

Submitted via email  
July 7, 2015

Lincoln/Lancaster County Planning Department  
555 S. 10th St., Ste. 213  
Lincoln, NE 68508

Dear Steve Henrichsen:

Thank you this opportunity to comment on the draft regulations on Commercial Wind Energy Conversion Systems. And thank you also for giving the public and those of us on the Wind Energy Text Amendment Working Group the benefit of six meetings with knowledgeable speakers and an excellent website identifying authoritative studies on the subjects under consideration.

My comments are largely restricted to proposed Section 13.018 (i) to the County Zoning Regulations, Article 13, Special Permit, about noise regulation and Lincoln-Lancaster County Health Department Recommendations for Noise levels from Commercial Wind Energy Conversion Systems, (called Recommendations here) as posted on the Planning Department's Wind Energy Text Amendment Working Group website. <https://lincoln.ne.gov/city/plan/dev/wind/index.htm>

Following the traditions of the scientific studies we reviewed which were careful to point out the various kinds of biases, I should start by saying a few words about my own. While I think it is the proper role of government to protect public health, I also think it should be done in the least intrusive, least burdensome way. I think it should be based on science that can describe a cause and effect link between the matter regulated and the harm to be avoided. In my view, the possibility of harm is not enough basis to justify regulation.

From listening to the experts at the Working Group meetings and reading the studies on wind noise at the Planning Department website, here are my conclusions.

1. The basis for regulation for noise should be the best science available now.

I agree with the Lincoln-Lancaster County Health Department (called "Health" here) that regulation should be based on the best available scientific information. At the same time, we can acknowledge that the best information we have not is not final or complete. As Health says, there is "considerable uncertainty" in potential health impacts of the kind that may take 20 to 30 years to develop. (Recommendations, p. 2) In the meantime, I think, we should formulate standards, applying our best science to protect public health, but not be so cautious as to stop the wind industry in the county for 20 or 30 years. We can and should move forward, despite incomplete knowledge and some uncertainty.

2. The Health Canada study of November, 2014 is based on objectively measurable health impacts and therefore is far more useful for regulation than any of the other studies.

In Recommendations, Health lists the five studies it considers "the most valuable and scientifically sound." Of the four brought to the working group's attention (the fifth being the WHO study which does not specifically address wind turbine noise), only one, the Health Canada study, offers objectively measurable health outcomes. All the others rely only on self-reports, which are susceptible to selection bias, also called participation bias (who reports) and information bias, also called awareness bias (memory, values, attitude or personality characteristics of the reporter). Health Canada studied 1238 homes near wind farms in Ontario and Prince Edward Island provinces. In addition to asking people about their sleep, health, stress and quality of life, measurements were taken with an actimeter, a wrist-worn activity monitor of sleep, cortisol levels in hair (for stress), and blood pressure and heart rate using standardized procedures.

3. Health Canada found the occurrence of all health factors studied did not change in relation to wind turbine noise levels.

Self reports of sleep disturbance, illnesses (dizziness, tinnitus, migraines and headaches, heart disease, high blood pressure, diabetes), perceived stress and quality of life were not found to be associated with wind turbine noise. Even more important, no statistically significant association was found between hair cortisol levels or higher blood pressure levels and wind turbine noise exposure. Similarly, wind turbine noise levels near the participants' home were not found to be associated with sleep efficiency, the rate of awakenings, duration of awakenings total sleep time, or how long it took to fall asleep. (Recommendations, pp. 20, 23, 24,)

4. The Health Canada study gives us assurance that noise regulation of wind turbines in the two Provinces of Canada studied offer protection of the public health, as best as is known at the present time.

The Health Canada Study was conducted in the provinces of Ontario and Prince Edward Island. In Ontario, sound level (in dBA or decibels) at homes is measured by increments of wind speed at 10 meters height rather than with a single level as is proposed here. Turbine noise increases with wind speed, as do the Ontario regulations' limits. The values range from 40.0 dBA to 51.0 dBA in rural areas, and 45dBA to 52.0 dBA in urban areas. <http://www.ontario.ca/document/noise-guidelines-wind-farms-interpretation-applying-moecc-npc-publications-wind-power-generation> Describing Ontario's rules, an international survey said "These sound levels vary with the time of day and variances in existing sounds such as the speed of wind. In a rural area, sound level limits from wind turbines range from 40 to 51 db(A) at wind speeds of 4 to 10 meters per second (13 to 32 feet per second), respectively." [http://mn.gov/commerce/energyfacilities/documents/International\\_Review\\_of\\_Wind\\_Policies\\_and\\_Recommendations.pdf](http://mn.gov/commerce/energyfacilities/documents/International_Review_of_Wind_Policies_and_Recommendations.pdf) page 13.

