

Frequently Asked Questions (FAQs) about Wind Power

What is the size of a wind turbine?

Modern wind turbine generators have a hub height (which is the center of the rotor) ranging from 100m – 120m. From there, rotor blades extend with a length of 45m - 80m. The total height can therefore reach 200m. As technology progresses, turbines are expected to further increase in size to produce more electricity per turbine tower. The installed size will depend on the local conditions in terms of wind and environmental constraints like air traffic, visibility, etc.



Figure 1 PNE technical staff in a turbine nacelle, 2017

What is a wind turbines lifespan?

What is the typical lifespan of a wind turbine?

The wind turbines have a certified lifespan of 20-30 years. This lifespan may end up being longer, depending on the weather conditions at the site and the quality of the maintenance program.

What will happen to the wind turbine tower after the power purchase agreement has expired?

The term of the electricity purchase agreement between developers and SaskPower is 25 years. If SaskPower chooses not to renew or extend the contract, the wind farm will be dismantled. Provincially

owned utilities like SaskPower or Hydro Quebec, require that a fund be created to provide the necessary reserves for the dismantling of the wind farm at the end of its life or when the PPA contract expires. The money deposited into this fund is calculated based on the reclamation requirements of the surrounding area and the size and type of turbine that is installed.

How are turbines fixed to the ground?

Small-scale turbines can sometimes be found tied to the ground with guy wires. Modern wind energy turbines do not require guy wires. They stand on an underground concrete foundation strong enough to support the tower and rotor structure. This reduces a turbine's "footprint" on the ground.

What are the main environmental impacts of a wind turbine?

Main impacts of a wind turbine are the foundation on the ground, visibility, noise emission and shadow.

Do wind turbines disturb farming?

No. Once the wind turbine is installed, farming can continue up to the base of the wind turbine. The satellite image of the PNE Wind Farm Altenbruch shows turbines installed and farming as well as live-stock grazing right next to the turbines. Scheduled maintenance on the turbines is generally coordinated with the landowners farming around the turbines so not to disturb seeding or harvesting.

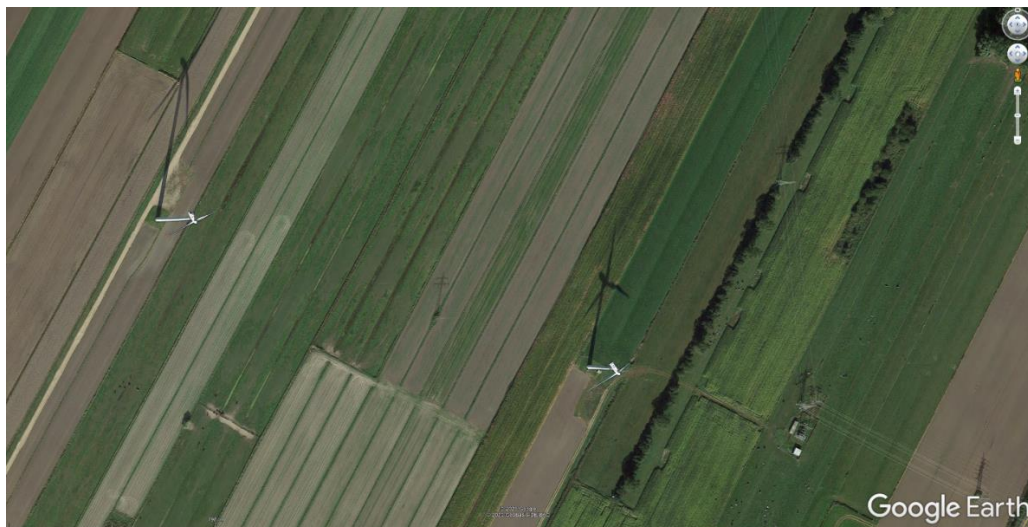


Figure 2 Satellite image of the PNE Altenbruch wind farm outside of Cuxhaven

Noise impact and Electro Magnetic Frequencies (EMF's) with wind turbines:

The noise level of a wind turbine depends on how close you are to the tower. At the base of a wind turbine, the perceived noise level will be approximately 60 decibels (dBA). It is therefore entirely possible to have a normal conversation at the base of a wind turbine without having to raise your voice. As you move farther away from the wind turbine, the perceived noise level drops.

