WCO | WIND CONCERNS ONTARIO

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Ottawa, Ontario Canada

To the members of the panel developing the WHO Environmental Noise Guidelines for the European Region

The purpose of this letter is to provide input from Wind Concerns Ontario on the review of World Health Organization's (WHO's) noise standards that is currently underway. Wind Concerns Ontario (WCO) is the citizens' advocacy coalition of grassroots community organizations and individuals that formed in response to the development of large industrial-scale wind turbine projects across rural Ontario, Canada. Our members and activities provide a unique experience and information that should be informative for the WHO as it establishes noise standards for the wind turbine noise emissions going forward.

The Province of Ontario in Canada based its noise regulations for wind turbines on the WHO standard for road, rail and airport noise in urban areas. The 40 dBA noise limit in this standard was applied to wind turbines even though almost all of the wind turbine locations were in rural areas with lower ambient noise levels. As the standard has been applied in Ontario, no adjustments were made to the base noise levels for the rural locations or the cyclical nature of wind turbine noise. No consideration is given to the low frequency noise and infrasound that wind turbines are emitting. The result has been a fixed standard separation of 550 metres between residential buildings and wind turbines.

All of the approvals for wind turbines were based on *predictions* of noise levels that will be experienced by "receptors," based on noise modelling. Again, the noise models used were designed for static industrial noise sources, not the complex noise emissions from wind turbines. And again, no allowance is made for estimation errors in these models that are normal practice in other statistical analyses where a confidence interval is applied to the actual output from the model.

The experiences in Ontario indicate that this approach is *not sufficient* to protect the health of residents living among the wind turbines.

The Ontario Ministry of the Environment and Climate Change (MOECC) has a very structured process to track complaints about wind turbine noise. In 2015, the MOECC advised us that it had received more than 2,700 complaints about wind turbine noise to the end of 2014. Reports from WCO contacts in areas where new projects are starting operations suggest that this number will have grown considerably since that data was provided. No information has been made available either at the local level or centrally about steps that have been taken to follow up on these complaints. Reports from the local

communities confirm that the noise emissions from wind turbines are forcing people from their homes. This decision is not taken lightly as in many cases the individuals cannot sell the home and are forced to find alternate accommodation for themselves and their families.

The health complaints from the residents living among wind turbines align with the same symptoms reported by individuals exposed to wind turbine noise in other communities. These include self-reported illnesses (e.g., dizziness, tinnitus, frequent migraines) and chronic health conditions (e.g., heart disease, high blood pressure and diabetes). Noise levels sufficient to disrupt sleep are also important as they can lead to a large range of health effects.

Of greater concern are the pulsing sensations reported by people within their homes. In project after project, the problems are so severe that people are being forced from their homes by these pulsing sensations. In some cases, people are being advised by physicians to leave their home to protect their health and/or the health of their family, including children. In most cases, the residents are not complaining about audible noise, but rather vibrations or pulsing sensations that appear to be associated with infrasound and low frequency noise emissions coming from the wind turbines.

Some community groups and /or municipalities have initiated independent testing noise emissions from the turbines. Their findings confirm that the regulatory process in Ontario is not working. The models used in the regulatory process to predict turbine audible noise are not accurately predicting the actual levels of noise experienced by nearby residents. Many factors not considered by these models, such as topography, buildings reflecting the sound, etc., are seen as contributing factors. In addition, testing in problem homes has shown the presence of elevated levels of infrasound at frequencies that match the frequency of turbine blades passing the turbine tower. These infrasound emissions are absorbed by the walls of the homes and in some cases; they are actually amplified by the shapes of the enclosed spaces.

The following points are based on the learning from the Ontario experience:

- Application of the WHO Night Time Noise Standard to wind turbines is not appropriate.
- Limiting exposure to audible noise above 40 dBA is not sufficient to protect health
- Standards for low frequency noise and infrasound noise emissions from wind turbines, using appropriate measures, are required.
- The current models used to estimate noise emissions are not accurately predicting the actual noise emissions produced by wind turbines. Different and more complex models are required but these need to be validated with real life experience before they are certified for use in regulatory processes.

While the stated goal is for the WHO to develop noise guidelines for Europe, the committee should be aware that policy-makers in other jurisdictions will adapt from the revised guidelines, and it will be critical to protect health if experiences from the world are considered.

