

Dear Botetourt County Board of Supervisors,

I am writing to you from Vermont where I run a small environmental organization that has been working on the issue of wind turbines for the last six years, during which time three large wind projects have been constructed in the state.

1. Sheffield Wind with sixteen 2.5 MW wind turbines operational Nov. 2011
2. Lowell Wind with twenty-one 3 MW wind turbines operational Nov. 2012
3. Georgia Mountain Wind with four 2.5 MW wind turbines operational Dec. 2012

For more than two decades my parents (now deceased) lived happily in Lexington and I enjoyed visiting your beautiful area. When I heard that a wind project was proposed for the area west of Lexington I thought it would be a good exercise to see what was proposed and where. While I have not reviewed all the materials related to the project, I have looked at the project developer's website and reviewed your proposed supplemental regulations http://www.botetourtva.gov/government/documents/p_and_z/June2015_Wind_Website.pdf. Reading the proposed supplemental regulations is what has caused me to write to you today.

In particular, the proposed noise standard on page 6 of 60 decibels at any non-participating property owner's property line is a formula for disaster. I say this from experience. While there are many issues with constructing utility scale wind turbines and they are all magnified in mountainous terrain, by far the most serious issue we have had to deal with post-construction is the "noise" problem. I spend much of my time trying to get relief for neighbors who can not sleep and are sick as a result.

Vermont has a regulatory process for renewable energy that goes through a three-person board at the state level. We have no local control or county government, so all approvals are done after extensive expert witness testimony in a contested case scenario. In approving the three large wind projects that are now operating in Vermont, the regulators have chosen to listen exclusively to experts paid for by the wind industry and have ignored the expert witness testimony provided by towns and neighbors. In particular, Vermont state regulators have agreed to a noise standard of 45 dBA Leq (that means audible decibels averaged over an hour). With that standard, at any given time the noise levels are permitted to be above 45 dBA but cannot exceed that hourly average. I hope you appreciate that Vermont's accepted standard is lower than what you are suggesting be allowed.

The actual experience has been that the 45 dBA Leq standard is not at all protective of public health, and has resulted in widespread complaints around all three big wind projects. I have been accumulating complaints and mapping them, after setting up a website windreporting.org to offer people a place to file complaints. I have also met with neighbors and am in regular contact with people living around all three wind projects. Vermont's regulators have tepidly acknowledged there are problems by opening a Sound Standard Investigation docket, you can see the filings here <http://psb.vermont.gov/docketsandprojects/electric/8167>, which has had no activity since July 2014.

The first thing to learn about wind turbine "noise" is that it is complex and far more problematic than other types of "noise." I put "noise" in quotation marks because the problems are not only what you hear but also what you do not hear. This was articulated by the most credible study done to date, commissioned by a wind developer and done by a credible acoustician who was given complete access to people's homes, where the neighbors kept diaries which the acoustician could coordinate with his readings as he was trying to identify specifically what it was that was causing problems for neighbors. The full report is here: <http://www.pacifichydro.com.au/english/our-communities/communities/cape-bridgewater-acoustic-study-report/?language=en>. What he found is that it is more like a sensation than noise, it is tied to infrasound which is not audible, and what people experience is not only about audible decibels but is also about the pressurization of the air. Think of the wind turbines as giant fans that send out waves of vortexing energy that can go for miles. See the images in this letter which will provide a way to visualize what is happening http://psb.vermont.gov/sites/psb/files/VCE_8167BarometricPressureWaves.pdf.

Another way to look at it is what honest acousticians will tell you and which tracks to the noise standard Massachusetts has had on the books: When audible decibel levels (dBA) exceed 10 dBA above background, complaints are assured. The higher you go above background, the more complaints you will receive. Wind turbines built in the proposed area on North Mountain are likely to be well above 10 dBA above background sound levels. In Vermont we have found that background nighttime noise levels are as low as 20 dBA and no higher than 30 dBA, so when you allow 45 dBA (and higher) you are definitely going above 10 dBA above background. Your proposed standard of 60 decibels is downright frightening. The wind company won't have any trouble complying with that standard, but if you allow that you will need to also prepare to find places for people to live, come up with buy-out programs for people who can no longer live in their homes, and compensate people for the loss of their quality of life and health. You will get complaints.

