Wind

Wind Turbines and Public Health

Over 25 years of research into the impact of wind turbines on human health indicates that wind turbines when constructed properly at the permitting authority's approved setback distances do not pose a risk to people's health.

Key Takeaways

1. Hundreds of thousands of people around the world live near and work in proximity to operating wind turbines with no ill health effects. **More than 100 peer-reviewed scientific studies soundly discredit the claim that wind farms cause negative health impacts.**
2. The strongest epidemiological study suggests that there is **not an association between noise from wind turbines and measures of psychological distress or mental health,** nor is there evidence to link the noise to sleep disturbance or other physical health impacts.
3. **There is no scientific evidence to suggest that shadow flicker negatively affects human health.** Several studies also conclude that shadow flicker from wind turbines does not pose a seizure risk.
4. EMF levels measured at wind projects were **four orders of magnitude lower than the levels known to cause harm to human health.**

Background

University researchers, government scientists, and medical and public health authorities have published over 100 peer-reviewed scientific studies on health and living in proximity to wind turbines. These studies have investigated the wide range of purported negative health claims with respect to wind turbines including sound, low frequency noise and infrasound, shadow flicker, and electromagnetic field emissions (EMF). Furthermore, independent health experts have conducted comprehensive reviews of the existing research and repeatedly conclude that wind turbines do not pose a threat to public health.

Misinformation about the health impacts of wind turbines can contribute to harmful impacts through the "nocebo effect", which is the opposite of the placebo effect. It describes a situation where a negative outcome occurs due to a belief that the action will cause harm.

In 2012, the Massachusetts Department of Public Health convened a committee of expert scientists, engineers, physicians, and public health experts to evaluate the merits of the reported human health effects related to the exposure to sounds from operating wind turbines.

- The findings of the study were particularly conclusive, stating that there is no evidence for a set of health effects from exposure to wind turbines that can be characterized as "Wind Turbine Syndrome" (WTS).[1]
- Since then, several more health departments in other U.S. states and other countries have published peer-reviewed scientific publications, including surveys and objective health measurements as opposed to relying solely on self-reported symptoms, consistently concluding that living adjacent to wind turbines does not pose a public health risk.[2,3,4,5,6]
- In 2024, Wisconsin's Wind Siting Council conducted a review of 59 recent studies on wind turbines and health. Of the 59 articles cited in the report, seven studies concluded there are significant positive health benefits to be realized from wind turbine facilities and twelve studies identified annoyance as the primary impact of wind turbine facilities.[7]
- A 2025 study used a nationwide sample of approximately half a million residents of the Netherlands to evaluate ten consecutive years of health data (2012-2021) along with exposure to wind turbines. Using a broad range of symptoms and conditions documented through primary care physicians and proximity of their home to wind turbines for the sampled population, the researchers found no consistent associations between health risks and living near wind turbines.[8]

Ohio Department of Health compiled a summary of the available scientific literature regarding wind turbines and public health as of 2018 and concluded that **"there is no significant body of peer-reviewed, scientific evidence that clearly demonstrates a direct link between adverse physical health effects and exposures to noise (audible, LFN, or infrasound), visual phenomena (shadow flicker), or EMF associated with wind turbine projects."**[4]

Wind Turbine Noise and Health

When in operation, wind turbines emit sound from the rotating blades passing through the air, often described as a "whooshing" sound. Wind turbines emit sound over a wide frequency range, including low frequency noise and infrasound. While low frequency sound levels may be heard, infrasound near wind turbines does not exceed hearing thresholds, which at these levels, studies show does not cause health issues.[1,2,4,8] In some instances, the mechanical sounds (e.g., cooling fans, generators, and gears that rotate the turbine into the wind) may also be audible, but typically less so than the whooshing sound. Even so, you can have a conversation at normal volume at the base of a wind turbine, and the sound is reduced as you get further from the turbine. A recent study also found that short-term exposure to wind turbine noise does not adversely affect cognitive function and is not perceived as more stressful or bothersome than typical road traffic noise.[9]

