

March 15, 2018

Daniel Wolf
Executive Secretary
MN Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

Re: In the Matter of the Application of Freeborn Wind Energy LLC for a Large Wind Energy Conversion System Site Permit for the 84 Megawatt Freeborn Wind Farm in Freeborn County
PUC Docket No. IP-6946/WS-17-410
OAH Docket No. 80-2500-34633

Dear Mr. Wolf,

I want the MPUC and the ALJ to pay particular attention to a letter from the Minnesota Department of Health (MDH) to Invenergy's representative Dan Litchfield (Document ID: 20176-132804-03; pages 59-61). Human health impacts of wind turbines is specifically listed as a key issue of concern by the MPUC in this comment period and is a material issue in the contested case hearing. In this May 2, 2017 letter (attached), MDH Assistant Commissioner, Dr. Paul Allwood, made specific recommendations that Freeborn Wind has apparently ignored. The MPUC stated in public hearing that it follows the recommendations of its "sister agencies – MDH and the Pollution Control Agency". I recommend that Freeborn Wind be required by the MPUC to follow each and every MDH recommendation in detail.

I find MDH's second to last recommendation to be particularly important:

- *Recognizing that it is unknown whether reported health impacts are direct health effects or indirect stress impacts from annoyance and/or lack of sleep resulting from turbine noise or shadow flicker, potential health impacts from wind turbine projects should be acknowledged, and provision should be made to mitigate these effects for residents within and near proposed project areas.*

What does Dr. Allwood say in this one recommendation?

1. The reported health impacts are a result of turbines. The only unknown is whether the impacts are direct health effects or indirect stress impacts.
2. Wind turbines cause lack of sleep.
3. The "potential health impacts from wind turbine projects should be acknowledged".
4. Provision should be made to mitigate these effects for residents within and near proposed project areas

In the Freeborn Wind site application, Freeborn Wind never mentions this MDH letter. In testimony on the contested case, Freeborn's consultants mentioned a few out-of-context quotes from MDH's 2009 Public Health Impacts of Wind Turbines and previous MDH letters from other MPUC dockets. I see no evidence that Freeborn Wind has made any attempt to address MDH's comments or recommendations specific to the Freeborn Wind project.

The wind industry wants to set very high bar for citizens to directly prove medical causation. It was not necessary for individuals to prove direct medical causation before public policy restricted smoking in public places – the associated health effects of tobacco smoke are well known. Also, “causation” is not the standard for administrative decisions, such as MPUC wind siting. “Association” is the standard; and association between wind turbines and negative human health effects is clear, consistent and world-wide.

Dr. Mariana Alves-Pereira of Lusofona University, Portugal provided expert testimony during the October 19, 2017 MN Legislative Energy Commission (LEC) hearing on wind turbine noise and health. Dr. Alves-Pereira testified that the same health symptoms are consistently reported by people in nearly every country who live near wind turbines. She said that for these symptoms to not be caused by wind turbines would require that you believe this is a “collective hallucination” occurring around the world. Dr. Alves-Pereira refers to wind turbine produced low frequency noise as an “agent of disease.” Dr. Alves-Pereira provided testimony about her published research including both non-invasive and more invasive medical tests that show consistent results in people exposed to both occupational and environmental noise pressure waves from various industries, including wind turbines. The audio can be heard at the LEC website: <https://www.leg.mn/meetings201718.html>

At the same LEC hearing and in Freeborn Wind (DOC ID 20183-140988-01), acoustician Robert Rand explains that the ONLY mitigation for wind turbine noise is sufficient distance from homes.

Two of Freeborn Wind’s contested case consultants, Dr. Mark Roberts and Michael Hankard, were also brought in by the wind industry to provide testimony to the LEC. MN Senator Andrew Mathews succinctly summarized Robert’s and Hankard’s testimony to the LEC. Senator Mathews facetiously asks, ‘Are you saying that if these people just changed their attitude and would have a more positive perspective of turbines, they would start having a better night's sleep?’ I observe that Senator Mathews’ assessment appears consistent with Robert’s and Hankard’s testimony to the ALJ during the Freeborn Wind contested case.

