

October 2016 Alive & Well Update: Wind Turbines and Health

Bakker, R. H., et al. (2012). "Impact of wind turbine sound on annoyance, self-reported sleep disturbance and psychological distress." *Science of the Total Environment* 425(0): 42.

Purpose of the research: The present government in the Netherlands intends to realize a substantial growth of wind energy before 2020, both onshore and offshore. Wind turbines, when positioned in the neighborhood of residents may cause visual annoyance and noise annoyance. Studies on other environmental sound sources, such as railway, road traffic, industry, and aircraft noise show that (long-term) exposure to sound can have negative effects other than annoyance from noise. This study aims to elucidate the relation between exposure to the sound of wind turbines and annoyance, self-reported sleep disturbance and psychological distress of people that live in their vicinity. Data were gathered by questionnaire that was sent by mail to a representative sample of residents of the Netherlands living in the vicinity of wind turbines **Principal results:** A dose–response relationship was found between emission levels of wind turbine sound and self-reported noise annoyance. Sound exposure was also related to sleep disturbance and psychological distress among those who reported that they could hear the sound, however not directly but with noise annoyance acting as a mediator. Respondents living in areas with other background sounds were less affected than respondents in quiet areas. **Major conclusions:** People living in the vicinity of wind turbines are at risk of being annoyed by the noise, an adverse effect in itself. Noise annoyance in turn could lead to sleep disturbance and psychological distress. No direct effects of wind turbine noise on sleep disturbance or psychological stress has been demonstrated, which means that residents, who do not hear the sound, or do not feel disturbed, are not adversely affected.

Jalali, L., et al. "Changes in quality of life and perceptions of general health before and after operation of wind turbines." *Environmental Pollution*.

Ontario is Canada's provincial leader in wind energy, with over 4000 MW of installed capacity supplying approximately five percent of the province's electricity demand. Wind energy is now one of the fastest-growing sources of renewable power in Canada and many other countries. However, its possible negative impact on population health, as a new source of environmental noise, has raised concerns for people living in proximity to wind turbines (WTs). The aims of this study were to assess the effect of individual differences and annoyance on the self-reported general health and health-related quality of life (QOL) of nearby residents, using a pre- and post-exposure design. Prospective cohort data were collected before and after WT operations, from the individuals (n = 43) in Ontario, Canada. General health and QOL metrics were measured using standard scales, such as SF12, life satisfaction scales developed by Diener (SWLS) and the Canadian Community Health Survey (CCHS-SWL). The mean values for the Mental Component Score of SF12 (p = 0.002), SWLS (p < 0.001), and CCHS-SWL (p = 0.044) significantly worsened after WT operation for those participants who had a negative attitude to WTs, who voiced concerns about property devaluation, and/or who reported being visually or noise annoyed.

Michaud, D. S., et al. (2016). "Exposure to wind turbine noise: Perceptual responses and reported health effects." *The Journal of the Acoustical Society of America* 139(3): 1443-1454.

Health Canada, in collaboration with Statistics Canada, and other external experts, conducted the 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. Calculated outdoor WTN levels at the dwelling reached 46 dBA. 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 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. Concern for physical safety and closing bedroom windows to reduce WTN during sleep also increased with increasing WTN levels. Other sample characteristics are discussed in relation to WTN levels. Beyond annoyance, results do not support an association between exposure to WTN up to 46 dBA and the evaluated health-related endpoints.