

WCO | WIND CONCERNS ONTARIO

February 25, 2017

Editor, Sound and Vibrations:

Re: "Health Effects from Wind Turbine Low Frequency Noise & Infrasound," January 2017

We are writing in response to the article "Health Effects from Wind Turbine Low Frequency Noise and Infrasound" (January 2017 *Sound and Vibration*). The article has value as it documents the somewhat conflicting positions of four acousticians on wind turbine noise. Notably absent from the list of authors, however, is the medical expertise qualified to comment on human health, as promised by the title. Our concern is that the article falls short as it puts forward several positions that are not supported by evidence from people affected by wind turbine noise emissions; it also fails to include current directions of research on the rapidly changing understanding of wind turbine noise.

Founded in 2008, Wind Concerns Ontario (WCO) is a coalition of 20 community groups and hundreds of individual and family members who are concerned about wind turbines in their communities across the Province of Ontario in Canada. The membership is a grassroots network that gives WCO a unique and evolving perspective on the impact of wind turbines on communities in Ontario. In addition to its membership, WCO also draws on input from a wider group of academics and technical specialists, including some international experts, who are also concerned about the effects of wind turbine projects.

Based on the reports of the impact of wind turbines on the people living among the many Ontario projects, we know that the emissions from wind turbines are challenging existing methodologies and analysis paradigms used by acousticians. The range of sound pressure waves emitted by wind turbines are multi-dimensional; a full understanding of the issue can come only from acousticians who are willing to move outside of existing procedures and investigate complaints without preconceived notions of answers when working on the topic. It is not clear that the authors of the article were willing to do this.

While stating erroneously that opinions on health impacts are "at an impasse" (this is false; true scientific investigation never ends), the authors do agree that more investigation of wind turbine noise is necessary. WCO supports this position, too, but our experience indicates that the methodology of further studies needs to reflect the following key issues if it is to be meaningful in our continuing journey of discovery.

1. **Assume people's complaints are valid** – The starting point for any investigation of this problem is with the issues being raised by residents living among turbines. The suggestion by Geoff Leventhall in the article that people are imagining these sounds is not only not credible – people do not abandon homes that they cannot sell because of imaginary noise – but also insulting to people who are suffering from wind turbine emissions. It is also contrary to very basic scientific investigation procedures, and is further demonstration of the lack of medical expertise in this

group of authors. Sir Austin Bradford Hill, the pioneering epidemiologist who developed the concept of randomized clinical trials for public health investigation, believed that if you have reports of a health problem but your research does not reveal a cause and effect, *you do not give up* --- you keep looking. The work by Steven Cooper at Cape Bridgewater, Australia provides a useful methodology for future studies. It starts with complaints and develops a structured severity index that quantifies residents' concerns so that they can be compared with actual turbine operations.

2. **Inaudible Noise Can Cause Problems** – The focus on audible noise runs counter to the nature of the complaints documented by Ontario's Ministry of Environment and Climate Change since 2006. The theme of "I could not hear anything but felt a pulsing vibration in my body" is common throughout reported complaints. The Ministry's response that the project was operating within *audible* noise standards does not address the concerns of the original complaint. Even some Ministry staff noted the disconnect between their standards and the evident problems in people's homes in their internal reporting. The article in question, however, focuses on noises that can be heard, as well as dB(A) measures that replicate human hearing. As a result, it furthers erroneous assumptions that are not supported by real-world experiences. The focus of any investigation of turbine noise needs to be on the source of "pulsing vibrations," whether or not they are audible.

Including inaudible noise in the analysis is also supported by testing underway to develop noise cancellation equipment to offset the inaudible sound pressure waves present in homes.

Occupants of homes participating in the trials are reporting that while not solving the problem completely, the equipment does provide some relief from the symptoms linked to wind turbine noise. People are also aware of when the equipment needs to be reset because of the sensations they are feeling, not by a change in audible noise levels or by visually monitoring the operations of nearby wind turbines.

