

Kingston Wind Independence (KWI)
415 VFW Drive, Rockland, MA
October 22, 2012

To the honorable Kingston Board of Health,

The present letter is a brief executive summary of our investigation to date into sound and flicker complaints filed with your Board regarding the "Independence" wind turbine.

The Independence wind turbine is a 2MW Hyundai model, consisting of an 80m (262.46 feet) tall tower and 3 blades with radial length of 43m (141.06 feet). The total "tip height" of the facility is 403.54 feet when one of the blades is pointing straight up at the 12 o'clock position.

The Independence has the same nameplate capacity (2MW) as each of the nearby No Fossil Fuel turbines (owned by O'Donnell group). However the Independence has a smaller blade size (6 feet smaller).

Sound Levels

Hyundai wind turbines are guaranteed by the manufacturer not to exceed 104dBA in emission value (i.e. the sound emitted right at the wind turbine hub height), which results in a maximum sound level at 400 feet of distance of 50dBA. A 50dBA sound level is equivalent to that of a typical kitchen refrigerator. At a distance of 800 feet, the sound level would not exceed more than 45 dBA under worst-case conditions.

Tech Environmental conducted ambient sound level measurements in the neighborhood for the Town of Kingston in July of 2008, and a detailed sound level study was issued in April of 2010 which examined an equivalent 2MW wind turbine with an 87m rotor.

The attached power point presentation puts the situation into context:

- The normal ambient sound levels at 49 Prospect Street (right next to the Reilly residence) is in the range of 55 to 77 dBA at 1 AM, louder than the sound level of the wind turbine.
- The distance to the Reilly residence is approximately 1,000 feet which is sufficient setback per international IEEE standards to reduce the sound level emitted by the wind turbine and audible at the receptor to below 50dBA.
- The sound level was predicted by Tech Environmental not to exceed the MA DEP L90 level by more than 10 dBA (the study predicted a range of 1 to 7.5 dBA assuming 2 dBA of uncertainty).

Based on a number of observations we have conducted over the past five months we are confident that the Independence wind turbine is operating as guaranteed by the manufacturer and per international and Massachusetts standards for sound.

While we understand that it may be possible for someone to hear the wind turbine outdoors from across route 3, we find it highly implausible that the wind turbine would be heard indoors from anyone's residence.

As a simple test, we ask members of the Board of Health to visit the wind turbine site and listen. Even at 300 feet outdoors the sound level is very mild and masked by other sounds nearby (such as the waste water treatment plant and route 3). Then compare the same sound level from within their vehicles with the windows rolled up. You will notice that you cannot hear the wind turbine at all. At a distance of 1,000 feet the sound level is much fainter and blends into the high ambient sound levels (77 dBA at 1am) that are normal to the neighborhood near the Reilly residence.

In other words, the surrounding area is subjected to loud sounds on a normal regular basis, even at night. This is not surprising since the neighborhood is a mixed residential / industrial area with many sound emitters such as the Waste Water Treatment Plant, the MBTA station, a gravel pit, a large mall, and route 3 one of the busiest highways in the state of Massachusetts.

Nevertheless, due to the complaints filed with your Board, we have voluntarily requested that the Massachusetts Clean Energy Center (MassCEC) commission a post-construction sound study to be conducted by a reputable engineering firm under a scientific protocol. We are confident that the results of the study will show that the Independence complies with Massachusetts law and with international standards for acceptable sound levels.

We ask the Board of Health to consider that it is normal for opponents of wind turbine projects to claim that wind turbines are too loud as a way to prevent the project from proceeding or operating. In nearly all cases across the country where such claims have been presented, it has been found that the claims made by a tiny minority of neighbors were greatly exaggerated.

A review of the scientific and medical literature conducted by the Massachusetts Department of Health / Massachusetts Department of Environmental Protection (MA DPH / DEP) concluded that there is no scientific evidence for claims of adverse health effects from wind turbines ("wind turbine syndrome").

The MA DPH/DEP study concluded that the scientific / medical literature has found "annoyance" in a small number of residents near wind turbines, and that annoyance with wind turbines is largely a result of the person's attitude toward wind turbines. For instance, if the person living near the wind turbine benefits in some financial way from the wind turbine, the reported level of annoyance decreases substantially as in the case of community wind projects conducted in Europe where the neighbors own the wind turbines or receive a benefit such as reduced cost of electricity or lower taxes on their property.

Annoyance is not a valid scientific or medical reason to present a complaint before a Board of Health. There are many things in our environment that annoys us and that reason alone is not sufficient to stop an activity which is beneficial to the community as a whole.

Shadow Flicker

Wind turbine blades rotate at approximately 17 revolutions per minute. When the angle of the sun and wind direction coincide a moving shadow of the wind turbine blades can be reflected off adjacent surfaces and nearby buildings. This is what is known as "shadow flicker" or simply flicker and only occurs under sunny conditions at precise times of the year for any one receptor depending on the receptor's distance to the wind turbine and relative location.

For a receptor on Leland Road (approximately 1,000 feet from the wind turbine) the angle of the Sun has to be at approximately 17 to 19 degrees of altitude and at an azimuth of approximately 235-240

degrees (South West) with the wind blowing from the South West and sunny conditions. These conditions occur for the Leland Road location mostly in October and in April for a brief period of a few weeks.

For the Leland road location this is a transient condition lasting not more than 30 minutes before the shadow moves away from the residence, and totaling not more than 30 hours per year. The sun moves at a rate of 5-10 degrees per hour across the sky. After 30 minutes the sun has moved outside of the visible range where the shadow can reach the receptor on Leland Road.

To put this into context consider that typical conditions in October and April are not more than 50% sunshine (it is cloudy much of the time) and therefore no shadows are cast on about half of the days when it is possible to be at the right combination of altitude and azimuth. On another 30% of the time the wind is either not blowing hard enough for the wind turbine to operate or it is blowing from a different direction (not from the required south westerly direction for the flicker to reach the Leland road location of the Reilly residence). Therefore, 80% of the time flicker would not happen even in the months of October and April, and the rest of the year the angle of the sun is not at the exact altitude or azimuth for flicker to affect nearby residences.

In other words, shadow flicker is a very mild event lasting generally for not more than 30 minutes and a few days of the year, and the rest of the year for a maximum of 4 minutes per day on average.

Shadow flicker is not a health threat: it is simply a moving shadow. It does not rotate at a speed fast enough that can give anyone headaches or other health issues and the shadow moves quickly away from anyone location. If a particular window or location of a residence, which is regularly used by the resident, is affected, the person can move away from this location for a few minutes or put up a window shade. A more permanent solution is to have a tree or shrub of some kind block the shadow.

Conclusions

In conclusion, we respectfully submit to the Board of Health that the sound level of the Independence and shadow flicker effects are of a mild nature and are not a health concern for nearby residences. While we have requested that MassCEC conduct a post-construction sound study, we are confident that the study will find that sound levels are well within compliance with Massachusetts regulations. In terms of shadow flicker, it is a transient condition lasting for not more than 30 minutes per event on a few occasions per year, and is also not a health concern.

Common sense dictates that if the wind turbine is barely audible at 300 feet (and not audible within a car or other vehicle), it would not be audible at 1,000 feet of distance across from route 3. Common sense dictates that if a shadow is cast for only a few minutes during a few times a year, simply waiting until the angle of the sun changes or blocking the shadow with a shade is a simple step to take. Neither the mild sound levels emitted by the wind turbine or a few minutes of flicker qualify as health concerns.

We look forward to answering any additional questions from the Kingston Board of Health.

Sincerely,

Kially Ruiz
Manager
Kingston Wind Independence LLC