

Wind Fact Sheet #5: Are modern wind turbines noisy?

Noble Environmental Power, LLC



Are modern wind turbines noisy?

No. It's true that some older turbine designs were noisy. However, the wind turbine manufacturers have worked hard to improve turbine design. Modern wind turbines are much more efficient and make much less sound...nowadays, they are actually pretty quiet. A commonly used reference is that at a distance of 750 to 1,000 feet a modern wind turbine is no noisier than a kitchen refrigerator or a moderately quiet room (AWEA). While proper "setbacks" from homes are still essential, at 1,000 feet, the sound of a modern turbine is practically indiscernible over the background noise associated with the environment in which a turbine is placed. Very often, one of the loudest background noises is the wind itself!

What kind of sounds are associated with wind turbines?

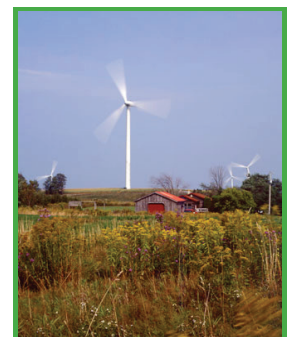
Wind turbines can create two kinds of sounds: mechanical sounds, which originate from the generator, hydraulics, and gearbox; and aerodynamic sounds, which have broadband characteristics, and occur when the wind flows around the blades and the tower.

Mechanical sounds from modern wind turbines are not a significant problem thanks to several design improvements. First, the nacelle, which is the "box" that sits atop the tower and holds the gearbox and the generator, has been streamlined and soundproofed with insulation materials. Better design has also made the gearbox itself quieter. Lastly, the tower has been streamlined. Taken together, these factors have nearly eliminated any machinery sounds produced by the wind turbine. While it may be possible to hear some mechanical sounds when standing close to the turbine, these sounds become nearly inaudible as the distance from the base of the turbine increases.

Aerodynamic sounds, on the other hand, are commonly described as a "swish" or "whoosh." Aerodynamic sounds can be reduced in two ways: blade design, and blade position relative to the tower. Blade design is becoming increasingly efficient, which means that more of the wind's energy is captured by the blades and turned into electricity, and less is able to "swoosh" past the blades. Blade position has to do with whether the blades face into the wind (this is called an "upwind" turbine), or away from the wind (a "downwind" turbine). With upwind turbines, the wind passes over and through the blades before it reaches the tower, so it makes less sound moving around the tower. All the turbines Noble will use are the modern "upwind" design.

How loud are these sounds in comparison with other common sounds?

The loudness of a noise is the "sound pressure level" (AWEA), measured in decibels (dB). The chart on the next page is based on one that was produced for the British Wind Energy Association (BWEA) and shows the sound pressure level produced several common noises, compared to that of a modern wind turbine. Note that the chart shows sound pressure level measurements in dB (A), which is a measurement of "environmental noise" with an adjustment for the "sensitivity of the human ear" (BWEA). In other words, the "A" weighted scale most closely approximates the way that we hear sounds.



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Source / Activity	Indicative Noise Level dB (A)
Threshold of hearing	0
Rural night-time background	20-40
Quiet bedroom	35
Wind farm at 1000 ft	49-50
Car at 40 mph at 333 ft	55
Busy general office	60
Truck at 30 mph at 333 ft	65
Pneumatic drill at 23 ft	95
Jet aircraft at 825 ft	105
Threshold of pain	140

So, one more time...are wind turbines noisy?

We often use the word “noise” to refer to “any unwanted sound.” It’s true that wind turbines make sounds...but whether or not those sounds are “noisy” has a lot to do with who’s listening. It’s also worth noting that studies have shown that a person’s attitude toward a sound – meaning whether it’s a “wanted” or “unwanted” sound – depends a great deal on what they think and how they feel about the source of the sound. In other words, if someone has a negative attitude to wind turbines, or is worried about them, this will affect how they feel about the sound. However, if someone has a positive attitude toward wind energy, it’s very unlikely that the sounds will bother them at all.



Helpful Sites/Additional Reading:

- BWEA - Reference – Noise from Wind Turbines – The Facts <http://www.bwea.com/ref/noise.html>
- Danish WEA - Sound From Wind Turbines - <http://www.windpower.org/en/tour/env/sound.htm>
- AWEA – Facts About Wind Energy and Noise - http://www.awea.org/pubs/factsheets/WE_Noise.pdf
- AusWEA – Wind Farms and Noise - <http://www.thewind.info/downloads/noise.pdf>