It is important to note that wind turbines reach their maximum noise levels only when winds are high. As a result, other sources of noise (leaves rustling in trees, branches scraping against each other or the wind passing by our heads) will also be present and may make the wind turbine itself barely audible. When winds are low, the blades turn more slowly and therefore make less noise. The best way to see for yourself how much noise wind turbines make is to take a walk through a wind farm and listen.

The continued development of wind farm technology over the past decade has decreased noise from turbines significantly. Thanks to new innovations in turbine technologies, such as vibration control and optimized blade shapes, the noise from one wind turbine is comparable to a quiet conversation or the noise emitted by a modern fridge (approximately 40 dBA) at a distance of 500 meters. Health Canada published a study in 2014, which found that wind turbine noise exposure was not associated with self-reported medical illnesses and health conditions.ⁱ

What is a decibel range and is there a reference point?

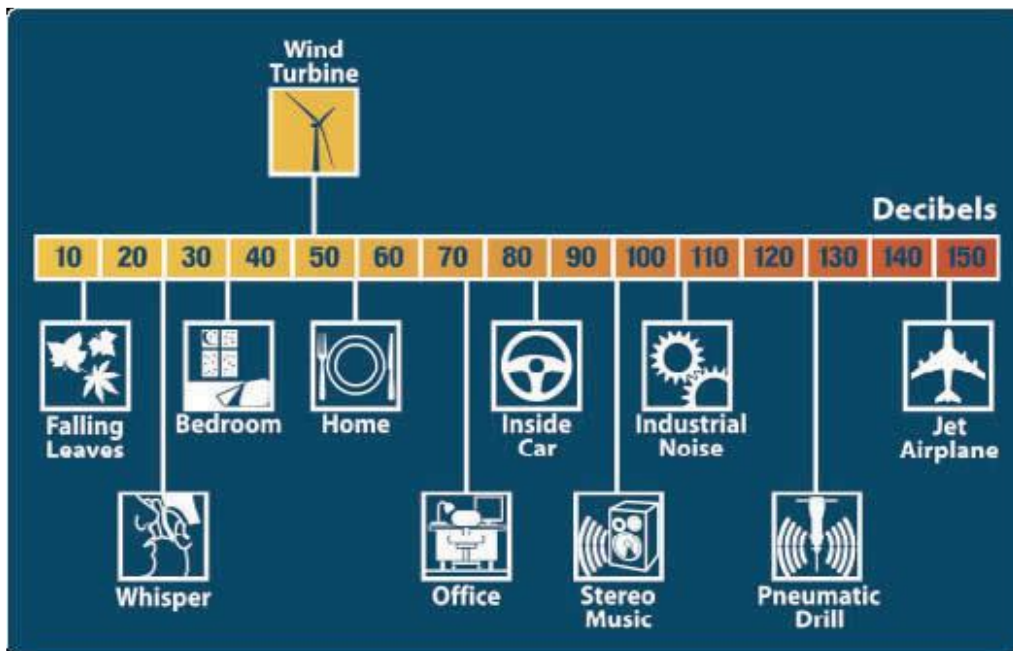


Figure 3 Examples of noise levels at different decibel noise ranges ⁱⁱ

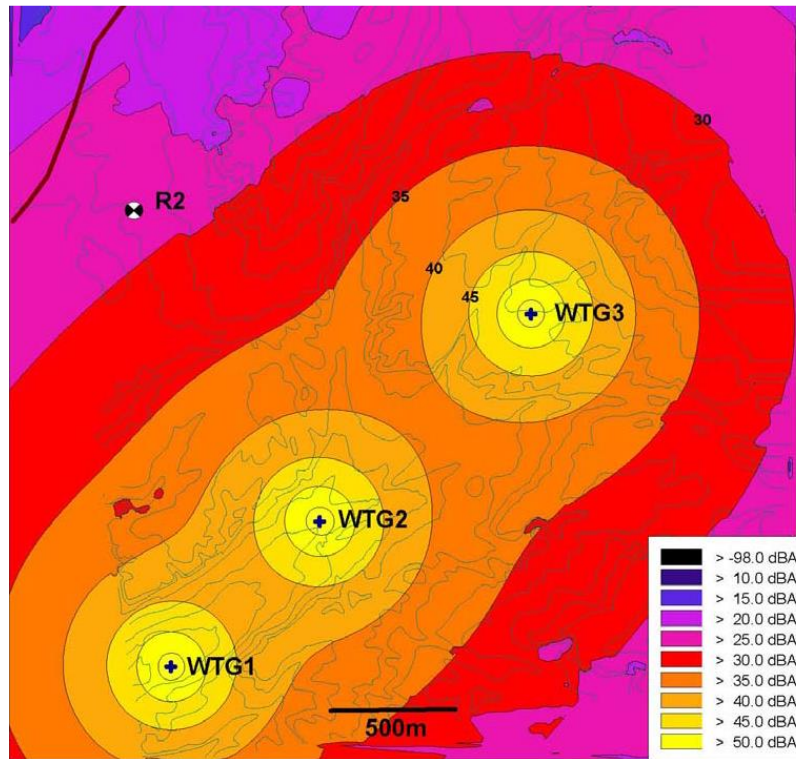


Figure 4 Example of the sound range for a wind turbine tower ⁱⁱⁱ

Electromagnetic Field Exposure:

People are exposed to electromagnetic fields (EMFs) on a daily basis in homes and workplaces. EMFs are generated by household wiring, plug-in electrical appliances, fluorescent lighting, computer monitors, photocopiers, fluorescent lights, electric heaters and electric tools. There are four potential sources of EMF exposure in wind projects:

- the generators in the wind turbines
- the underground network cables between the turbines and the substation
- the electrical transformers in the substation
- the transmission lines connecting the substation to the electricity grid

There is no scientific consensus on health risks from magnetic fields. EMF concerns are not specific to wind energy, however, and in most wind projects the highest EMF exposure would come from transmission lines, not the turbines themselves. Health Canada states that there is no need to take action regarding daily exposures to electric and magnetic fields at extremely low frequencies, and that there is no conclusive evidence of any harm caused by exposures at levels found in Canadian homes and schools, including those located just outside the boundaries of transmission line corridors. ⁱⁱ



Impact on Wildlife

Will the wind turbines affect wildlife?