Respectfully submitted,

Jane Wilson

President

Wind Concerns Ontario

President @windconcernsontario.ca

BACKGROUNDER: Recent Health Studies of Wind Turbine Noise

Health Canada – The Canadian federal government conducted a study of wind turbine noise from 2012 to 2014. The findings released in November 2014 reported two contradictory findings – first, there are no health effects linked to wind turbines and yes, there are health effects related to wind turbines. The design of this study was criticized by epidemiologists and health professionals before the project began. (The study was not designed to find a causal link; to now claim, as Health Canada does, that there is no causal link is disingenuous.) A review of the survey instrument design after the project revealed that the finding of "no problems" was based on questioning respondents about a narrowly-defined timeframe — in other words, participants were questioned about symptoms and events during a time when wind in Ontario is low and turbine noise emissions would be less. Responses to other questions that covered the whole year showed that problems existed. This second result was confirmed when physical samples from the people reporting complaints showed the physical indicators of stress.

Data specifically provided to Wind Concerns Ontario by **Dr. David Michaud** and other members of the Health Canada study team indicate some results that are relevant to your assessment of wind turbine noise standards.

- Respondents to this study reported that wind turbine noise was worse than the road, rail and airport noise that formed the basis of the WHO's night-time noise standards that provide the basis for the Ontario regulations.
- Problems with noise begin at residents estimated to be exposed to audible noise levels of 35 dBA**.**
- Annoyance with wind turbine noise emissions in Ontario was found 1-2 km from wind turbines with the percentage of "extremely annoyed" was 16.5% at 550 metres to 1 km, and 25% at 550 metres. (Annoyance in this context is a medical term that denotes stress or distress.)

Council of Canadian Academies – This early 2015 review initiated by Health Canada found that dBA measures were not appropriate for assessing the noise emissions from wind turbines. They also found there is sufficient evidence of a causal relationship between exposure to wind turbine noise and annoyance, which is a serious medical condition that can lead to a broad range of health effects. The Council also noted significant research gaps, and that vulnerable populations such as the elderly, children, and groups who are hypersensitive to noise (e.g., people with autism) had not been considered at all.

Cape Bridgewater - The Health Canada study was never designed to find a link between wind turbines and health issues, but this situation is being addressed by some actual studies of problems reported in specific wind projects. A study of the Cape Bridgewater Wind project in

Australia, published in the Journal of the Acoustical Society of America (January 2016), is an example of these new studies. It was financed by a wind power producer trying to understand ongoing community complaints about their project. To address these complaints, the study asked residents to track the specific times when their symptoms occurred, lessened and grew worse. Discussions with the residents indicated that the issue was not audible noise but rather the physical pulsing *sensations* in their bodies generally associated with low frequency noise and infrasound. The research design was adjusted in response to this feedback. The finding should be instructive for the WHO in developing the noise standards.

- Testing of actual noise emissions indicated that noise modelling, similar those used in Ontario's turbine project approval process, did not reflect the reality experienced by the residents living among the turbines.
- The study reports that resident complaints in this project could not be linked to audible noise generated by the wind turbines.
- Infrasound pressure waves matching turbine blade pass frequency were present in their homes.
- When the resident observations were matched against the operating records for the wind turbines, the residents' complaints were inked to specific changes in wind speeds and turbine operations.

Both the experience with Ontario's attempt to apply the WHO night time noise standard for road, rail and airport noise to wind turbines as well as the recent health research cited above confirm that need for a separate noise standard for wind turbine noise emissions. The key characteristics of this standard should include:

- The standard needs to cover the full range of noise emissions from wind turbines including audible, low frequency and infrasound noise. Separate levels using appropriate measures for each type of noise should be part of the standard.
- Levels both inside and outside of homes need to be established.
- Penalties for the cyclical nature of wind turbine noise needed to be part of the standard.
- As most turbines are installed in rural areas, the standard for audible noise needs reflect the lower level of ambient noise in these areas. The 35 dBA level reported from the Health Canada study confirms this need.
- More robust models are needed to predict wind turbine noise that reflect the full range of noise emissions, include additional parameters for the specific site conditions and consider noise emission levels both inside and outside of homes.
- Consideration in the standard also needs to be given to people particularly sensitive to noise including seniors, children and for people who are hypersensitive to noise such as

those with autism. These are needed when siting wind turbines close to residential facilities for senior citizens, schools and other facilities for special needs children.