Also, in his direct testimony in the contested case hearing, it appears that Dr. Roberts tries to convince the MPUC and the ALJ that he is right and the MDH is wrong. His statements seem to be very carefully crafted to mislead. I will provide several examples from Dr. Robert’s direct testimony:

1. Dr. Robert’s talks about the scientific method which involves “...developing a hypothesis, testing that hypothesis, publishing the results and having others attempt to repeat the research...”

Dr. Roberts provides precisely zero data and zero examples of medical examination, testing or evaluation of individuals living in wind project at their own homes and properties. In addition, I can find no evidence or testimony that Dr. Roberts has ever attempted to examine or medically evaluate humans in the vicinity of operating industrial scale wind turbines. For the scientific method to work, I presume someone would actually have to engage in the scientific method – Dr. Roberts does not appear to have done so.

2. Dr. Roberts stated, “The published literature has shown some association between wind turbine noise emissions and annoyance. ...Annoyance is at times associated with various symptoms [but] it is not a disease. Instead, those varied symptoms represent a normal physiological response.”

Roberts appears to be acknowledging that the reported symptoms are a direct physiological response to wind turbine annoyance. Even if this is not a proof of direct medical causation, Roberts is admitting that the symptoms people report are a direct result of the wind turbine operations.

Dr. Roberts cites the World Health Organization (WHO), but fails to state that the State of MN audible noise standard (M.S. 7030) allowing 50 dBA is many times higher than the recommended 35 dBA limit and the 40 dBA absolute limit set by the WHO for night-time noise that does not disturb sleep.

Roberts admitted that “noise-related annoyance” is a “health effect related to exposure to noise from wind turbines....” Then he says that there is no association between wind turbines and health effects that has been scientifically shown and that there are no potential adverse health effects from the sound of wind turbines. While annoyance and sleep deprivation may not be diseases, I know of no-one who believes these are beneficial for anyone’s health.

The well-known and well-documented negative health impacts of turbines are the most frequently raised, and I believe, the most serious and contentious issue facing the MPUC at both proposed and built industrial wind projects. Instead of “[acknowledging] the health impacts from wind turbine projects” as recommended by MDH, Freeborn Wind is attempting to convince the MPUC and the ALJ that none exist. Again, the May 2, 2017 MDH letter stated that the reported health impacts are a result of turbines - the unknown is whether the impacts are direct health effects or indirect stress impacts. The MDH letter states that wind turbines are known to cause lack of sleep.

Freeborn Wind seems determined to convince the ALJ and the MPUC that it is just fine to issue a wind site permit that everyone knows will cause sleep deprivation – because is it not a “disease”. Sleep deprivation is widely recognized as a form of torture. I oppose torture.

I recommend the MPUC make the May 2, 2017 MDH recommendations conditions of the Freeborn Wind site permit. I recommend that the MPUC not issue a site permit that it knows will torture people through sleep deprivation.

Thank you.

Kristi Rosenquist
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Attachment: MDH letter 5-2-2017



Minnesota
Department
of Health

PROTECTING, MAINTAINING & IMPROVING THE HEALTH OF ALL MINNESOTANS

May 2nd, 2017

Dan Litchfield
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RE: Request for Comments on Freeborn Wind Farm in Freeborn County, Minnesota

Dear Mr. Litchfield,

Thank you for providing the Minnesota Department of Health (MDH) with the opportunity to comment on the Minnesota portion of the Freeborn Wind Farm project in Freeborn County, Minnesota. The mission of MDH is to protect, maintain, and improve the health of all Minnesotans. The careful planning and development of projects such as this one supports this mission and is an important step in ensuring health in all policies.

Wind turbine noise and shadow flicker effect are the two areas related to wind turbines that generally receive the most complaints. MDH reviewed available data on the generation and propagation of turbine noise; the potential for exposure to shadow flicker from wind turbines; and studies of health impacts from exposures to wind turbine noise. Findings are discussed in detail in the 2009 report, *Public Health Impacts of Wind Turbines*.

(<http://www.health.state.mn.us/divs/eh/hazardous/topics/windturbines.pdf>)

From MDH's 2009 report *Public Health Impacts of Wind Turbines*, complaints about wind turbine noise appear to rise with increasing noise levels above 35 dB(A) when measured outdoors. Sleeplessness and headache are common health complaints and complaints in general are more likely when turbines are visible or when shadow flicker occurs. Most available evidence suggests that reported health effects are related to audible low frequency noise.