Bird and bat mortality due to wind turbines is very rare due to improvements and siting and turbine technology. Older and dated wind farms that were poorly located and designed with trellis-style (lattice) towers had a major impact on certain bird and bat species. In the wake of these unfortunate experiences, further research led to a better understanding of bird behaviour to find better locations for wind turbines. Observations and post-construction monitoring following the construction and commissioning of newer wind farms have shown that wind turbines now cause significantly less deaths of birds and bats compared to other types of infrastructure or human activity.

What environmental studies are required?

Wind developments require a list of environmental considerations. These include the initial assessment, compliance with stringent provincial and federal environmental regulations and long-term monitoring programs. Environmental assessments require comprehensive studies to be carried out by independent qualified biologists and environmental professionals.

Conducting pre-project environmental assessments is crucial to the understanding of a site. The information collected is used to refine the siting of infrastructure within a project area and is incorporated into the regulatory report.

Proposed developments with the potential for environmental impacts are assessed in accordance with the *Environmental Assessment Act*ⁱⁱⁱ of the Province of Saskatchewan to determine whether an environmental impact assessment and Minister of Environment Approval is required prior to the project construction. This process evaluates the ecological and socio-economic and cultural aspects of a development to determine the tangible costs and trade-offs of a proposed wind project.

The Ministry of Environment will then decide if the facility is ready for construction or if further environmental and social consideration is required before final sign off and commencement of construction.

Sources:

ⁱ Health Canada, in partnership with Statistics Canada, has conducted a series of studies involving communities located in Southern Ontario and Prince Edward Island to better understand the impacts of wind turbine noise on health and well-being. A total of 1238 households participated, out of a possible 1570. The study had three parts:

- An in-person questionnaire, which was given to randomly selected participants living at various distances from the wind turbines;
- A collection of physical health measures that assessed stress levels using hair cortisol, blood pressure and resting heart rate, as well as measures of sleep quality; and
- More than 4000 hours of wind turbine noise measurements conducted by Health Canada to support calculations of wind turbine noise levels at all homes in the study.

ⁱⁱ Health Canada, Electric and Magnetic Fields at Extremely Low Frequencies, Health Canada, January 2010, www.hc-sc.gc.ca/hlvs/iyh-vsv/environ/magnet-eng.php (accessed April 19, 2010).

ⁱⁱⁱ <https://www.saskatchewan.ca/business/environmental-protection-and-sustainability/environmental-assessment/environmental-assessment-process>

