated with Wind Turbines?](#) Health Psychology 2014. Vol. 33, No. 4, 360-364.
- Tonin, Renzo; Brett, James; Colagiuri, Ben. [The effect of infrasound and negative expectations to adverse pathological symptoms from wind farms.](#) Journal of Low Frequency Noise, Vibration and Active Control 2016, Vol. 35(1) 77–90 (2016).

The **Finnish study** used long-term measurements (started in August 2018), listening tests and questionnaires to investigate the properties of infrasound. The study reported the following:

- 15% of people living within 2.5km of a wind farm experienced Wind Turbine Syndrome symptoms, compared to 5% for those living up to 20km away.
- Measurements showed that the infrasound levels in rural areas with wind power parks were about the same as levels in a regular urban environment.
- The main frequencies of the infrasound were between 0.1 and 1.0 hertz (Hz), which is well below the hearing range of the human ear (16-20 Hz).
- People who claimed their symptoms were caused by infrasound were not found to be able to hear the low frequencies any better than people who did not claim it as a cause. Their autonomous nervous systems were not found to be any more activated by the waves than those of asymptomatic test subjects. In other words, the symptoms were not caused by exposure to infrasound.
- For some sufferers, symptoms may be psychosomatic due to the so-called nocebo effect, where strong belief in negative effects can bring some of them about.

- People may also assign blame for their real, underlying ailments to the wind turbines in error or bad faith.