For Prince Edward Island, the international survey quoted immediately above and a 2013 Noise Impact Assessment by a wind contractor

[http://www.gov.pe.ca/photos/original/elj\\_hc\\_appendd.pdf](http://www.gov.pe.ca/photos/original/elj_hc_appendd.pdf) were the only two sources located. Both report that there are no noise standard requirements on Prince Edward Island. The Noise Impact Assessment says: "Allowable Noise Limits: Currently there is no provincially or federally regulated noise limit for wind farms on Prince Edward Island. A noise limit of 45 dB(A) is a commonly used guideline for this jurisdiction." [http://www.gov.pe.ca/photos/original/elj\\_hc\\_appendd.pdf](http://www.gov.pe.ca/photos/original/elj_hc_appendd.pdf)

The World Health Organization "identifies an annual outdoor night time average of 40 dBA as the level below which no health effects associated with sleep disturbance are expected to occur even among the most vulnerable people" (Recommendations p. 25). The 45 dBA limit may not be at odds with the Prince Edward Island guideline since the WHO recommendation is provided as an annual outdoor night time average, not a noise ceiling. The WHO study is a general one about noise, not specifically about wind noise.

If the 45 dBA guideline in Prince Edward Island can be confirmed with authorities there as their general practice, I believe Lancaster County should adopt 45 dBA as the regulatory standard. Doing so would provide the county with the most thorough and current research and documentation of its safety in the Health Canada study to support the ordinance were it ever challenged in court. Alternately, adapting the Ontario regulations could serve the same purpose.

##### 5. The County should not regulate for annoyance.

Two of the three experts on sound the working group heard on April 16th referred to the quality of annoyance as "subjective." One said the degree of annoyance depends in part on the level of sound itself, but also on the listener's opinions about the source of the sound, one's ability to control the source of the sound, (think parents with a screaming baby), and many others factors. Health Canada found there to be a statistically significant relationship between increasing wind turbine noise levels and the prevalence of reports of high annoyance. "These associations were found with annoyance due to noise, vibrations, blinking lights, shadow and visual impacts from wind turbines." (Recommendations p. 22) Health Canada also learned that "[a]nnoyance was significantly lower among the 110 participants who received personal benefit, which could include rent, payments or other indirect benefits of having wind turbines in the area, e.g., community improvements. However, there were other factors that were found to be more strongly associated with annoyance, such as the visual appearance, concern for physical safety due to the presence of wind turbines and reporting to be sensitive to noise in general." (Recommendations, p. 23)

An analysis of past wind turbine noise studies published in Nov. 2014 concluded that the factors of "attitudes toward wind turbines, the visual aspect of the turbines, and whether they obtain economic benefits from the turbines" play "a more significant role than noise from wind turbines in people's

reporting

annoyance." [http://journals.lww.com/joem/Fulltext/2014/11000/Wind\\_Turbines\\_and\\_Health\\_A\\_Critical\\_Review\\_of\\_the.9.aspx](http://journals.lww.com/joem/Fulltext/2014/11000/Wind_Turbines_and_Health_A_Critical_Review_of_the.9.aspx) p. 126

The same study points out that findings of annoyance related to wind turbine noise "have been associated with other mediating factors (including personality and attitudinal characteristics), reverse causation (ie, disturbed sleep or the presence of a headache increase the perception of and association with wind turbine noise) and personal incentives (whether economic benefit is available for living near the turbines)."

[http://journals.lww.com/joem/Fulltext/2014/11000/Wind\\_Turbines\\_and\\_Health\\_A\\_Critical\\_Review\\_of\\_the.9.aspx](http://journals.lww.com/joem/Fulltext/2014/11000/Wind_Turbines_and_Health_A_Critical_Review_of_the.9.aspx) p. 125

Apportioning factors affecting perception of sound like attitudes toward the wind industry and aspects of wind turbines, like their appearance and their sound, would appear to be a difficult challenge.

The connection between annoyance -- which are, necessarily, all self reports--and conditions that are indisputably measurable health effects like blood pressure are tentative--too tentative, I believe, to call for regulation. Here is the strongest statement Health Canada makes about wind turbine noise, annoyance and health: "Although Health Canada has no way of knowing whether these conditions may have either pre-dated and/or are possibly exacerbated by exposure to wind turbines, the findings support a potential link between long term high annoyance and health." (Recommendations, p. 23)

Should "a potential link" be a basis for regulation? I'd say not. It's simply too weak, too far from a cause-and-effect link. Also, if we were to apply the same standard--regulating for a potential link to health effects and regulating for annoyance, we would have to greatly expand the Noises Ordinance, assuming we wanted to achieve equitable treatment for all industries and sound sources as to their effects on public health. There are a lot of "potential links" out there.

6. The County should require a pre-construction noise study as proposed in the June 8, 2015 draft of the regs for 13.018, Commercial Wind Energy Conversion System.

As the Expert Panel on Wind Turbine Noise and Human Health said: "Equity and fairness have been crucial for the acceptance of wind turbines in many communities, with perceived loss of social justice and disempowerment being significant barriers to acceptance in some cases. One important regulatory approach is to conduct a noise impact assessment of any proposed project. ."  
." (Recommendations, p. 17)

I look forward to seeing your response to public comments on the proposed rules.

Marilyn McNabb  
1701 W. Rose St.  
Lincoln NE 68522