

**STATE OF VERMONT
PUBLIC SERVICE BOARD**

Request for Proposal and Comment for)
Implementing temporary sound-level)
Standards for wind generation projects)

June 27, 2016

Dear Public Service Board,

I am writing to recommend new sound-level standards and methodology for protecting neighbors from wind generation noise. I am heartened to see that the Vermont Legislature has directed the Public Service Board to implement improved sound standards and methodology for industrial wind generation projects that are protective of public health and do not harm Vermonters quality of life. The concerns of neighbors have taken a back seat to the interests of developers for too long. The passage of S.260 is evidence that the growing distress from Vermonters concerned about industrial energy siting and its effects have garnered the attention of our elected officials.

My concern is that writing this comment is a fool's errand. The Public Service Board has taken comments on this topic from Vermonters for years and, to my knowledge, nothing has been done to enhance protections for Vermont citizens. Industrial scale energy developers enjoy a privileged status in Vermont because they masquerade as environmentalists, while neighbors who suffer are dismissed by "industry representatives" as being "emotional" (<https://vtdigger.org/2016/06/25/public-comment-on-turbine-wind-noise-standards-due-monday/>). It is my sincere hope that this time the concerns of Vermonters and neighbors will take precedence over the interests of developers.

My recommendations are:

- **INTERIOR STANDARD:** In 2006, the Vermont Department of Public Service (DPS) recommended the wind turbine sound standard should be 30 dBA LMax interior. This recommendation is in line with the "NIGHT NOISE GUIDELINES FOR EUROPE" published by the World Health Organization in 2009. On page 108 the guidelines reads "Up to 30 dBA: Although individual sensitivities and circumstances may differ, it appears that up to this level no substantial biological effects are observed."
- **EXTERIOR STANDARD:** In 2006, the Department of Public Service (DPS) recommended the wind turbine sound standard should be 45 dBA LMax exterior. This is too high. It anticipates a 15dBA attenuation between outside and inside a home, which is not realistic, especially when windows are kept open.
 - o According to the WHO (page 31, Nighttime report) "... when windows are slightly open, outside sound levels are usually reduced by 10 – 15 dB. (Scharnbergetal., 1982; Lambert and Plouhinec, 1985; Lambert and Vallet, 1994).
 - o In the same report we learn "When night-time environmental noise reaches high levels, residents tend to close their bedroom windows (cf. Langdon and Buller, 1977; Scharnberg et al., 1982; Schreckenberget al., 1999; Diaz et al., 2001)... while residents with closed windows reported a reduction of sleep disturbances due to noise, they also reported an increase in sleep disturbances due to poor ventilation."
 - o Vermonters should not have to choose between loss of sleep because of noise OR loss of sleep because of poor ventilation.