There are a couple of ways to go about establishing good sound standards for wind turbines. One is to try and address both the audible decibels (which are still a problem as people do get awakened at night just from the audible noise) as well as the infrasound. Denmark, which is widely acknowledged to be leading the way with renewables and especially wind turbines, has a mix of standards which you can read here http://eng.mst.dk/media/mst/66206/engelsk_vindmoellebekendtgørelse.pdf. You will note that none of their standards exceeds 44 dBA. I recently met with a visiting Vermont Law School Fullbright scholar who is a Danish attorney on a panel that hears complaints from neighbors of Danish wind turbines and I asked her if that was an Leq (averaged) standard and she said absolutely not, it is maximum only. The lowest standard they have is 37 dBA and that is for quiet areas of the type that is being considered in your area. The experts I have been consulting with over the years say that to be truly protective of public health, to simplify the issue to make it one standard (rather than trying to accommodate for the infrasound), it should be 35 dBA LMax. That means no higher than 35 dBA, not averaged, but a maximum level. The World Health Organization says that 30 dBA is necessary at night for healthy sleep.

Here is what I can tell you that we have documented and learned:

- pretty much everyone living within a mile is complaining about not being able to sleep, and have had their complaints completely ignored to the point that extreme frustration has set in, and people in that circumstance know they need to leave their homes and do not know what to do
- people living 2 1/2 miles away around all three wind projects have complained about the noise
- the larger the turbines, the further the noise travels. The Lowell wind project has 459 foot tall Vestas v112 3MW turbines which are designed for low wind speeds. The taller turbines with longer blades project the noise/acoustic issues out further. We have documented complaints going out 5 to 6 miles east of the Lowell wind turbines from dairy farmers who cannot sleep at night.
- once the wind turbines are up, there is no solution. Either you can turn them down, turn them off, or take them down. Once up, wind developers will fight fiercely to produce power at maximum output, and will fight any efforts to curtail them so that people can sleep at night.
- government officials and regulators, having no solutions, offer no assistance to neighbors who are left to live in misery, having lost their quality of life and in worst cases, their health
- some people have developed heart conditions. This is a typical story from those type: "I woke up at 2 in the morning having a panic attack, my heart racing, unable to get back to sleep, not sure what is going on." Two of these types sold their home and moved away after being hospitalized and/or having a pacemaker installed plus high blood pressure, none of which had been problems until the wind turbines became operational. One person sold out to the wind company and moved away and all symptoms resolved. Another person simply walked away from his home out of fear for his life because of the cardiac symptoms he was experiencing.
- we do not know the extent of the problems, but we do know that for three years nobody has offered any solutions and the wind developers say that the neighbors are crazy or it's all in their heads, or they simply ignore the complaints.

I would be glad to answer any questions you might have about this technology, its benefits and costs. The wind developers downplay the problems, and in my experience dealing with a lot of different issues over the last 15 years including large farms, quarries and landfills, the wind industry is the least accountable and does not accept responsibility for damages they may cause. While wind turbines kill birds, bats, displace wildlife (I read that they claim that wildlife habitat improved at camps, but it is best to "trust but verify" with this industry), and disrupt watersheds in mountainous terrain, at the end of the day the question you all need to grapple with now is whether you are prepared to turn your backs on the people who live around this area. Are you prepared to see them ridiculed by people making money from the wind turbines while they lose their ability to sleep or enjoy their property outside? Are you prepared to help people relocate? Are you prepared to help find them attorneys to sue the wind company after the fact? Are you prepared to dip into your own pockets to buy a home for people who have no other resources? I can tell you that while I heard in advance these could be problems, I had no idea just how bad it could be and yes, I even dipped into my minimal resources to help a family relocate after three years of being ignored. This story was published on Dec. 28, 2014 (ironically and coincidentally I used money my parents left me to help this family abandon their home, and Dec. 28 was their wedding anniversary): <http://www.vermonttoday.com/apps/pbcs.dll/article?AID=%2F20141228%2FNEWS01%2F712289907%2F-1%2FNEWSPHOTOS>

I wish you well with this topic, which is not as clean or green as it appears. In fact, in my experience the wind industry is an ugly business. Please feel free to ask me questions or inquire about sources of information that are not coming from the

wind industry. It takes very little research to learn that the noise/acoustic problem is occurring all over the world, and it is a big problem.

Annette