FACT SHEET 6

Wind Farms & Noise

How Noisy Are Wind Turbines?

Although wind turbines do make noise, today's modern generators are generally much quieter than most people expect. It is quite possible to carry out a normal conversation at the base of a turbine running at maximum power, without raising one's voice.

The noise at locations within or around a wind farm can vary considerably depending on a number of factors including the layout of the wind farm, the topography or shape of the land and the speed and direction of the wind. It can be accurately measured using acoustic equipment.

What Do Wind Turbines Sound Like?

The main sound is the swooshing of the blades as they rotate. Sometimes when standing close to the tower, the whirr of the gearbox and generator may also be audible.

An unusual feature of wind turbine noise is that unlike most sources of industrial noise, it increases with wind speed. Around wind farms, many sources of background noise such as vegetation, are also affected by wind speed. At any given location, a wind farm's level of audibility will depend upon the relative levels of noise produced by the wind farm and the surrounding background noise.

When there is little or no wind, a wind turbine does not operate and therefore produces no noise. As the wind speed increases, the turbine commences operation and will start to produce noise which will increase as the wind speed rises. Wind related background noise at locations around the wind farm will also increase. Typically, this background noise rises more quickly and tends to mask the noise from the wind turbines.

The "noisiness" of a wind farm is therefore dependent on not only the level of noise that the wind turbines produce, but also the levels of background noise where the listener is situated. This will vary in different operational conditions.

The sound of a wind farm 100 m away would be inaudible in many urban areas of Australia as it would be drowned out by wind related and other background noises.

A listener's perception of noisiness is influenced not only by how much louder the noise is than that of the existing environment, but also by additional factors which include the acoustic characteristics of the noise itself [ie. whether it has audible tones or characteristics that may annoy the hearer]. All of these factors are considered when setting noise limits for wind farms.

Low Frequency Noise & Infrasound?

Concern is sometimes expressed about the possible effects of low frequency noise from wind turbines on nearby residents. Low frequency noise was a feature of some early wind turbine designs with the blades down-wind of the tower. This caused a low frequency 'thump' each time a blade passed the tower. Modern wind turbines have their blades upwind of the tower, thus reducing the level of this type of noise to below the threshold of human perception, eliminating any possible effect on health or wellbeing.

How Does Noise Affect Wind Farm Layout?

Noise limits are carefully determined and result in turbines being located far enough away from occupied houses to protect the amenity of the people living in them. This can have a significant impact on the number and type of turbines included in the design of a wind farm and where they are located.

In Europe, it is common to have wind turbines within 100m of houses. In Australia however, a more conservative approach has been taken and wind turbines are usually placed at least 400m from noise sensitive locations.

How Does Wind Turbine Noise Compare With Other Sounds?

Levels of sound perceived by the human ear are usually expressed in decibels, denoted dB(A). The "A" represents a weighting of the measured sound to mimic that discernable by the human ear, which does not perceive sound at low and high frequencies to be as loud as mid range frequencies.

- A change of 1dB(A) is the smallest difference one can hear within an acoustically controlled environment
- A change of 3dB(A) is a just noticeable change in level difference in an external environment
- A change of 5dB(A) is a clearly noticeable difference in level
- A change of 10dB(A) is heard as a doubling in loudness of the noise

The following table shows that at 350m, a wind farm has a noise level of between 35 and 45dB(A). In a very quiet rural setting you might therefore be able to hear a wind farm at this distance, depending on the level of wind related background noise.

Source/Activity	Indicative noise level dB (A)
Threshold of hearing	0
Rural night-time background	20-50
Quiet bedroom	35
Wind farm at 350m	35-45
Busy road at 5km	35-45
Car at 65 km/h at 100m	55
Busy general office	60
Conversation	60
Truck at 50km/h at 100m	65
City traffic	90
Pneumatic drill at 7m	95
Jet aircraft at 250m	105
Threshold of pain	140

Who Determines Wind Farm Noise Limits?

As wind farms have become more plentiful, they have attracted greater regulatory scrutiny. This particularly relates to noise, which is an important design criterion. A regulatory authority, often the state's Environment Protection Authority (EPA), will issue guidelines for noise limits and recommend standard methods to use in predicting and measuring noise. Standards Australia is currently developing a standard methodology for predicting and measuring noise emissions from wind farms, but the setting of noise level criteria will remain the responsibility of the relevant Regulatory Authority.

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