

**Wind Wise Massachusetts is a statewide alliance of grass roots organizations and individuals who are concerned about the negative health, environmental and economic impacts of poorly-sited wind turbines.**

<http://windwisema.org/about/noise/wind-turbine-syndrome-and-vibroacoustic-disease/>

## **Wind Turbine Syndrome and Vibroacoustic Disease**

### **Industrial Wind Turbines Pose Public Health and Safety Concerns**

By Thomas A. Jones, BSME, MSME

Industrial wind turbine development is being strongly supported by private interests due largely to government subsidies and artificial financial incentives, making wind turbine development possible, whereas otherwise it would fail on financial grounds alone. Neither the Commonwealth of Massachusetts nor the Federal Government has performed a comprehensive assessment of the public health and safety concerns associated with the design and operation of industrial wind turbines. Yet both continue to support wind turbine development through tax subsidies and other monetary incentives. There are currently no government regulations affecting placement of industrial wind turbines (setback) in Massachusetts. However, many concerns have been expressed by medical doctors around the world regarding the harmful effects to humans of operating industrial wind turbines.

Recently published peer reviewed comprehensive information prepared by medical doctors, pathologists and engineers strongly warn of major physiological consequences of living too close to industrial wind turbines. These have been classified into two categories according to two different phenomena associated with wind turbine noise. One is Wind Turbine Syndrome (WTS), Reference (1), which produces several symptoms related to the vestibular system's (balance) organs: disturbed sleep, headaches, tinnitus (ear ringing), and sense of quivering or vibration, nervousness, rapid heartbeat, nausea, difficulty with concentration, memory loss, irritability and anger. The other is Vibroacoustic Disease (VAD), Reference (2), which causes direct tissue or organ damage. WTS symptoms discontinue when the person moves away from the source; however, VAD symptoms continue long after the source of infrasound is turned off. Both WTS and VAD can be very harmful and debilitating and possibly deadly.

#### **= Components of noise, from low frequency to ultrasound**

Wind turbine noise is comprised of two different frequency sets. The so-called whooshing noise (which is audible) is at approximately 300 Hz. Infrasound (which is inaudible) occurs at frequencies from 0 to 15 Hz (see enclosed diagram). WTS is caused by the former and the latter; VAD is caused by the latter.

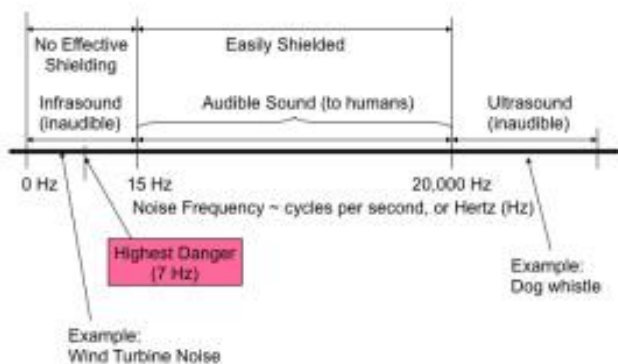
WTS is a term coined by Dr. Nina Pierpont. Her book, Reference (1), is an excellent resource regarding health effects wind turbine generated WTS on the vestibular system. It provides an excellent summary in medical terms and laymen's language of the dangers of WTS and no attempt is made to expand on her presentation here.

VAD, however, is less well known to the public, but has been proven that man-made machines can cause VAD and can kill, Reference (3). The main question is whether there is sufficient amplitude (energy) in wind turbine infrasound to cause VAD. The following supports this possibility:

Reference (4): *"These results [comparison of infrasound levels contained in a residence in close proximity to wind turbines to a known VAD case caused by a nearby port grain terminal – the former being much larger] irrefutably demonstrate that wind turbines in the proximity of residential areas produce acoustical environments that can lead to the development of VAD in nearby home-dwellers."*

Reference (5): *"...another source of ILFN has appeared: wind turbines...ILFN levels contaminating the home of Case 2 [situated near wind turbines] are amply sufficient to cause VAD...widespread statements claiming no harm is caused by in-home ILFN produced by wind turbines are fallacies that cannot, in good conscience, continue to be perpetuated. In-home ILFN generated by wind turbines can lead to severe health problems, specifically, VAD."*