- In tests conducted by Acentech for the Brouha home (victims of the Sheffield Wind Project) Acentech's analysis of the Outdoor/Indoor Level Reduction (OILR) found attenuation with windows partially to fully open to be between 6 and 1 dBA.
 - Assuming there is only a 5 dBA attenuation then, according to the WHO "NIGHT NOISE GUIDELINES FOR EUROPE" for 40 – 50 dBA "Adverse health effects are observed among the exposed population. Many people have to adapt their lives to cope with the noise at night. Vulnerable groups are more severely affected."
 - Therefore, a reasonable starting place for a wind turbine sound standard should be between 31 and 36 dBA LMax exterior.
BUT final responsibility should fall to the noise-maker to ensure whatever the outside noise, interior noise should never be greater than 30 dBA with a fully opened window.
- **PROPERTY LINE:** When I bought my property, it was my intention to someday build a retirement home in a particularly attractive location. The abutting property was bought by an investor from Hong Kong in 2012. The investor proposed industrial turbine development on his property. I have not yet built my retirement home, but I would hope that when I do, the sound standards for internal noise will apply to my new construction. As such Interior/Exterior sound standards should apply at the property line, and not at the site of current buildings.
 - **LOW FREQUENCY NOISE and INFRASOUND:** Both infrasound and LFN require monitoring and an LFN standard must be developed.
 - Infrasound (a.k.a. low-frequency sound or vibration) is often felt rather than heard. It is defined as lower in frequency than 20 Hz (Hertz) or cycles per second. For most humans this is sub-audible. Most noise sources are complex and composed of a wide range of frequencies at different sound levels. For sources made up of many frequencies, the range of frequencies and their corresponding sound levels is called frequency spectrum. Our ears are the primary organ for sensing infrasound. But at higher intensities infrasound vibrations can be felt throughout the body (which, to infrasound, is a cavity). It is scientific fact that low frequency sound travels further than audible frequencies. In addition, reflection is also frequency dependent. Low frequency sound travels through hard mediums (like, say the walls of a home near wind turbines), whereas audible frequencies tend to reflect off those surfaces.
 - In the 1980's the Department of Energy led research into neighbor complaints of wind turbines. According to the lead investigator, Dr. Neil Kelly* (**Acoustic Noise Associated with the MOD1 Wind Turbine: Its Source, Impact, and Control* <http://www.nrel.gov/docs/legosti/old/1166.pdf>) "The annoyance was real and not imagined" (pg. iii). The source of problem was impulsive infrasound and low frequency noise.
 - The research determined people became more sensitive with cumulative exposure. They could feel the sound pressure and were disturbed by it at levels where they could not hear it. This is precisely what people living near wind turbines describe today: they report feeling pulsations or vibrations even when they cannot hear the turbines.
 - The 1980's research is still relevant. According to WHO** (**World Health Organization Community Guidelines for Noise 1999 *): "Where noise is continuous, the equivalent sound pressure level should not exceed 30 dBA indoors, if negative effects on sleep are to be avoided. When the noise is composed of a large proportion of low-frequency sounds a still lower guideline value is recommended, because low frequency noise can disturb rest and sleep even at low sound pressure levels"
 - This bears repeating: "**When noise is composed of a large proportion of low-frequency sounds, if negative effects on sleep are to be avoided, then a guideline of lower than 30dBA should be set.**"

- This is especially applicable for rural environments where the public has a strong appreciation for quiet and natural soundscapes.
- **MONITORING:**
 - We need full frequency spectrum acoustic monitoring.
 - Monitoring must be continuous. It should include all weather and wind conditions.
 - Measurements must specifically include infrasound and low frequency noise, (using dBLinear, dBC, as well as dBA)
 - Noise monitoring must be performed by professionals independent of the wind industry, who have been approved by the people who are suffering (no more “fox in charge of hen house”)
 - Noise monitoring must be done in a way that ensures the lack of either unintentional or deliberate manipulation of turbine operations
 - Wind turbines operators should pay for all sound emissions testing.
 - All results (including all the raw data and associated sound files) must be made available to all parties
- **COMPLAINTS:** The current process for complaints is ineffective. It does not resolve the issue for those who are suffering. No complaint about wind turbine noise has ever been resolved. It’s an insult to Vermonters for the industry to claim “we don’t get complaints.” The measure should be “How many complaints have you resolved?” not “How many complaints have you received and ignored?” The complaints should be handled by an independent 3rd party customer support consultant who is measured using customer satisfaction criteria.
- **CONSEQUENCES:**
 - According the WHO “... excessive exposure must be avoided either by removing the people exposed or **removing the source if source-related measures fail.**”
 - If penalties can be folded into “the cost of doing business” then industry will not be motivated to adhere to standards. Penalties should be significant and cumulative:
 - For each infraction, a significant financial penalty should be incurred AND the turbines should be shut down for a month.
 - First infraction: shut down the turbines for one month;
 - Second infraction: shut down the turbines for two months,
 - Third infraction: shut down the turbines for three months
 - And after 3 infractions: remove the source of the problem.

Dated Newark, Vermont this 27th day of June, 2016.

By: *Noreen Hession*

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