3. **Assess Noise Inside Affected Homes** – Common complaints also indicate that situation is worse *inside* homes rather than outside. While the article briefly mentions testing inside homes, the current focus on testing outside of homes ignores the different transmission characteristics of various frequencies and the potential for noise to be amplified inside homes of various construction types and not others. This suggests that the core of any research and standards needs to be focused on noise levels inside homes. Any investigation needs to include measurements, preferably synchronized, inside and outside of homes to provide a full understanding of the variation in responses to the same level of wind turbine noise.
4. **Full Spectrum of Noise Emissions** – Depending on the biases of the author in the article, various aspects of wind turbine noise are proposed for assessment. Work done by municipalities and community groups in Ontario confirms that wind turbine noise is complex and the full range of noise emissions need to be assessed to provide the complete answer to the problem. Picking one aspect of wind turbine noise and then rejecting complaints as invalid when they are not linked to that aspect is not an acceptable research methodology. Any investigation needs to start with the complaints and then compare them to the full range of noise emissions. For this reason, WCO must be sceptical of any study that proposes to save money by replicating wind turbine noise conditions and conducting testing in a laboratory setting. At this stage, there

is not a sufficient understanding of wind turbine noise emissions to ensure that the replicated noise aligns with actual field experiences.

5. **Full Range of Noise Assessment Techniques** – Many acousticians seem to have a favourite method which they promote as the single, best tool to measuring wind turbine noise. Wind turbine noise is different and just as the full spectrum of noise needs to be assessed; all measurement techniques for the noise also need to be assessed in studies going forward. The goal is to let the science identify the best match between noise assessments and complaints. The “pulsing” nature of the sound that is the subject of many complaints suggests caution about using standard measurement techniques, like dB(A), that average noise over periods. Testing in Ontario suggests a focus on measurements of maximum and minimum levels within short periods would be more promising.
6. **Extended Study Periods Needed**– Although costly and difficult, noise data need to be captured and assessed over extended periods of at least a month per home to capture the full range of wind conditions and operating procedures. The article, however, proposes investigating specific turbine operating conditions; this again risks missing the real cause of the complaints. The Ontario experience suggests that quick assessments of noise rarely replicate the actual conditions that created the complaint. Similar to the approach used in Cooper’s Cape Bridgewater study, the complaints need to be evaluated against the specific noise conditions present at the time of the complaint.

WCO is working with Ontario’s Huron County Health Unit, the University of Waterloo and with an experienced wind turbine noise measurement technician to implement a study that is compliant with these standards. It will be a follow-up to the Health Unit’s investigation of wind turbine noise complaints, to be launched shortly. The investigation phase will have potential for leaseholder participation in the study as a separate segment within the wider study population which will address one of the opportunities mentioned in the article. Their role in the noise testing phase is to be determined.

It is clear that wind turbine noise is presenting real challenges for acousticians. Some have provided advice to governments resulting in regulations that do not respond to the complaints of people living with turbines. These real-life experiences, supported by Cooper’s work at Cape Bridgewater, have discredited dB(A) measures. The article’s continued focus on a measure with all of its identified shortcomings is very concerning.

All stakeholders involved with wind turbines will benefit from an improved understanding of these noise emissions. Denial of problems may work for a short period but over the long run, new governments will be elected and as they are not responsible for past mistakes, they can take a fresh look at the science. Communities affected by wind turbines have demonstrated a large capability to raise financial and volunteer resources to challenge wind turbine projects. This will continue as the focus shifts to generating credible research into wind turbine noise emissions, as governments and industry fail to respond appropriately.

This work will change the legal environment in which wind power projects operate. The future may mean a financial environment with greater risk for investors interested in a quick or long-term payback from improperly sited wind turbine projects.

To maintain credibility, acousticians and journals associated with the profession need to adjust to the rapidly changing understanding of wind turbine noise. The continued reliance on dB(A) measures, as suggested in this article for example, is no longer seen as a credible means to provide expert advice on the issue of wind turbine noise.

Respectfully submitted

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