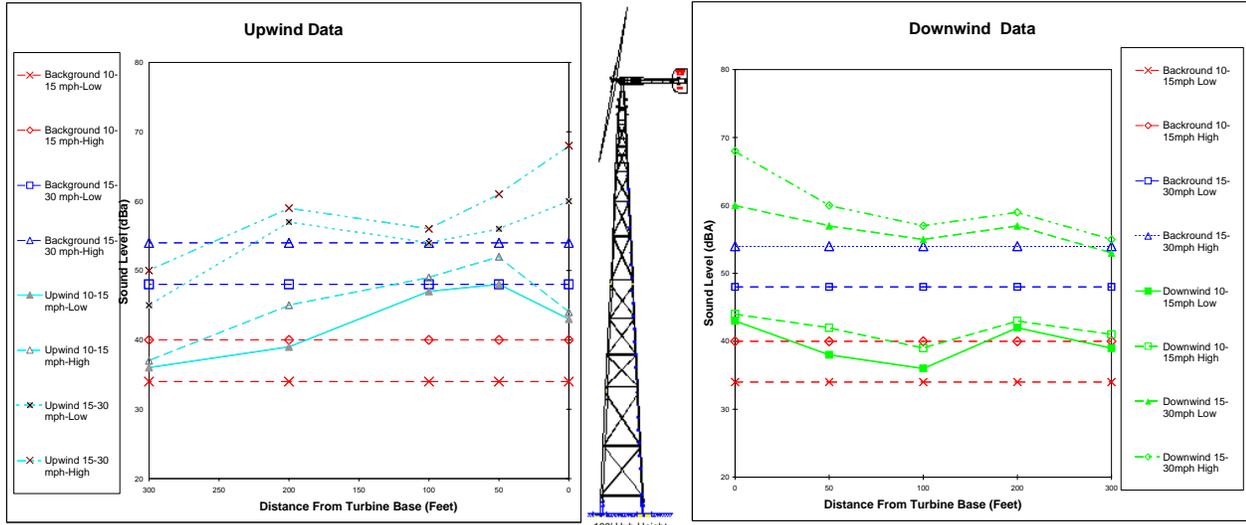


# WTIC Jacobs 31/20 Wind Turbine Sound Level Measurements

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 Lake Michigan Wind & Sun, Ltd is a design / build engineering firm with over 25 years of experience in the wind industry  
 Measurements taken in Sept. of 2007

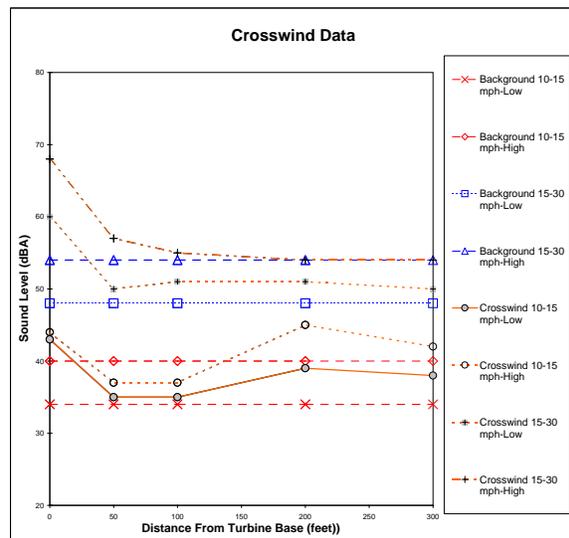


## Summary:

The graphs illustrate that at 100 feet, and greater distances, sound is typically 5dBA or less than the higher background sound range. Differences in sound of less than 3 dBA are not readily apparent to the human ear. In most cases the sound level was not noticeably above background levels, although the turbine sound is of a frequency that could be heard.

The data illustrates the sound level variations with wind speed for the turbine and background. In higher winds the turbine appears louder, as does the background sound. The difference between the turbine sound level and the background sound level decreases with distance from the turbine. The turbine sound level is typically indistinguishable from background sound at distances between 250 & 300' for the sample wind speed ranges.

The WTIC Jacobs 31-20 Wind Turbine is a relatively low rpm and blade tip speed. This in part provides the characteristics of a relatively low sound level as compared to many other small wind turbines.



## Notes and Findings:

Measurements were taken using a Bruel & Kjaer Model 2232, IEC 652 type 1, Sound Meter.

The measurements were taken in wind speed ranges of 10 to 15 mph and 15 to 30 mph ranges. In these wind speed ranges high and low sound data measurements were taken in the same time frame and graphed. Because wind and sound are not static, the changes in wind speeds within these ranges during the test can skew data somewhat

Sound measurements were conducted on a WTIC Jacobs 31/20 Wind Turbine on a 100' tower. It is expected that the relative sound from a unit on a 120' tower would be slightly lower and the relative sound from a unit on an 80' tower would be slightly higher, in the same wind regime.

Sound measurements were conducted in relatively wide open flat hay field (after harvest) with little ground cover and very few trees within 500'. Should the turbine be placed in a corn field it would be expected that the background sound levels would be noticeable higher and the sound from the turbine less noticeable. A similar effect would be noticeable with other forms of vegetation as such a pine trees, which produce quite loud background sound in high winds. Increased vegetation typically produces higher background sound and adds a dampening effect for the sounds from wind turbines.

The steel pole building next to the turbine would have minimal effect on the sound measurements, and this overall setting would be considered to be typical for wind turbine installations.

The downwind measurement point at 200 feet is in proximity to a few trees, causing an increase in background sound level. Background readings of trees was 55-60 dBA at the 15-30 mph wind regime.