Furthermore, studies show that infrasound from wind turbines does not directly impact the vestibular system. Several recent studies on sleep disturbance have also concluded that there is no compelling evidence supporting the association between wind turbine sound exposure and sleep disturbance.[10,11,12,13]

Shadow Flicker and Health

Shadow flicker occurs when rotating wind turbine blades pass between the sun and an individual's home, casting a periodic shadow that may result in a flickering phenomenon. Numerous health studies have concluded that shadow flicker does not cause negative health impacts to those living in proximity to wind turbines and does not increase risk of seizures in the small percentage of people with photosensitive epilepsy.[1,2,4,14] Shadow flicker from modern commercial wind turbines occurs at "flash" frequencies between 0.3 and 1 Hertz, whereas photosensitive epileptic seizures are triggered by flash frequencies between 5 to 30 Hertz or flashes per second.15,16 Approximately 1.2% of the U.S. population has active epilepsy and even fewer with epilepsy have photosensitive epilepsy.[17]

A recent study by the Lawrence Berkeley National Lab reviewed people's perception of wind turbines and shadow flicker. The study found that only a small portion of the population near turbines experience any shadow flicker and "annoyance to shadow flicker was most strongly correlated with perceptions of wind project aesthetics and general annoyance to other (non-turbine) factors. Shadow flicker exposure was not a significant predictor of shadow flicker annoyance when subjective factors were included." The conclusions of the study indicate that shadow flicker annoyance is primarily a subjective response to other factors, such as the appearance of wind turbines and the individual's attitude towards the wind turbines.[14,18,19,20]

EMF and Health

Despite the wealth of scientific evidence not supporting a causal link between EMF and health issues at the levels of exposure typically encountered by the public, there has been increased concerns raised at public meetings and legal proceedings about exposure to EMF from wind turbines and associated electrical transmission. As with wind turbine sound and health effects, the concerns raised by wind energy opponents are not based on actual measurements of EMF exposure surrounding existing wind energy projects but appear to follow from worries from internet sources and a misunderstanding of the science.[21]

A study conducted at a wind project in Ontario Canada measured magnetic fields exposure to nearby homes in proximity to wind turbines, substations, and several buried and overhead collector and transmission lines.[4,21] The study found that magnetic field levels in the vicinity of wind turbines are lower than levels that people are exposed to on a daily basis in homes, offices and schools, and much lower than exposure people receive from many common household electrical devices, such as televisions, hair dryers, cell phones, laptop computers, or other portable wireless devices. The researchers' findings are consistent with measurements conducted during a 2011 study at one of the largest wind turbine energy parks in Bulgaria (Israel et al. 2011), which found that EMF levels were four orders of magnitude lower than the levels known to cause harm to human health according to the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guideline.[4]

Furthermore, the Ohio Department of Health upon reviewing the peer-reviewed scientific literature published between 2004 and 2019 came to the same conclusion that "information to date does not indicate a public health burden from electromagnetic fields generated by any part of a wind turbine or wind farm."[4]

There are over 84,000 wind turbines operating across the U.S. and to date, there is no indication that those with pacemakers have been negatively affected.

Conclusion

Wind energy reduces the reliance on traditional, combustion-based electricity generation which in turn provides air-quality, pollution reduction, and greenhouse gas emission benefits. Reducing harmful air pollutants has a beneficial impact on pollution related respiratory illnesses such as asthma, lung cancer, and chronic obstructive pulmonary disease (COPD). Between 2007 and 2015, wind-generated electricity avoided as many as 3,000 to 12,000 premature deaths according to researchers from the Lawrence Berkley National Laboratory,[22] and in 2021, wind energy avoided over 318 million metric tons of carbon (CO2) emissions, approximately 228 thousand metric tons of nitrogen oxide (NOx) emissions, and approximately 221 thousand metric tons of sulfur oxide (SOx) emissions that leads to air pollution and climate change.

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Endnotes

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