Wind turbines generate a broad spectrum of low intensity noise. At typical setback distances higher frequency (or higher pitch) noises may be muted. Walls and windows of homes decrease the loudness of high frequencies, but the effect on low frequencies is more limited. Low frequency noise has been identified as a potential wind turbine issue that may affect some people indoors, especially at night.

Regulations regarding placement of wind turbines are intended to assure that Minnesota Pollution Control Agency (MPCA) noise guidelines are not exceeded. The MPCA nighttime standard for noise intensity of 50 dB(A), not to be exceeded more than 50% of the time in a given hour, appears to underestimate how much low frequency noise can enter into dwellings. Prior to site development, MDH recommends that low frequency noise and total noise from turbines be evaluated.

Unlike low frequency noise, shadow flicker can affect individuals outdoors as well as indoors. Shadow flicker is a potential issue in the mornings and evenings, generally within 0.6 miles (1km) of a source. Annoyance, or concern about the potential for other impacts from shadow flicker, can be eliminated by placement of wind turbines outside of the path of the sun as viewed from areas of concern, or by appropriate setbacks.

Potential exposures to shadow flicker and noise are at their highest closer to wind turbines. As the distance from a wind turbine increases, reported complaints and health effects generally decrease. This suggests that the use of appropriate setback distances of homes from wind turbines can minimize or eliminate health complaints. In addition, placing wind turbines in areas where wind shear is minimal and aerodynamic noise is minimized can likely reduce the potential for health complaints.

Again, a more in depth discussion of the above concepts and conclusions can be found in the MDH 2009 report *Public Health Impacts of Wind Turbines* (linked above). MDH encourages you to reference this report when considering the potential health impacts that could be associated with this wind farm project as you move forward with your development plans.

MDH is also following a study being conducted at the University of Minnesota, the Minnesota Study on Wind Turbine Acoustics (<http://mnsowta.saf1.umn.edu/>). The study is intended to evaluate the source and characteristics of wind turbine sound, develop techniques for measuring wind turbine noise, and to better understand the human response to wind turbine generated sound. The study is expected to be completed in 2018.

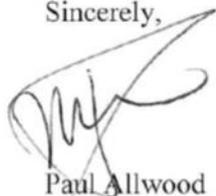
Recommendations:

- Prior to development, low frequency noise and total noise from turbines should be evaluated by qualified acoustical engineers to determine measurable noise components from wind turbines that engender complaints and to assess noise impacts from proposed wind farms.
- Wind turbine noise estimates should include cumulative impacts (40-50 dB(A) isopleths) of all wind turbines.

- Isopleths for dB(C) – dB(A) greater than 10 dB should be determined to evaluate the low frequency noise component.
- The impacts of aerodynamic modulation noise and shadow flicker should be modeled and evaluated.
- Evaluations of turbine noise generation and shadow flicker should be incorporated into decisions when determining the appropriate setback distances of homes from wind turbines.
- Any noise criteria beyond current state standards used for placement of wind turbines should reflect priorities and attitudes of the community.
- Recognizing that it is unknown whether reported health impacts are direct health effects or indirect stress impacts from annoyance and/or lack of sleep resulting from turbine noise or shadow flicker, potential health impacts from wind turbine projects should be acknowledged, and provision should be made to mitigate these effects for residents within and near proposed project areas.
- The project should be designed so that exposure to residents is minimized and inclusion of all potentially impacted residents as compensated participants should be considered.

Health starts where we live, learn, work, and play. To create and maintain healthy Minnesota communities, we have to think in terms of health in all policies. Thank you again for the opportunity to provide comments on the Freeborn Wind Farm project in Freeborn County. Please feel free to contact me at (651) 201-5711 or Paul.Allwood@state.mn.us if you have any questions regarding this letter.

Sincerely,



Paul Allwood
Assistant Commissioner
Minnesota Department of Health
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Saint Paul, MN 55164-0975

cc: James Kelly, MDH Environmental Surveillance and Assessment Manager
Sue Yost, Freeborn County Public Health Director