

# FACT SHEET: WIND ENERGY AND NOISE

Every day, rural communities benefit from wind energy. Wind development provides new income for landowners, new tax revenue to fund schools and services, and creates local career and job opportunities. County officials are responsible for enacting siting or zoning standards that help ensure wind development is supported by local residents. Many seek to address the issue of **noise**.

## Noise produced by wind energy systems

- An operating wind turbine can create noise—or unwanted sound—due to vibration and the rotating blades.
  - The amount of noise generated by wind turbines is influenced by multiple factors: atmospheric conditions, whether the turbine is upwind or downwind from the person perceiving the sound, the model and design of the turbine, the local terrain, distance from the turbine, and ambient sound.
  - Sound decreases as it travels from the source, meaning any noise produced by a turbine will be more intense next to the system.
- Wind energy systems also produce infrasound, or vibrations measuring under 20 Hertz. Infrasound measured from wind turbines has been below the threshold for human perception.<sup>3</sup>
  - While some have raised concerns about health impacts related to noise from wind turbines, there have been no studies that show a direct connection between specific health conditions and exposure to wind turbine noise.<sup>4</sup>
  - However, wind turbine noise may be a cause of annoyance for nearby residents. Studies have shown that self-reported annoyance from wind turbine noise increases as sound levels surpass 35 dBA.
  - Notably, other factors may contribute to self-reported annoyance—perceived sensitivity to noise, personal benefit or lack thereof, and aesthetic issues related to wind turbines.
  - Annoyance itself has been shown to have an effect on health, although the link between a particular noise level and annoyance has not been identified.<sup>5</sup>

Noise is measured in decibels, commonly using an A-weighted or C-weighted filter. A-weighted decibels (dBA) measure sound based on the loudness and the response to that sound, while C-weighted decibels (dBC) include measurement of lower or higher frequencies that people cannot hear.<sup>1</sup>

- Modern turbines produce a sound pressure level of just over 100 dBA. At 400 meters from the turbine, this sound pressure level typically drops to 40 dBA or less—a level consistent with sound produced by household appliances, such as a refrigerator.<sup>2</sup>





## Recommendations

- › Local officials may wish to enact noise limits on wind energy systems to reduce exposure to nearby residents. Before putting a noise limit into place, however, officials should develop an understanding between noise level and distance—more restrictive noise standards significantly limit viable turbine locations.
  - › If a county wishes to enact a noise standard, it should also create requirements for measuring sound levels, typically pre- and post-construction. Officials can also request sound modeling information from developers, providing decision makers with more information on the potential sound impacts of a project.
  - › Counties should seek out certified professionals if they wish to do their own independent sound modeling.
- › Rather than putting into place noise limits, counties can use distance setbacks to limit potential impacts of noise produced by wind turbines.
  - › In this case, the aforementioned sound modeling data can offer insight into the optimal distance to limit potential impacts.
- › Developers can limit potential for high level noise exposure to residents by using the nearby landscape and their own setback distances to reduce noise levels when possible.
- › Because annoyance may be derived from actual wind turbine noise as well as perceptions of a given project, developers must work to include stakeholders early in the development process. Addressing myriad concerns and integrating insight from nearby residents may assist in reducing annoyance and improve the final design of a project.

## Sources

- 1 “A Primer on Noise.” Government of Canada, Oct. 28, 2014, [canada.ca/en/health-canada/services/environmental-workplace-health/noise/wind-turbine-noise/primer-noise-environmental-workplace-health.html](http://canada.ca/en/health-canada/services/environmental-workplace-health/noise/wind-turbine-noise/primer-noise-environmental-workplace-health.html). Accessed July 2019.
- 2 Ellenbogen, Jeffrey M., et al. “Wind Turbine Health Impact Study: Report of Independent Expert Panel.” Massachusetts Department of Environmental Protection and Massachusetts Department of Public Health, January 2012, [mass.gov/files/documents/2016/08/th/turbine-impact-study.pdf](http://mass.gov/files/documents/2016/08/th/turbine-impact-study.pdf). Accessed July 2019.
- 3 Ibid.
- 4 Michaud, DS, et al. “Exposure to wind turbine noise: Perceptual responses and reported health effects.” *Journal of the Acoustical Society of America*, 139(3): 1467-1479, March 2016.
- 5 Ibid.

