

Sound meters assess sound.
Humans assess noise.



Wind turbines can harm humans

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Ontario Environmental Review Tribunal (2011)

“This case has successfully shown that 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.”¹

Reported effects:

Some individuals living in the environs of wind turbines report experiencing adverse health effects.² Reported effects include annoyance and/or sleep disturbance and/or stress related health impacts and/or reduced quality of life.^{3,4,5,6,7,8,9,10,11,12,13,14,15}

Plausible causes:

Plausible causes of annoyance and/or other reported health effects are wind turbine sound characteristics including amplitude modulation,^{16,17,18,19} audible low frequency noise,^{20,21,22} infrasound,²³ tonal noise, impulse noise²⁴ and night time noise.²⁵

Wind turbine visual impact, shadow flicker,²⁶ social economic impact and stray voltage²⁷ are also plausible causes of health effects.

World Health Organization: health, rights, noise and effects

“Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”²⁸

“The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.”²⁹

Noise = unwanted sound.³⁰

The health effects of noise: “interference with communication; annoyance responses; effects on sleep, and on the cardiovascular and psychophysiological systems; effects on performance, productivity, and social behavior; and noise-induced hearing impairment”.³¹

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What is annoyance?

An adverse health effect.^{32, 33, 34, 35, 36}

“A feeling of displeasure associated with any agent or condition known or believed by an individual or a group to be adversely affecting them.”³⁷

“The results of the LARES study in relation to severe annoyance by neighbourhood noise demonstrate that neighbourhood noise must be classified as a serious health endangerment for adults.”³⁸

Symptoms associated with annoyance: stress, sleep disturbance, headaches, difficulty concentrating, irritability, fatigue, dizziness or vertigo, tinnitus, anxiety, heart ailments, and palpitation.^{39, 40, 41, 42}

“... apart from “annoyance”, people may feel a variety of negative emotions when exposed to community noise, and may report anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation, or exhaustion ... Thus, although the term annoyance does not cover all the negative reactions, it is used for convenience in this document.”⁴³

Wind turbine sound: more annoying

“The study confirms that wind turbine sound is easily perceived and, compared with sound from other community sources, relatively annoying.”⁴⁴

Pierpont (2009)

Wind turbine syndrome: “Symptoms include sleep disturbance, headache, tinnitus, ear pressure, dizziness, vertigo, nausea, visual blurring, tachycardia, irritability, problems with concentration and memory, and panic episodes associated with sensations of internal pulsation or quivering that arise while awake or asleep.”⁴⁵

Health Canada: 2009

The health effect “conclusively demonstrated”^{46, 47} from exposure to wind turbine noise is an increase of self-reported general annoyance and complaints. (i.e., headaches, nausea, tinnitus, vertigo)

The well-known stress effects of noise: Colby et al. (2009)

“...wind turbine syndrome ... is an example of the well-known stress effects of exposure to noise ... merely a subset of annoyance reactions.”⁴⁸

Ontario Ministry of Environment Freedom of Information obtained 2011

“It appears compliance with the minimum setbacks and the noise study approach currently being used to approve the siting of WTGs will result or likely result in adverse effects ...”⁴⁹

Ontario Ministry of Environment commissioned report released December 2011

“The audible sound from wind turbines, at the levels experienced at typical receptor distances in Ontario, is nonetheless expected to result in a nontrivial percentage of persons being highly annoyed. As with sounds from many

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sources, research has shown that annoyance associated with sound from wind turbines can be expected to contribute to stress related health impacts in some persons.”⁵⁰

Minnesota Department of Health (2009)

“The most common complaint in various studies of wind turbine effects on people is annoyance or an impact on quality of life. Sleeplessness and headache are the most common health complaints and are highly correlated (but not perfectly correlated) with annoyance complaints.”⁵¹

Turbines welcomed: adverse effects

In studies where adverse health effects have been documented some researchers have commented that the wind turbines were initially welcomed into the communities for their perceived economic⁵² and/or environmental⁵³ benefits. “The reported adverse impacts were unexpected.”⁵⁴

¹ Case Nos.: 10-121/10-122 Erickson v. Director, Ministry of the Environment Environmental Review Tribunal, Decision, p 207

² Hanning, C., & Evans, A., “Wind Turbine Noise”, British Medical Journal, BM J2012;344:e 1527, (2012)

³ Pedersen, E., & Persson Waye, K., “Perception and Annoyance Due To Wind Turbine Noise—A Dose Response Relationship”, Journal of the Acoustical Society of America, 116, 3460-3470, (2004)