### **Noise Components**



All things in life have natural frequencies, e.g., buildings, bridges, guitar strings, our internal organs. If the frequency of a forcing function, e.g., noise, happens to match the natural frequency of an object, the object will react at that same frequency and motion of the object will be amplified. Most people recall from high school the films of the infamous Tacoma Narrows Bridge (“Galloping Gertie”) which was built in 1940, and collapsed four months later due to large harmonic (synchronous) oscillations caused by wind. VAD can cause similar catastrophes within our bodies. The resonant frequencies of our body organs happen to be low. Industrial wind turbines happen to produce low frequency noise (1-2 Hertz – the blade passage frequency) with overtones of up to about 20 Hz, Reference (2). This noise is transmitted through every medium between the turbine and your body. It is well documented that infrasound generated by certain machines can cause VAD. References (4) and (5) claim that industrial wind turbines can do likewise.

Reference (5) also firmly states that “...*real and efficient zoning for wind turbines must be scientifically determined, and quickly adopted, in order to competently and responsibly protect Public Health.*” Potential dangers to the health and safety of the public cannot be ignored, and clearly there are well researched and published papers that conclude that wind turbines can cause WTS and VAD. Infrasound has the nasty characteristic of traveling great distances and shielding of infrasound is ineffective. Until we have a determination of required setbacks to avoid health effects from wind turbine generated infrasound, erection of wind turbines should be halted. The establishment of such setbacks should not be a burdensome request:

*“Existing evidence is not sufficient to make several important quantifications, including what portion of the population is susceptible to the health effects from particular exposures, how much total health impact wind turbines have, and the magnitude of exposure needed to cause substantial risk of important health effects. However, these are questions which could be answered if some resources were devoted to finding the answer. It is not necessary to proceed with siting so that more data can accumulate, since there is enough data now if it were gathered and analyzed,”* Reference (7).

The State Department of Public Health of the Commonwealth of Massachusetts is responsible for ensuring public health and safety. Development of wind turbine technology has progressed more rapidly than our knowledge of the potential consequences to human health and safety. The Commonwealth needs to place a moratorium on this development until conservative setback limits (2-3 miles) consistent with medical findings are established for proximity to homes, industries, schools, hospitals, etc. For proximity to wild animals, no practical setback can be established.

#### Definitions:

- (1) cycles per second = frequency = Hertz (Hz)
- (2) Infrasound = noise from 0 to 15 Hz
- (3) ILFN = infrasound and low frequency noise from 0 to 500 Hz
- (4) WTS = Wind Turbine Syndrome
- (5) VAD = Vibroacoustic Disease
- (6) Noise Components (see enclosed figure)

#### References:

- (1) Dr. Nina Pierpont, Wind Turbine Syndrome. Santa Fe, NM: K-Selected Books, 2009.
- (2) Mariana Alves-Pereira and Nuno A A. Castelo Branco, “Vibroacoustic Disease: Biological effects of infrasound and low-frequency noise explained by mechanotransduction cellular signaling,” *Progress in Biophysics and Molecular Biology, Volume 93, Issues 1-3, January-April 2007, Pages 256-279.*
- (3) “A Short History of Sound Weapons Pt2: Infrasound,” January 14, 2008 (<http://crab.wordpress.com/2008/01/14/a-short-history-of-sound-weapons-pt2-infrasound/>)

(4) M. Alves-Pereira and N. Castelo Branco, “Industrial Wind Turbines, Infrasound and Vibro-Acoustic Disease (VAD),” Press Release, May 31, 2007 <http://www.wind-watch.org/documents/industrial-wind-turbines-infrasound-and-vibro-acoustic-disease-vad/print/>

(5) M. Alves-Pereira and N. Castelo Branco, “In-Home Wind Turbine Noise [that is, noise in the home caused by wind turbines] is Conducive to Vibroacoustic Disease [VAD],” September 20-21, 2007

(6) J. Punch, et al, “Wind Turbine Noise – what audiologists should know,” Audiology Today, July 2010.  
<http://docs.wind-watch.org/AudiologyToday-WindTurbineNoise.pdf>

(7) C. Phillips, “Analysis of the Epidemiology and Related Evidence on the Health Effects of Wind Turbines on Local Residents,” July 20, 2010