⁴ Pedersen, E., & Persson Waye, K., “Wind Turbine Noise, Annoyance and Self-Reported Health and Well Being in Different Living Environments”, Occupational and Environmental Medicine, 64, 480-486, (2007) doi:10.1136/oem.2006.031039

⁵ Harry, A., Wind Turbines, Noise and Health, (2007, February) Retrieved from <http://www.wind-watch.org/documents/windturbines-noise-and-health/>

⁶ van den Berg, F., Pedersen, E., Bouma, J., & Bakker, R., Project WINDFARM Perception: Visual And Acoustic Impact Of Wind Turbine Farms On Residents (Final Report FP6-2005-Science-and-Society-20, Specific Support Action, Project no. 044628), Groningen, Netherlands: University of Groningen and the University of Gothenburg, (2008)

⁷ Phipps, R., Amati, M., McCoard, S., & Fisher, R. Visual And Noise Effects Reported By Residents Living Close To Manawatu Wind Farms: Preliminary Survey Results, (2007) Retrieved from <http://www.wind-watch.org/documents/visual-and-noise-effects-reportedby-residents-living-close-to-manawatu-wind-farms-preliminarysurvey-results/>

⁸ Pierpont, N., Wind Turbine Syndrome: A Report on a Natural Experiment, Santa Fe, NM: K-Selected Books, (2009)

⁹ Pedersen, E., Bakker, R., Bouma, J., & van den Berg, F., “Response To Noise From Modern Wind Farms In The Netherlands”, Journal of the Acoustical Society of America, 126, 634-643, (2009)

¹⁰ Nissenbaum, M., Aramini J, Hanning C., Adverse Health Effects Of Industrial Wind Turbines: A Preliminary Report, 10th International Congress on Noise as a Public Health Problem (ICBEN) 2011, London, UK. (2011, July) Retrieved from <http://www.windvigilance.com/about-adverse-health-effects/resource-centre>

¹¹ Krogh, C., Gillis, L., Kouwen, N., & Aramini, J., “WindVOiCe, A Self-Reporting Survey: Adverse Health Effects, Industrial Wind Turbines, and the Need For Vigilance Monitoring” Bulletin of Science Technology & Society, 31, 334-345, (2011)

¹² Thorne, B. “The Problems With Noise Numbers For Wind Farm Noise Assessment” Bulletin of Science, Technology & Society, 31, 262-290, (2011)

¹³ Krogh, C., “Industrial Wind Turbine Development and Loss of Social Justice?” Bulletin of Science Technology & Society, 31, 321-333, (2011)

¹⁴ Shepherd D, McBride D, Welch D, Dirks KN, Hill EM, Evaluating the Impact of Wind Turbine Noise on Health-Related Quality Of Life. Noise Health 13:333-9.(2011)

¹⁵ Rand R., Ambrose S., Krogh C., Wind Turbine Acoustic Investigation: Infrasound and Low-Frequency Noise—A Case Study, Bulletin of Science Technology & Society, 32(2): 128–141 (2012)

¹⁶ Leventhall, G., “Infrasound from Wind Turbines: Fact, Fiction or Deception”, Canadian Acoustics, 34, 29-36, (2006)

¹⁷ Colby, W. D., Dobie, R., Leventhall, G., Lipscomb, D. M., McCunney, R. J., Seilo, M. T., & Søndergaard, B., Wind Turbine Sound and Health Effects: An Expert Panel Review, Washington, DC: American Wind Energy Association and Canadian Wind Energy Association. (2009)

Retrieved from http://www.canwea.ca/pdf/talkwind/Wind_Turbine_Sound_and_Health_Effects.pdf

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¹⁹ Leventhall Geoff, Wind Farms and Human Health, Retrieved from http://www.nhmrc.gov.au/_files_nhmrc/file/media/events/windfarms_science_forum_geoff_leventhall.pdf

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²¹ Minnesota Department of Health, *Public Health Impacts Of Wind Turbines*, (2009, May)

²² Howe Gastmeier Chapnik Limited. (2010, December 10). Low frequency noise and infrasound associated with wind turbine generator systems: A literature review (Rfp No. Oss-078696). Mississauga, Ontario, Canada: Ministry of the Environment.

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²⁴ Thorne, B. "The Problems With Noise Numbers For Wind Farm Noise Assessment" *Bulletin of Science, Technology & Society*, 31, 262-290, (2011)

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²⁸ World Health Organization, *Constitution*

²⁹ World Health Organization, *Constitution*

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³³ Health Canada, *Community Noise Annoyance, Its Your Health*, (2005, September)

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